



Department of Information Technology
Ministry of Communications & Information Technology
Government of India

ELCOMOS REPORT

Electronic Components, Hardware Market Manufacturing Output Study Including related Assemblies & Value Chain in India



Research Partner



Prepared By

ELCINA

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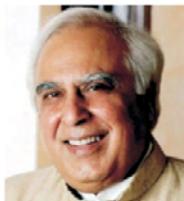
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कपिल सिबल
KAPIL SIBAL



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MESSAGE

I am happy to note that Department of Information Technology has, along with ELCINA, conducted a study on Electronics Components and related assemblies for various electronic hardware products in the country. Electronic components being the basic building blocks for manufacturing of electronic products, the Government considers it extremely important that this segment needs to develop so that the vision of making India a global destination in electronic hardware manufacturing can be realized.

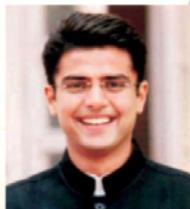
I am confident that electronics component industry with Government support will be able to meet the challenges and provide the necessary support for development of this sector. This study will contribute significantly for assessing the gaps and taking necessary action as required.

I congratulate the Department of Information Technology and ELCINA for compiling this report.

A handwritten signature in black ink, appearing to read "Kapil Sibal".

(KAPIL SIBAL)

सचिन पायलट
SACHIN PILOT



संचार एवं सूचना प्रौद्योगिकी राज्य मंत्री

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MINISTER OF STATE FOR
COMMUNICATIONS & INFORMATION TECHNOLOGY
GOVERNMENT OF INDIA
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MESSAGE

I am extremely happy to learn about the release of ELCOMOS Study for assessing the market and production of electronic components and associated value chain in India. The rapid growth in demand for electronic goods in the country has exceeded our expectations and we have to address and meet the requirements of the nation.

The Government at large and Department of Information Technology in particular has been working on evolving policies and programmes, which will enable us to break out from the sluggish growth in electronic manufacturing and surging imports, meet the challenges faced by the sector and utilize the opportunities offered to us by the growing market. The vision is to transform India into a global hub for Electronics System Design and Manufacturing (ESDM) so as to meet the growing domestic and global demand. Establishing a strong electronic components base, which is the basic building block for the industry, is necessary to make this transformation possible. Component manufacturing requires large investments, as it enables high value addition and technology inputs.

Electronics hardware manufacturing has high employment potential for even low-skilled people left out of the software opportunity. It can generate better quality jobs for women. The sector can help the Government to achieve its ambitious target of creating 100 million manufacturing jobs over the next decade. I am sure that this report will help us to focus our efforts in the right direction.

I compliment the Department of Information Technology for instituting this research study and ELCINA for coming out with this high quality and detailed report. This detailed study shall provide the necessary direction for achieving excellence in electronic components manufacturing. I am confident that the study report will be of immense value for all stakeholders.

(SACHIN PILOT)



सचिव

संचार एवं सूचना प्रौद्योगिकी मंत्रालय
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Message

Electronic components form the basic building blocks for electronics manufacturing. The electronic components sector is therefore an extremely important segment which needs to be supported for creating a sustainable electronic hardware manufacturing eco-system in the country as proposed in the draft National Policy on Electronics, 2011.

The present information base regarding the status of components manufacturing within the country is quite limited. In this context, the ELCOMOS study is a desirable and welcome step at an appropriate juncture. I am sure it will help identify the strengths and weaknesses and areas that need focus.

I compliment ELCINA on having taken up the arduous task of compiling necessary information in this regard. I am confident that the report would provide useful information to investors and policy makers for making suitable decisions with regard to the electronic components sector.

(R. CHANDRASHEKHAR)



Public services closer home

FOREWORD

The market for electronics hardware has been growing fast over the last decade, especially since the mobile and internet revolutions took root in India. The demand for electronics in the country is projected to increase from about USD 45 billion in 2009 to USD 400 billion by 2020. The growing market has provided us a huge opportunity but manufacturing needs a boost to reap the economic benefits.

The Government is keen to develop an ecosystem which will make India a global destination for electronics system design and manufacturing. Towards this goal, all stakeholders, especially the industry and the Department of Information Technology have felt the necessity for reliable and sound data on electronic components and equipment market and domestic manufacturing. This information is necessary to assess the status of this expanding industry, comprehend the reasons for its sluggish performance and come up with effective steps to boost investments in electronics manufacturing.

Electronic components are the building blocks for this industry. A strong electronic component manufacturing base requires high capital investments and a supportive ecosystem. One of the main objectives of the Study - ELCOMOS (Electronic Components, Hardware Market and Manufacturing Output including related Assemblies and Value Chain in India) assigned by the Department of Information Technology to ELCINA was to build a comprehensive database on existing indigenous production of electronic components and hardware manufacturing including related assemblies and value chain in the country. Another important objective of the study was to assess the size and trends in Output and the Market with respect to electronic hardware components and assemblies as well as equipment by sector. This study also assesses the demand-supply scenario within the country vis-à-vis imports and exports and attempts to identify the future drivers and enablers for this industry which would strengthen the local value chain. The detailed information and findings would be useful for fine-tuning policies and programmes to realize the manufacturing potential in the country and stem the growing tide of uninterrupted imports.

I am happy that the joint DIT - ELCINA project has come to fruition with the completion of the Study – ELCOMOS. It comes at an opportune time when the Government is in the process of finalizing the National Policy on Electronics. While it will be of great assistance to the Department of Information Technology, the data contained in the Study will be of immense value to the Industry.

*Dr Ajay Kumar, IAS
Joint Secretary, Department of Information Technology
Government of India*

PREFACE

The Indian electronic hardware market has been witnessing rapid and sustained growth. Higher disposable income coupled with the availability of technologically advanced electronic devices at affordable prices is expected to drive the Indian electronics market further up the growth trajectory. However, the contribution of Indian manufacturing to this growth story is limited today. A very large proportion of electronic components needed for these products are being imported from countries that have established themselves as a hub for electronic and electronic component manufacturing.

The Department of Information Technology, Government of India commissioned a research study to understand the electronic component industry along with the impact that it could potentially have on the hardware market and manufacturing output of the country. The study, ELCOMOS, was executed by ELCINA with IMRB International as the research partner for the study.

This study report is the result of a rigorous research process that spanned over a year and involved contacts with about 2000 stakeholders and detailed discussions and interviews with more than 500 stakeholders in the industry that covered electronic component manufacturers, sub-assembly manufacturers, product manufacturers including ODMs and OEMs as well as experts. The report provides a detailed overview of the electronic component industry in India including the overall size of the market and the proportion of Indian manufacturing. The report also provides a detailed account of about 20 electronic component groups that were investigated. In addition, the report also delves into the industry level challenges and suggests the way forward for the component manufacturers in India to tap the available market more effectively.

We are hopeful that this report will be extremely helpful for all stakeholders – Government, investors, component manufacturers, EMS providers and end product manufacturers—who have a long term interest in the industry.

This Report should provide direction to industry in making investments in the electronic industry segments where there is the best opportunity and most urgent need resulting in a strong supply chain and enhanced value addition. We are grateful to all respondents, specially ELCINA Members and Industry players who have given their valuable time and shared their insights to make this report possible.

Dr. J Rajaretnam
Senior Vice President
IMRB International

T Vasu
President
ELCINA

ACKNOWLEDGMENTS

This study is the result of support and guidance by a number industry experts and individuals. DIT and ELCINA are sincerely grateful to them for their support and for sharing their insights which has made this Report possible. Special thanks is due to ELCINA Members and industry players who have spared their time in providing necessary information. Names of Committee members from Government of India and ELCINA are mentioned below:

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Mr. Vinod Sharma, Managing Director, Deki Electronics Ltd. & Past President, ELCINA
Mr. Pankaj Gulati, COO, CDIL & Honorary Secretary, ELCINA
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Mr. K Srinivasan, Secretary



About ELCINA – Genesis, Evolution & Mission

ELCINA was established in 1967 as the first industry association supporting electronics hardware, when India's Electronics industry was still in its infancy. Since then, ELCINA has established itself as an interactive forum for electronics and IT manufacturers. ELCINA actively interacts with the government and advises it on policy and business environment issues. It networks with technical institutions and business support organisations in India and abroad to enable business expansion and information dissemination on technical developments. With greater liberalisation, ELCINA's focus has shifted to professional and value-added services to the Electronics Community.

While ELCINA's focus was originally on promotion of manufacturing components - the building blocks of the industry, **ELCINA, now renamed as ELCINA Electronic Industries Association of India**, has widened its horizons and broadened its activities to include the development of entire Electronics and IT Hardware. ELCINA now focuses on promoting manufacture of:

- ♦ Electronic Components
- ♦ Industrial/professional electronics
- ♦ Defence/strategic electronics
- ♦ Electronic Manufacturing Services
- ♦ Other expanding areas in electronics such as Medical, Automobile, Electronic Design, Embedded Systems and more

Our focus is to support the value chain for Consumer Electronics, Telecom and Computers/ IT correlating their common interest with that of equipment, material and machinery producers for expansion of manufacturing.

ELCINA believes that the Government and the industry need to work together to stimulate manufacturing and catalyse an IT/Electronics boom that can contribute significantly to the development of India. ELCINA persistently works to facilitate changes that would strengthen India's electronics and IT manufacturing base to make it a leader on the world electronics map.

Services & Activities

ELCINA constantly endeavours to upgrade services which include, among others:

- Active industry-government interface and networking with key decision making bodies with quick and effective representation to government.
- Swift dissemination of information/data, circulars and notifications using electronic media and providing value added information and updates as well as promoting business with the support of ELCINA's comprehensive and dynamic website
- Publications, Reports and Surveys to capture the latest in the industry.
- Under the umbrella of ELCINA Centre for Knowledge Management, organise Training & Interactive Programmes and Workshops to enhance competitiveness of our industry to be at par with the best globally. These include among others, programs for quality improvement, cost competitiveness, manufacturing efficiency and management development.
- Advisory and Consultancy services on business viability, opportunities and market trends
- Infrastructure support for business meets, conferences and promotional activities at ELCINA House with an Auditorium, Board Room and Committee Room.
- Annual Awards for Excellence, and permanent Product Display Facility at ELCINA House, including virtual display in the ELCINA website.

For further details on our services & activities, please visit www.elcina.com or call us.

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TABLE OF CONTENTS

<i>Chapter #1.0:- Executive Summary</i>	2
<i>Chapter #2.0:- Indian Electronics Industry – An Overview</i>	15
<i>Chapter #3.0:- Overall Industry Landscape</i>	21
<i>Chapter #4.0:- Understanding The Electronics Components.....</i>	35
<i>Chapter # 4.1:-Integrated Circuits (ICs)</i>	36
<i>Chapter #4.2:-Cathode Ray Tube</i>	41
<i>Chapter #4.3:-Diode</i>	46
<i>Chapter #4.4:-Transistor</i>	51
<i>Chapter #4.5:- Light Emitting Diode (LED).....</i>	56
<i>Chapter #4.6:-Wound Components</i>	61
<i>Chapter #4.7:-Capacitors.....</i>	66
<i>Chapter #4.8:-Resistors</i>	72
<i>Chapter #4.9:- Printed Circuit Boards (PCBs).....</i>	77
<i>Chapter #4.10:- Connectors</i>	83
<i>Chapter #4.11:- Speakers</i>	89
<i>Chapter #4.12:- Switch</i>	94
<i>Chapter #4.13:- Cables</i>	99
<i>Chapter #4.14:- Relays</i>	105
<i>Chapter #4.15:- Fuse</i>	110
<i>Chapter #4.16:- Optical Disc</i>	115
<i>Chapter #4.17:- Magnets</i>	120
<i>Chapter #4.18:-Other Components</i>	126
<i>Chapter #5.0:- Raw Materials Used in Electronic Component Manufacturing</i>	132
<i>Chapter #6.0:-Application Segments</i>	146
<i>Chapter #6.1:-Telecommunication Sector</i>	148
<i>Chapter #6.2:-Automobile Sector</i>	152
<i>Chapter #6.3:- Consumer Electronics Sector</i>	156
<i>Chapter #6.4:- Information Technology & Office Automation Sector</i>	160
<i>Chapter #6.5:- Medical & Healthcare Sector</i>	164
<i>Chapter #6.6:- Lighting Sector</i>	168
<i>Chapter #6.7:- Industrial Electronics</i>	171
<i>Chapter #6.8:- Strategic Electornics Segment</i>	174
<i>Chapter #6.9:- Electronic Manufacturing Services (EMS)</i>	177
<i>Chapter #7.0:- Challenges faced by Electronic Component Manufacturing Companies</i>	179
<i>Chapter #8.0:- Future Direction</i>	189
<i>Chapter #9.0:-Annexure</i>	196

Chapter #1.0:- Executive Summary





Growth of the Indian Economy:

India's GDP has witnessed consistent growth rates in excess of 8% until 2008 owing to the sub-prime crisis in US. However, India has stayed on the growth path and is expected to grow at 8.2% for the FY 2011-12. Some economists believe that India would surpass China as the world's current fastest growing economy by 2018 and its GDP will be in the range of USD 3.5 Trillion by 2020. In FY 2010-11, the services segment contributed a major component of the GDP accounting for 57.2% with Global Services Output including Information Technology (IT) and Business Process Outsourcing (BPO) as the major contributors to the services segment. However, over the last few years, the industrial segment has also witnessed significant growth to increase its contribution from 19.4% in FY 2003-04 to 28% in FY 2010-11. This was largely due to increase in production of Consumer electronics, Industrial electronics, Communication & broadcasting, Automobile and Textile industries.

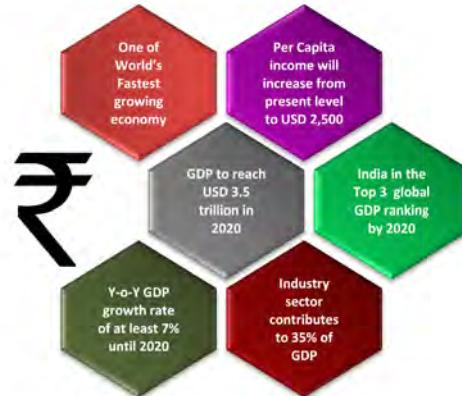


FIGURE 1:- INDIAN GDP GROWTH

Sl. No.	Industry segments	FY 2003-04	FY 2007-08	FY 2010-11
1	Agriculture& Allied Activities	21.7%	17.8%	14.6%
2	Industrial	19.4%	19.4%	28%
3	Services	58.9%	62.9%	57.2%

Source : Central Statistical Organization (CSO)

FIGURE 1.1 COMPOSITION OF GDP- A COMPARATIVE

Growth of Indian Electronics Industry

India's electronics industry is ranked 26th in the world in terms of sales and 29th in terms of production of various electronic products. India's electronics industry is still in its nascent stage by global standards and is expected to grow at a significant rate over the next few years. This growth is largely contributed by growth in mobile phones, consumer electronics products like TV, DVD, etc and Information Technology & office Automation products like Computers, printers etc.

The high growth has attracted many companies in these industries to either set up new manufacturing facilities or expand their production capacity in India over the last few years. Some notable companies that have set up their manufacturing units in the last couple of years include Samsung, Dell, Nokia, Motorola and Cisco.

Growth of Indian Electronic Components Industry

The growth of the electronics industry has triggered the expansion of electronic component industry as well. The electronic components produced in India include, among others, Picture Tubes, Diodes, Transistors, Power devices, Resistors, Capacitors, Switches, Relays, Connectors, Magnetic heads, etc.

In order to facilitate the growth of electronic component industry in India, the policy makers need reliable data regarding the electronic component industry including its current production, the current demand-supply and the future demand. As reliable data is crucial to

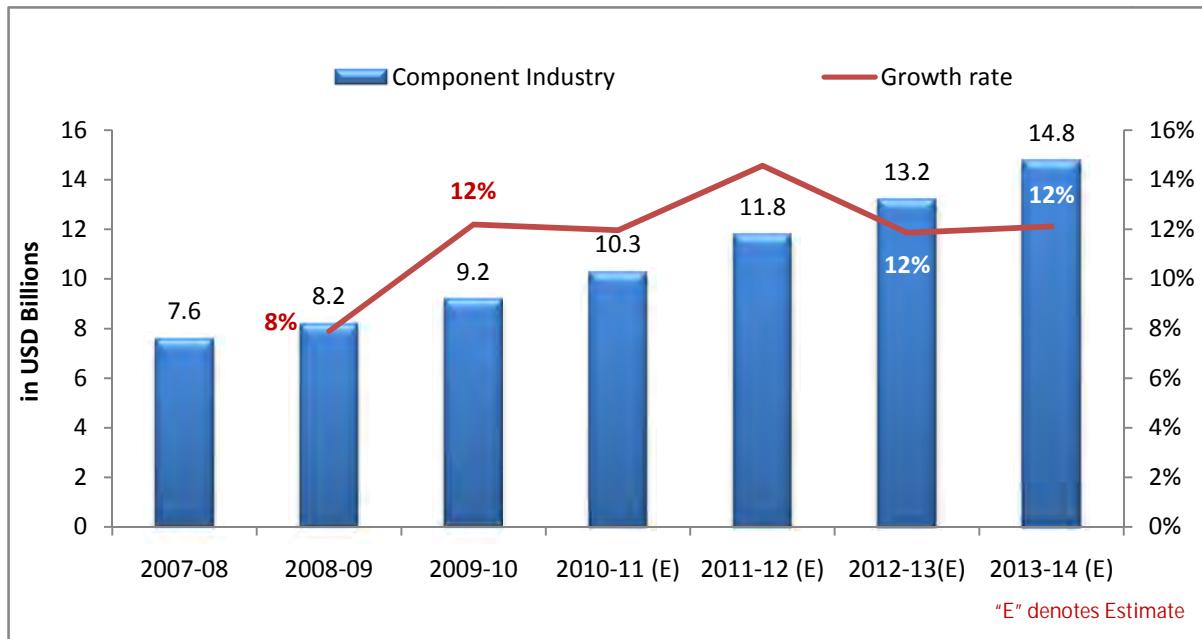


FIGURE 2:- GROWTH OF INDIAN ELECTRONICS COMPONENTS MARKET

drafting effective policy guidelines, the Ministry of Communication & Information Technology (MoCIT) commissioned a study in association with ELCINA to address these data requirements and to assess the future outlook of the electronic component industry. ELCINA commissioned IMRB to conduct this study to address these objectives. The report covers the current market size for 21 groups of electronic components and the likely growth of these component groups in future.

Electronic component Industry: Current & Future Demand

The current demand (Total Available Market) for electronic components in India is estimated at USD 9.2 Billion in FY 2009-10. This represents approximately 5.4% of the Global electronic component market. The demand is estimated to grow at an average yearly rate of about 12.5%



over the next three years and market size is estimated to be around USD 15 billion in FY 2013-14. This growth will be driven by telecommunication, consumer electronics and automotive electronics industries.

The Indian electronic component market is dominated by electro-mechanical components (like printed circuit boards, connectors, etc.,) and passive components (like wound components, resistors, etc.). However, in recent times, the active components (like Integrated circuits, diode, etc.) and the associate components (like optical disc, magnets, RF Tuners etc.) have also witnessed significant growth. Figure 3 shows the market contribution by type of components. The industry composition is not expected to change significantly over the next couple of years.

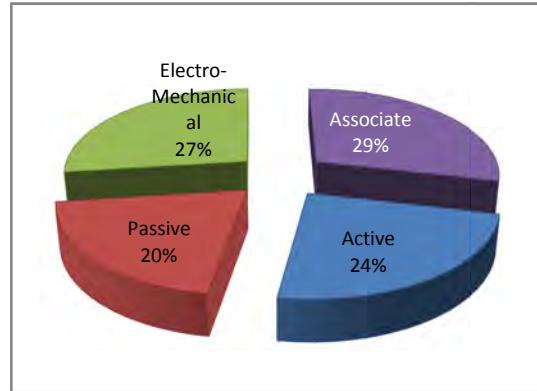


FIGURE 3:- TYPES OF ELECTRONICS COMPONENTS (FOR YEAR 2009-10)

Electronic component market: Current & Future Demand- by types of components

Sl. No.	Type of Components	FY 2007-08	FY 2008-09	FY 2009-10	FY 2010-11	FY 2011-12	FY 2012-13	FY 2013-14
1	Active Components	1.80	1.86 (4%)	2.20 (18%)	2.27 (3%)	2.51 (10%)	2.78 (11%)	3.09 (11%)
2	Passive Components	1.47	1.68 (14%)	1.88 (12%)	2.22 (18%)	2.63 (18%)	2.98 (15%)	3.36 (15%)
3	Electro-Mechanical Components	2.16	2.30 (6%)	2.46 (7%)	2.84 (15%)	3.27 (15%)	3.63 (13%)	4.03 (13%)
4	Associate Components	2.09	2.35 (12%)	2.66 (13%)	3.02 (14%)	3.44 (14%)	3.82 (13%)	4.24 (13%)
5	Total	7.52	8.19 (7%)	9.20 (11%)	10.35 (11%)	11.85 (13%)	13.21 (12%)	14.72 (12%)

Source : IMRB estimates ; Figures in Green represent Y-o-Y growth rate: Figures in USD Billion

FIGURE 4 :- INDIAN ELECTRONIC COMPONENT MARKET



Electronic component market: Current & Future Demand- by components

Sl. No.	Active Components (in Million USD)					Sl.No.	Passive Components(in Million USD)				
	Type of Components	Total Market	Indige nous	Imports	Exports		Type of Components	Total Market	Indig enous	Imports	Exports
1	Integrated Circuits (ICs)	1163	47	1116	-	1	Wound Components	1413	424	989	17
2	Cathode Ray Tube (CRT)	789	631	158	7	2	Capacitor	269	48	221	40
3	Diode	104	20	84	2	3	Resistor	81	5	59	2.83
4	Transistor	83	17	66	3	4	Piezo-electric Crystal	63	-	63	-
5	LED	60	5	55	-	5	Crystal Oscillator	54	-	54	-
6	Total	2199	720	1479	12	6	Total	1880	477	1386	59.83

Sl.No.	Electro-Mechanical Components (in Million USD)					Sl.No.	Associate Components(in Million USD)				
	Type of Components	Total Market	Indige nous	Imports	Exports		Type of Components	Total Market	Indig enous	Imports	Exports
1	Printed Circuit Boards (PCBs)	630	157	473	52	1	Optical Disc	298	238	60	834
2	Connector	607	256	351	97	2	Magnets	110	11	99	Negligible
3	Speakers	409	327	82	2	3	RF Tuners	100	-	100	-
4	Switch	377	226	151	80	4	Heat Sinks	67	-	67	-
5	Cables	373	300	73	33	5	Magnetron	55	-	55	-
6	Relays	31	17	14	2	6	Magnetic tapes	10	-	10	-
7	Fuse	15	9	6	1	7	Other Components	2022	202	1820	-
8	Micro/Stepper Motor	22	-	22	-						
9	Total	2464	1292	1172	267	8	Total	2662	451	2211	834

FIGURE 5:- ELECTRONIC COMPONENTS- AN OVERVIEW OF DEMAND



Electronic component Industry: Key Applications Industries

Consumer Durables and Telecommunications account for about 60% of the demand for electronic components in India. This is followed by IT & Office Automation and Automotive industries which contribute 22%. Other application industries like Industrial electronics, Medical electronics, Strategic electronics and Lighting industry contribute the balance of the market. Industries like lighting and strategic electronics are expected to witness substantial growth in the near future. However, given their current small base, there may not be a significant shift in the market contributions. Figure 6 shows the demand contribution of the application industries.

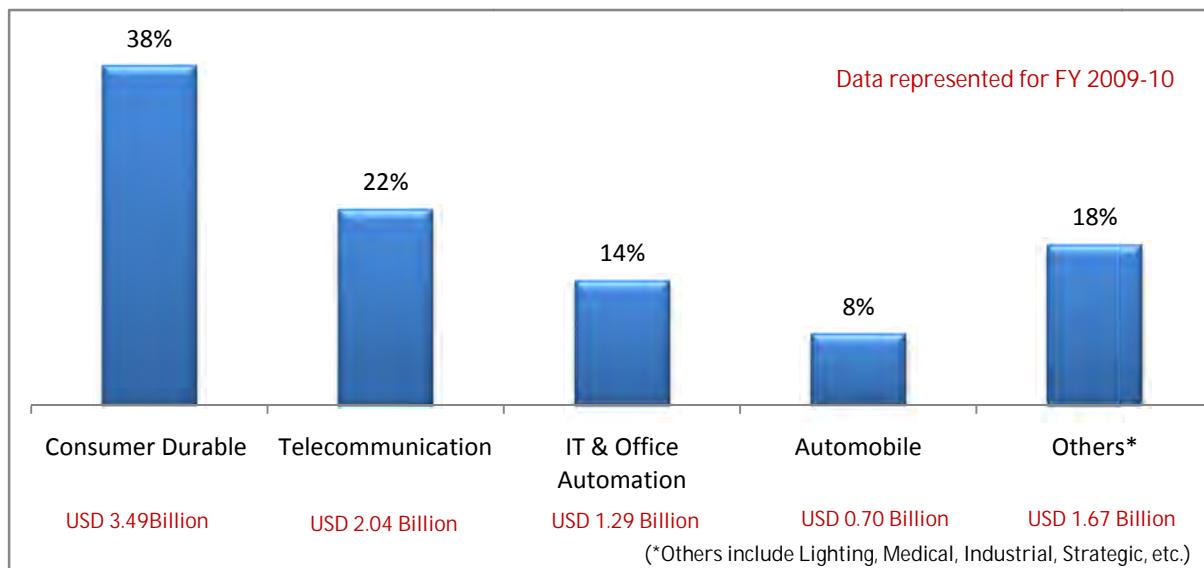


FIGURE 6: DEMAND FOR ELECTRONIC COMPONENTS MARKET IN FY 2009-10

Electronic component Industry: Demand-Supply Gap

The demand for the electronic components in India is largely met through Imports to the extent of about 60%. The countries which account for a major portion of the imports include China, Taiwan, South Korea, Japan and few European countries. The share of imports is higher for specialized & precision components like ICs, Chip components, PCBs, LEDs, etc.

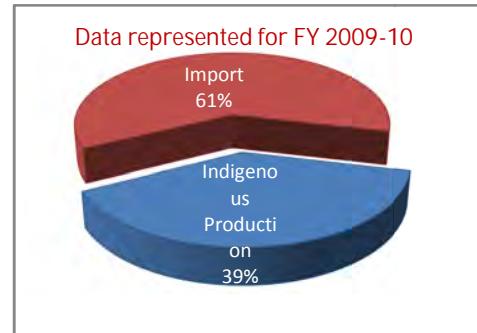


FIGURE 7:- DEMAND SUPPLY SCENARIO



For components which do not require sophistication, India has established a near self reliance. These components include cables, speakers, CRTs etc. India has also been exporting these components to other countries. Figure 8 shows the current domestic production and imports by the various components groups.

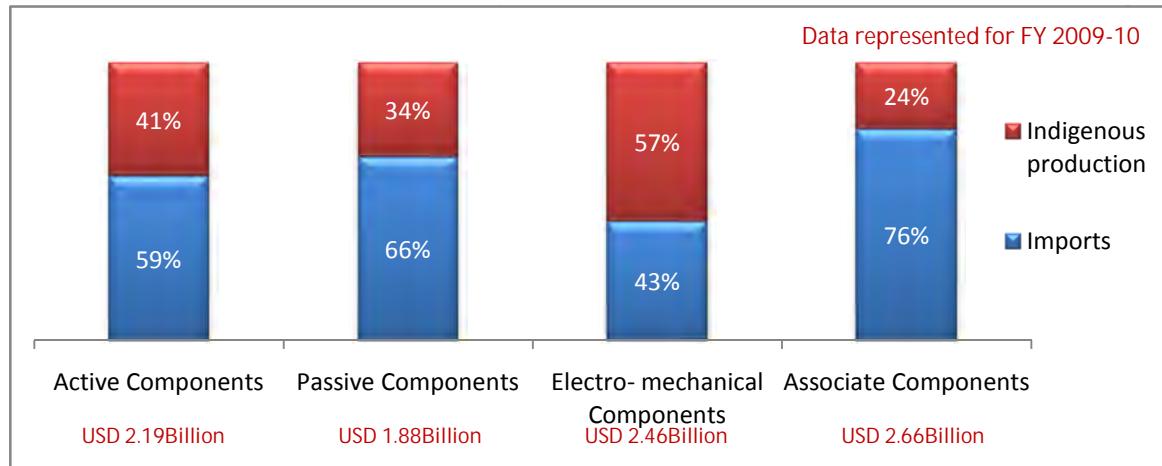


FIGURE 8:- DEMAND-SUPPLY SCENARIO BY TYPE OF COMPONENTS

Electronic component Industry: Value Addition

Value added is the amount by which the value of goods or services is increased at each stage of its production. In other words, it is the difference between the value of all the inputs (raw materials, purchase services) and the price at which the product is sold.

The value addition in electronic components is extremely limited as most of the raw materials are either imported or are purchased at high cost. Most manufacturers believe that the value addition in the electronic component industry would not exceed 40%. With the increase in imports of components from China, the value addition achieved in India is expected to reduce further. The table below highlights the value addition achieved by component manufacturers for some key components.

Sl. No.	Component Type	Component	Value Addition in FY 2009-10
1	Active Components	Cathode Ray Tube	40%
2	Active Components	Rest of the active Components	10-12%
3	Passive Components	Capacitors/Resistors	30-40%
4	Passive Components	Wound Components	15-18%
5	Electro-Mechanical Components	All components	15-18%

FIGURE 9 : VALUE ADDITION IN ELECTRONIC COMPONENTS

Electronic component Industry: Key Trends

The electronic industry is witnessing the launch of a slew of innovative products like tablets, smart phones, etc. These innovative products have also seen a very high degree of acceptance & adoption by consumers, particularly the youth. The demand for these products has contributed to two significant trends in the component industry:-

- a. Miniaturization
- b. Surface Mount Technology

A. Miniaturization

Miniaturization continues to be the key trend that is driving the electronic industry.

"Most of the cells in our body are very tiny, but they are active; they manufacture various substances; they walk around; they wiggle; they do all kinds of marvelous things-all on a small scale. They also store information. Consider the possibility that we too can make a thing so small which does what we want—that can manufacture an object that maneuvers at that level"- Richard Feynman, Physician mentioned in his paper



FIGURE 10 :- EFFECTS OF MINIATURIZATION

Miniaturization contributes to reduction in cost while providing convenience aesthetics and better quality in the final product. The advent of Surface Mount Technology (SMT) and Nanotechnology has given an impetus to this trend. It is expected that this trend will lead to discrete components being replaced by integrated components. This will have a significant impact in the Indian electronic component industry as it almost entirely manufactures discrete components.

B. Surface Mount Technology (SMT)

Surface Mount Technology (SMT) enables construction of electronic circuits in which Surface Mount components are mounted directly on the PCB. It offers major advantages such as automation, high speed assembly, miniaturization and better mechanical and electrical performance. Most modern products such as Tablet PCs, Laptops, Display Panels and Mobile Phones are manufactured by SMT.

Surface Mount Technology (SMT) requires the use of Surface Mount Devices (SMD) which consists of Chip components (Passive) and Integrated Circuits. These are not manufactured in India and their imports have been increasing rapidly.

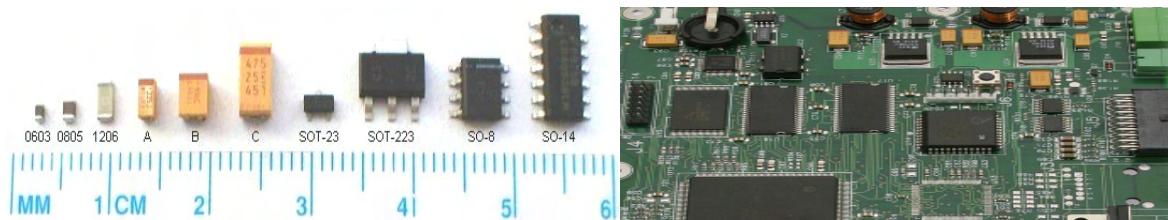


FIGURE 11:- SURFACE MOUNT DEVICES & PCB BOARD

Directions for the growth of Indigenous manufacturing

In order to grow the electronic component industry in a big way, the policy makers and the industry need to focus on the following:-

- a. Identify & promote electronic components that show high growth potential
- b. Develop & Promote Electronic Hardware Technology Park (EHTP) and Electronic Clusters
- c. Develop & Promote R&D centers across the country
- d. Rationalize tax policies
- e. Improve overall infrastructure in and around major Industrial Hubs and connectivity with major markets & ports.

a. Identify & Promote electronic components that show high growth potential

While the imports are higher for most electronic components, there are a few components like Integrated Circuits (ICs) and Transformers, PCBs and Connectors which are expected to have a significantly higher demand in the Indian market by FY 2011-12 when compared to their production in India. Therefore, it is important for the policy makers to promote indigenous production of these components immediately.

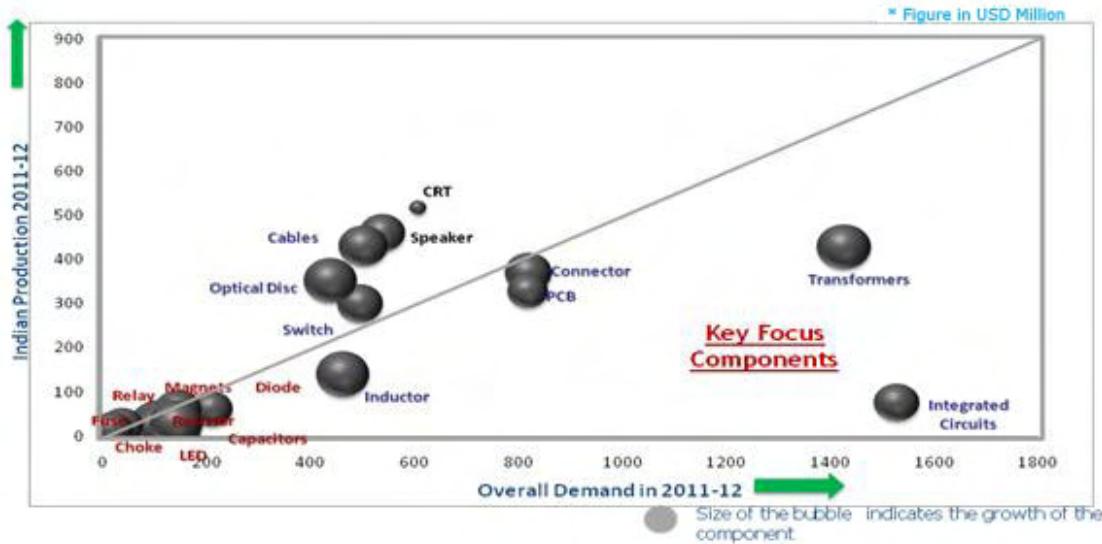


FIGURE 12:- DEMAND VS. PRODUCTION OF ELECTRONIC COMPONENTS IN FY 2012

b. Develop & Promote Electronic Hardware Technology Park (EHTP) and Electronic Clusters.

Electronic component industries and end user industries like Television, Automobiles, and IT products should ideally be concentrated in a cluster in order to gain in terms of lower inventory, lower transportation cost, etc. Countries which lead in manufacturing of electronic component have successfully adopted this practice. In our view, India should have a number of such clusters in each of the major application industry. We recommend that the policy makers and industry notify the following clusters and EHTPs:-

- **Consumer Electronics Industry:** - We recommend that a cluster be created to produce components like ICs & Power ICs, Wounded components, Resistors, capacitors, Cables, Connectors, SMT Assembly, etc., to the cater to the Consumer Electronics Industry. Some of the possible locations these clusters could come up are Greater Noida in the North India and Mumbai/Pune in West India.
- **Automotive electronics Industry:** - We recommend a cluster be created to produce components like Power Chips, Relays, and Fuses that could be used in the automotive electronics industry. These clusters could either come up in of Mumbai-Pune region or Gurgaon or Chennai due to the high concentration of automobile manufacturing in these locations
- **Information Technology & Office Automation Industry:** - We recommend that a cluster be created in places where large IT manufacturers have set up their



manufacturing and assembling plants. The electronic component cluster could focus on producing components like PCBs, Semiconductor chips, etc which are used in the IT & Office Automation industry.

c. Develop & Promote R&D centers in the country

India is lagging behind significantly in manufacture of high technology components. There are also components where the share of imports is much higher. One of the reasons for lower share of indigenous production is the lack of technology. In order to address this issue, we suggest that we focus on developing R&D centers on Private-Public Partnership. We also recommend that such R&D centers focus on SMT, LEDs & Nanotechnology on an urgent basis. In addition, Government could allocate corpus funds each year to focus on development of components involving these technologies.

d. Rationalization of Taxation policies.

The policy makers could amend or relax a few monetary policies in order to boost indigenous production. These policies include:-

- o Ensure uniform taxation system across the county
- o Abolish inverted duty structure
- o Lower slabs of taxes for purchase of raw materials and components that are sourced locally
- o Imports of all inputs including raw materials for zero duty items (ITA-1) at zero customs duty

Indian Government has recently taken a right step towards implementation of the GST. It would be extremely useful if such taxations be brought to use at the earliest.

e. Improve overall infrastructure in and around major Industrial Hubs and connectivity with major markets & ports.

The government could adopt a Public Private Partnership (PPP) or Build-Operate-Transfer (BOT) model along with Infrastructure management companies to develop and maintain the infrastructure at the various industrial hubs and ports. This could follow a similar model as the one used to develop many of the National Highways and International Airports in India.

In addition to the above, we also recommend the following additional changes:-



Sl. No.	Recommendation	Description
1	Promote Indigenous production	<ul style="list-style-type: none"> ➤ Encourage local companies to either set up new manufacturing facilities or expand their existing facilities by :- <ul style="list-style-type: none"> ○ Single window application process mechanism with guaranteed process time for each activity. ○ Provide freedom to source funds globally. ○ Promote Technology collaborations. ○ Lower rate of interest for funds sourced from financial institutions. ○ Promote investment companies to invest in electronic component manufacturing. ○ Compensate for disabilities in proportion to value addition –higher value addition can get benefit of deferred tax payment or rebates on Income Tax
2	Develop a Comprehensive plan by setting up a ‘Electronic components mission plan’	<ul style="list-style-type: none"> ➤ Set up an Electronic component Mission plan to identify the needs and requirements to develop India as a design and manufacturing hub like the way it was executed for ‘Automotive Mission Plan 2006-2016’
3	Develop & Establish a technical Standard	<ul style="list-style-type: none"> ➤ Develop a technical standard in the same lines of CE mark & CCC mark set up by Europe and China respectively. Alternatively, India could adopt technical standard developed by other countries and enforce regulation to follow the same for both Imports as well as local products. ➤ The technical standard would need to cover warranty, energy consumption, safety, product technical standards etc.
4	Preferential Access to Indigenous products in Government, PSUs and Government executed projects	<ul style="list-style-type: none"> ➤ Enforce a minimum of 40-50% usage of indigenously produced products in Government, PSUs, etc.
5	Engage in joint technology transfer/partnerships	<ul style="list-style-type: none"> ➤ Engage in joint exercises to facilitate technology transfer/partnership for developing new age electronic components in India.

FIGURE 13: RECOMMENDATION IN POLICIES



In addition to the above, ***we recommend that the policy makers and the industry would need to conduct a quick assessment of changing market scenario and market size every year and a deeper research covering all aspects once in three years.***

Impact of the implementation of recommendations on the Electronic Component Industry

The electronic component industry is currently estimated to growth at the rate of 12 % over the next two years to reach USD 14.8 billion in FY 2013-14 without any interventions from the policy makers. However, if the policy makers were to implement the above recommendations within the next one year, the industry could potentially achieve a CAGR of 22% as projected by the Task force report from FY 2014-15 onwards. The revised market estimates if the policy makers were to implement recommendations are depicted in Figure 13.1.

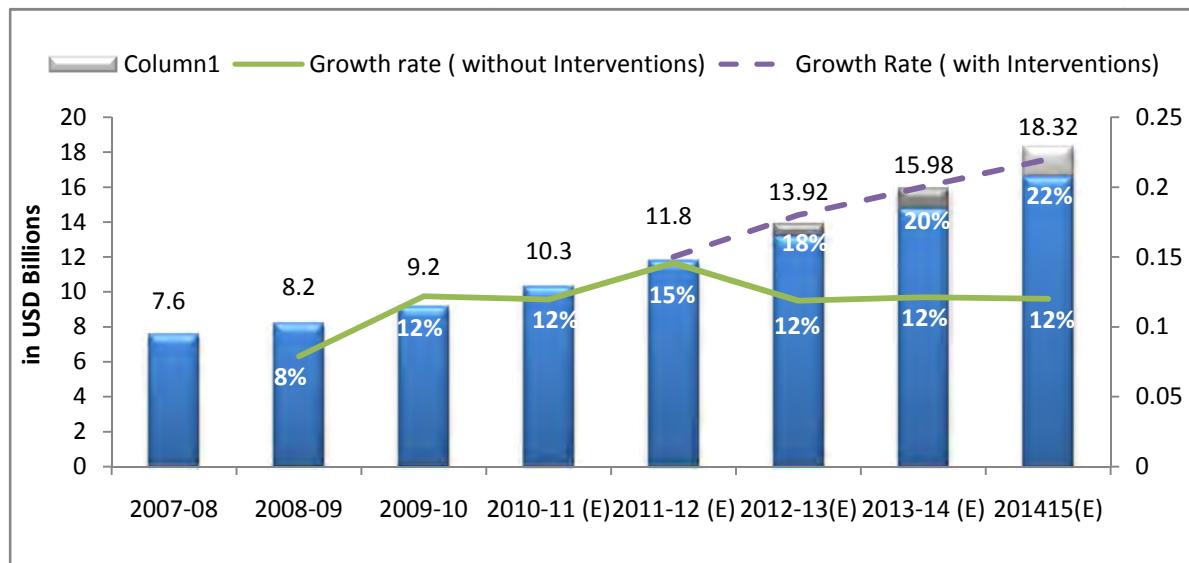
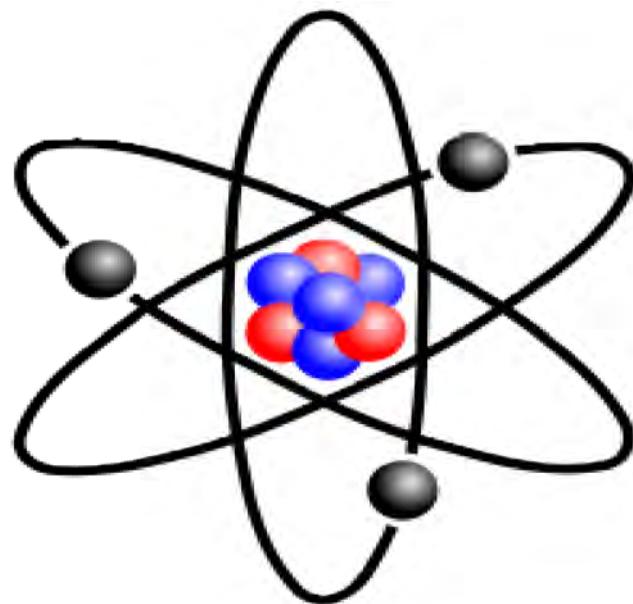


FIGURE 13.1:- GROWTH OF INDIAN ELECTRONICS COMPONENTS MARKET

Conclusion:-

The growth in Telecommunication, Consumer durables, Information Technology & Office Automation and Automobile industry has contributed to significant growth in the electronic component industry. While India presents a large demand, indigenous production is lagging behind owing mainly to the lack of technology and policy initiatives that can contribute to the growth. India has the capacity to develop new technologies which it has successfully demonstrated in fields like Information Technology (IT) and Bio-Technology (BT). The right impetus will lead to the growth of indigenous manufacturing of electronics components. This will lead India to become one of the electronic manufacturing hubs of the world.

CHAPTER #2.0:- INDIAN ELECTRONICS INDUSTRY – AN OVERVIEW





INDIA- A GROWING NATION

India is one of the fastest growing economies globally. In the last 64 years since its independence, India has progressed considerably to become the fifth largest economy in the world. Figure 14 depicts the growth of India in terms of growth in National GDP and per-capita GDP since 2000.

The Indian economy is largely a services driven economy with 57% of the GDP being accounted for by the services sector. The manufacturing and agricultural sectors contribute to 28% and 15% respectively of the Indian GDP.

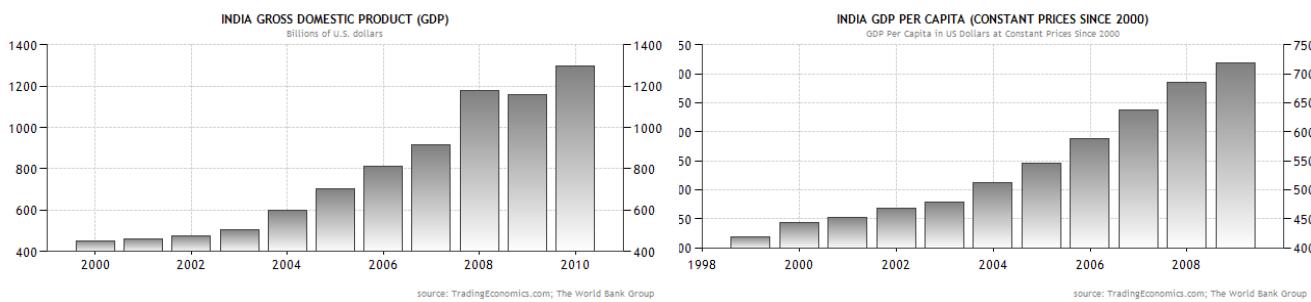


FIGURE 14:- INDIAN GDP & GDP PER CAPITA GROWTH

The initial phase of India's emergence as a global economic power was led by services sector and this period witnessed a decline in the share of manufacturing sector. However, there has been an increased realization of the importance of manufacturing for the growth of the economy and the Government of India has taken several initiatives in recent times to accelerate the growth of manufacturing. These include favorable policies towards manufacturing, launching of SEZs for manufacturing, creating positive enablers and inducements for companies to set up industries, etc. One of the goals of the national planning process is to raise the share of manufacturing in the GDP from the present 17% to 25% by 2020. Given the positive outlook of the economy coupled with the socio-political situation, most experts believe that India is poised to become the new low cost manufacturing hub by 2015 after China.

"India- the rise of this growing nation will change the balance of power in Asia- and potentially the world"- WTO President

India offers several benefits as compared to many other countries. These include the following:

- Inexpensive labor
- Large domestic market
- Availability of a large educated population that is young
- Element of cost consciousness in product design

These are strong triggers which are expected to propel the growth of manufacturing sector in India.



In the last few years, several large companies have established or expanded their operations in India while some are in the process of doing so. India has already emerged as one of the key global manufacturing hubs for the automobile industry in the last decade. There appears to be an emergence of a similar trend in the case of electronic industry too. Most mass market products have been adapted for the Indian market conditions and, therefore, their production base has been set up in India. In many cases, the Indian "value consumers" have made marketers create products that have subsequently been adopted globally. Some of the notable examples are Tata Nano, Nokia mobile with torchlight facility.

INDIAN ELECTRONIC INDUSTRY- CURRENT & THE PAST

The Indian electronic industry has been in the forefront of the Indian manufacturing revolution. While the industry dates back to the mid 1960s, its progress slowed down considerably in the 1990's due to intense international competition, lowering of customs duties and lack of a supportive eco-system which did not provide it a level playing field. More recently the industry has witnessed higher growth due to consistent and high rate of market growth as well as several government policy changes to encourage manufacturing by ironing out the anomalies in the tax system.

The development of the Indian electronic industry can be grouped in to four major time periods in which the industry took shape. They are as follows:-

The “Dawn” (1960- 1980):- The electronic industry in India dates back to the early 1960s. It was initially restricted to the development and maintenance of fundamental communications systems including radio-broadcasting, telephony, telegraphic communication & augmentation of defense capabilities. This was rigidly controlled and investments were largely initiated by the government.

The “Golden” Era (1980-1991):- Until 1984, the electronics sector was primarily government owned. The late 1980's witnessed a rapid growth of the electronic industry with products like transistor radios, Black & White TV, Calculator and other audio products entering the Indian market. In 1982 – a significant year in the history of television in India – the government allowed thousands of color TV sets to be imported into the country to coincide with the broadcast of Asian Games in New Delhi. The year 1985 saw the advent of computers and telephones exchanges, which were succeeded by Digital Exchanges in 1988. The period between 1984 & 1990 was the golden period for the electronics industry during which the sector witnessed continuous and rapid growth.

Era of “Reckoning” (1991-2002):- In 1991, the government opened the country's doors to the world and allowed private investments – both domestic and foreign in many of the industries.



The easing of the foreign investment norms, allowing 100 percent foreign equity, reduction in custom tariff and de-licensing of several consumer electronics products attracted significant amount of foreign collaboration and investment. The domestic market also responded favorably to the prudent polices of the government. The opening of electronics industry to private sector enabled entrepreneurs to establish industries to meet hitherto suppressed demand.

Era of "Pursuit" (2002 onwards):- The investments triggered by the liberalization process was not limited to one sector but encompassed all sectors like consumer electronics, telecommunications, instrumentation, positioning & networking systems, and defense. This period saw both Multinational and Domestic companies establish manufacturing units in India.

India signed the ITA-1 (Information Technology Agreement) in 1997 which was implemented in 2005. The ITA-1 under the WTO is solely a tariff cutting mechanism as per which the duties for all ICT products and their inputs (217 Tariff Lines) are to be abolished allowing for import at zero duty into the signatory countries. The implementation of ITA-1 propelled the growth of Multinational companies in India who were keen to access the growing market. However this also resulted in serious challenges to domestic manufacturing which was not able to compete with global companies due to higher cost structures in the Indian economy.

The implementation of ITA also led to government making amendments in the EXIM policy 2002-2007 to simplify the existing import-export procedure especially for imports to help reduce the price difference between the Indigenous manufacturers and imports. The changes in policies initiated by the government helped the market to grow at a brisk pace of about 25% per annum.

Indian Electronic Industry- Current Scenario

During the past five years the electronics industry in India has been driven mainly by Telecom products including equipment and mobile phones, IT Products & components and consumer electronics & durables sector. The growth in demand for telecom products & consumer durables has been breathtaking and is expected to continue over the next decade. Figure 15 shows the demand growth of the key product segments which drive the demand for electronic components.

Sl. No.	Segments	Million Units Sold in				
		2007-08	2008-09	2009-10	2010-11	2011-12
1	Mobile Phones	96	103	108	138.6	177.82
2	CRT Television	15	13.97	15.15	15.7	16.27
3	LCD Television	NA	2.7	3.3	6.6	9.7
4	MP3 Players	4.69	5.45	6.32	7.33	8.50
5	Set Top Boxes	3	5	7.5	10	13.3



6	Washing Machines	2.29	2.62	3.35	4.21	5.27
7	Passenger Cars	1.55	1.55	1.95	2.42	3
8	2 Wheelers	7.25	7.44	9.37	11.79	14.83

FIGURE 15: KEY PRODUCT CATEGORIES

Though trailing market growth, the electronics industry too has grown well in recent years at about 12-15% per annum. Electronics output during 2009-10 was USD 25 Billion against a market of more than USD 45 Billion. Presently, the largest segment is consumer electronics with Telecom catching up on it fast. Today, the market for cell phones alone exceeds USD 5 Billion per annum!

The Color Picture Tube industry played a major role in the electronics manufacturing sector in India. It was set up in the 1980's and today boasts of a capacity of about 20 million pieces per annum. Demand growth slowed down significantly after 2006 with shifting preference for new technologies such as LCDs and Plasma. CPT manufacturers encountered stiff competition from imports owing to lower Customs duties and the FTA with Thailand. The bright spark for this industry is that today India is the largest market for CRT based Televisions. Due to low market penetration and low cost of CRT based TVs, demand will continue to sustain for some more time before tapering down.

The growth in demand for telecom products has been the most impressive, and today India is adding 15 million mobile phone users every month! With telecom penetration at around 60%, this growth is expected to continue through the next decade. Penetration levels in other high growth products such as Computer/IT products, auto electronics, medical, Internet, networking, as well as consumer electronics are much lower and growth in demand is projected to stay brisk for the next 10 years. Combined with the sustained growth of our economy, the projection of a USD 400 billion plus market by 2020 though optimistic, is quite possible and offers an excellent opportunity to electronics players worldwide.

A growth area in electronics manufacturing for India is the EMS (Electronics Manufacturing Services) segment. This segment popularly known as 'contract manufacturing' has grown globally due to increased outsourcing of manufacturing by large OEM's. EMS has witnessed brisk growth in India and since last few years most global EMS leaders have set up base in India. This expansion of EMS activity is due to the all round growth in all segments of the market for electronic hardware products, as well as other growth drivers listed below:

- Strong local demand for electronic products, specially mass consumption items such as mobile phones, personal computers, and consumer electronics
- Growth of niche market specialized EMS players in automotive, strategic and medical electronics
- Highly talented workforce, especially for design and engineering services with good communication skills
- Rising labor costs in western countries and now also in Asia



- More outsourcing of manufacturing by both Indian and global OEMs who are looking for a larger share of the Indian market
- Shorter time to market and lower manufacturing cost benefit offered by EMS companies due to scale of production and specialization in manufacturing.

Even with a brisk rate of growth, the electronics industry in India constitutes less than 1.5% of the global industry. Much smaller countries like Malaysia, Singapore, and Thailand boast much larger electronics industries. By comparison, demand for electronics hardware in India is growing rapidly and this rate (25% +) is among the highest in the world. In this situation, where domestic manufacturing, which is barely 50% of demand, offers a huge opportunity for growth.

The Electronic Component Industry

While the demand for electronic equipment – including Telecom, Consumer Durables, and IT sectors - has witnessed sharp growth in India, the electronic component sector has lagged behind. The component industry depends on volumes for profitability and economies of large scale manufacturing. The Chinese have done extremely well on this count and high volume manufacturing of all types of electronic components has expanded there with new investments as well as re-location of factories from developed countries.

Electronic component manufacturing involves high value addition and thus is sensitive to finance, energy, infrastructure, logistics costs, all of which are high in India. This has resulted in the absence of a level playing field vis-à-vis our Asian competitors who have a very competitive eco-system for hi-tech manufacturing.

Various industry studies and estimates confirm that high value added (30-50% value addition) electronics manufacturing in India suffers 8-10% "disability costs" compared with competing countries. The higher the value addition, the higher the disability cost suffered by the manufacturer. This is also proved by the fact that new investments have been coming in low value added manufacturing activity rather than in components. The disabilities are as mentioned above- energy, finance, and infrastructure costs, plus the cascading taxes such as CST, or Local Government levies which are added to the cost of our components and products. Investments in capacity and technology have not been forthcoming and consequently, the economies of scale are missing.

The above scenario has resulted in a situation where imports of components have been growing rapidly and share of locally manufactured components used in equipment manufacturing has declined significantly since mid 90's and is currently about 39% of the total market. This does not include the derived demand for components which are being imported as part of finished electronic products. It is estimated that for a total electronics equipment market of USD 50 Billion, the total demand for components, used in manufacturing (or the Total Market) is expected to be between US\$ 15-18 Billion.

CHAPTER #3.0:- OVERALL INDUSRTY LANDSCAPE



3.1 Understanding The Electronic Components Market in India

The electronic component industry in India started with two small scale industries producing resistors and capacitors in 1960. The market was then estimated to be about USD 11,000. The usage of components was largely restricted to the defense sector. Over the next four decades,

the electronic component market grew at a steady rate. This was largely driven by the increasing popularity of electronic products among consumers and industry favoring government policies.

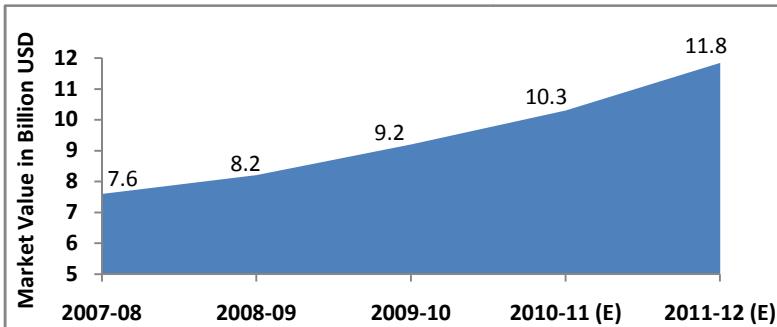


FIGURE 16:- MARKET VALUE OF ELECTRONIC COMPONENT INDUSTRY

The last one decade has been relatively fast paced with the market recording double digit growth rates in most years.

For the year FY 2009-10, the market is estimated at USD 9.2 Billion. This is expected to reach a value of USD 11.8 Billion in FY 2011-12 with a CAGR of 12% over the 5 year period. This growth is largely expected to be driven by the growth in telecommunication, consumer electronics and automotive sector.

The component industry is broadly classified into active, passive, electro-mechanical and associate components. The figure below (Fig 17) provides a detailed breakup of the industry based on this classification.

The Indian electronics component market has largely been dominated by electro mechanical components which contribute about 27% of the total component market. These are usually low-value high-volume products and include components like Cables, Fuses, switches, etc.

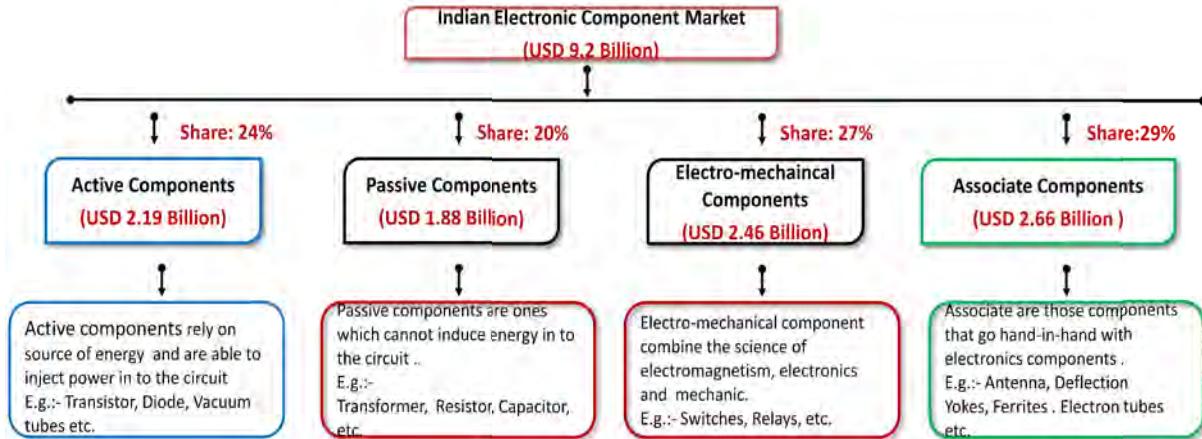


FIGURE 17: CLASSIFICATION OF ELECTRONIC COMPONENTS

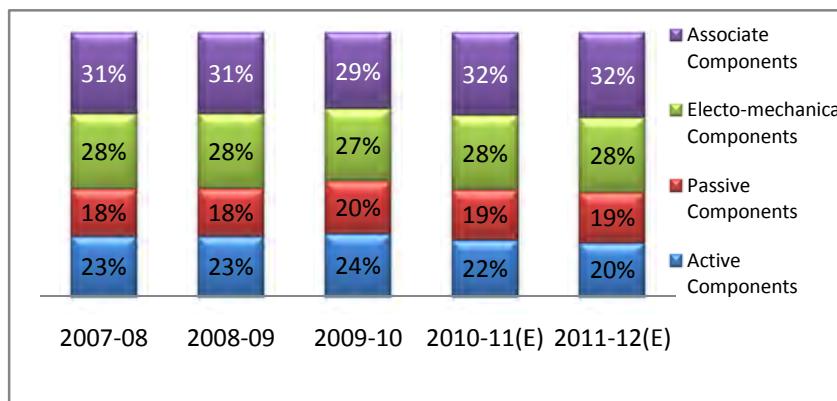


FIGURE 18:- MARKET SHARE-BY TYPE OF COMPONENTS

The graph (Fig 18) indicates that the share of passive and electro-mechanical components is not expected to change significantly over the five year period. However, the share of active components is expected to witness a decline over the same period and associate components expected to marginally increase in share.

This is primarily expected to be driven by:

- Change in technology
- Rising cost of infrastructure and raw materials

Active Components – Active components are those that inject power in to a circuit. These include Integrated Circuits, CRT, LED, Diode and Transistor. Of these, Integrated Circuits (ICs) have the largest share with about 52% share.

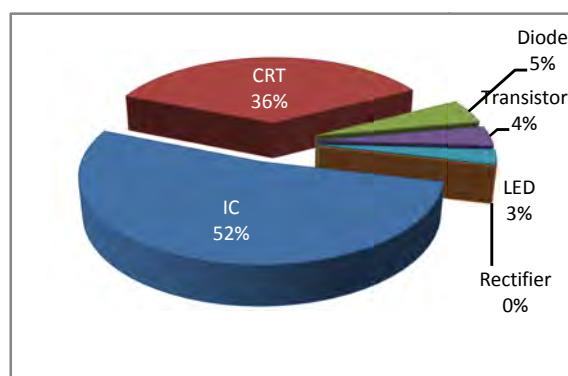


FIGURE 19: ACTIVE COMPONENTS- MARKET SHARE

The demand for active components is estimated at USD 2.2 Billion in FY 2009-10 and is expected to exhibit a growth of 9-10% year-on-year. The growth in the Active component segment is expected to be largely driven by LED & Integrated Circuits with digitization being introduced in most products.

Currently, active components are largely imported from China, Taiwan and Malaysia. Manufacturing of active components in India is limited to the manufacturing of CRTs and some discrete semiconductors. Though a large proportion of the active components will continue to be imported, with large players planning to increase their production capacity, the share of indigenous production is expected to increase.

Passive Components: - Passive components are largely used to control and provide the energy required for an operation. Resistors, Capacitors, Piezo-electric Crystals and Crystal oscillators are some of the widely used Passive components. As shown in Figure 20, wound components contribute about 80% of the total passive components market of India followed by capacitors.

The market for Passive component in India is estimated at USD 1.88 Billion in FY 2009-10. The market is expected to grow at around 13% year-on-year. This growth is largely expected to be driven by wound Components, resistors and Capacitors.

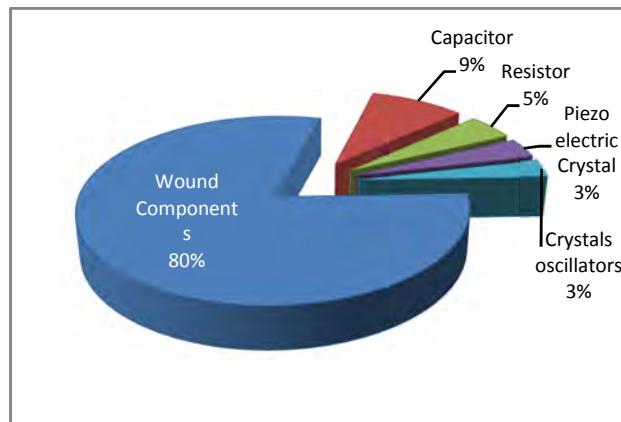


FIGURE 20: PASSIVE COMPONENTS- MARKET SHARE

Unlike active components, the share of indigenous production for wound components is relatively higher, with close to 30% being produced in India. However, there are a few components like resistor, capacitor, etc. which continue to be imported in even larger proportion.

Electro-Mechanical Components: -

Electro-mechanical components are largely used to act as interconnect between circuits and act as a switch or circuit breakers. PCB, Switch, Cables, Speakers, fuse and relays are some of the widely used Electro-Mechanical Components. As shown in Figure 21, Connector and PCB contribute to 50% of

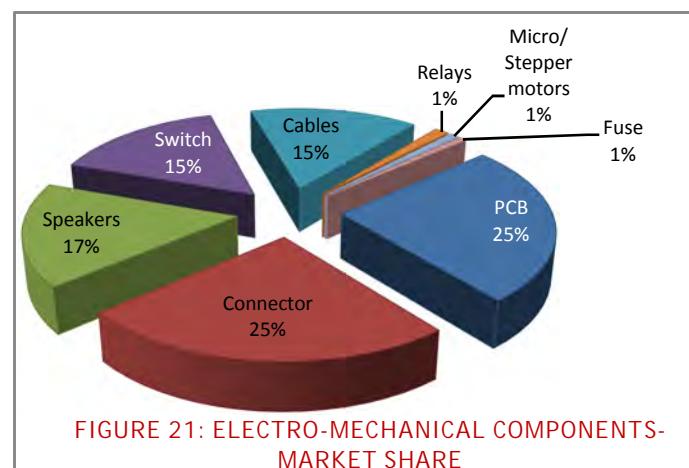


FIGURE 21: ELECTRO-MECHANICAL COMPONENTS- MARKET SHARE



the total market of India followed by speakers, cables and switches.

The market for Electro-mechanical components in India is estimated at USD 2.46 Billion for FY 2009-10. The market is expected to grow at around 10-12% year-on-year. This growth is largely expected to be driven by PCB, Connectors and Switches.

Unlike the active & passive components, the share of indigenous production for a few electro-mechanical components like cables, speakers and switches is relatively higher.

Associate Components- These components are largely used in conjunction with active and passive components in electronic circuits, or in some cases have independent functions and are not classified elsewhere. Optical Disc, Magnets, RF Tuners, Heat Sinks, Magnetron, Magnetic Tapes are some examples of associate components. As shown in Figure 22, Optical Disc is one of the largest constituents of Associate Component category contributing 16% to the segment.

The demand for associate components is estimated at USD 2.66 Billion in FY 2009-10. This is expected to grow by 13-14% in the next few years.

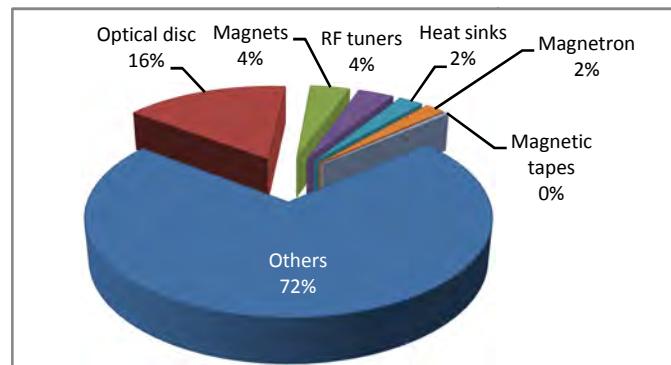


FIGURE 22: ASSOCIATE COMPONENTS- MARKET SHARE

Production of Electronic Components- Imports vs. Indigenous

The Indian electronic component market continues to be largely dependent on imports which have 65% of the share. Majority of these imports are from East and South Asian countries like Taiwan, Korea, Malaysia and China. Despite increase in production, the country continues to be actively dependent on imports for meeting the domestic demand because of the rapid increase in demand for electronic products.

In addition, most manufacturers also attribute this huge demand-supply gap to the lack of a supportive ecosystem in the country for indigenous manufacturing. This includes lack of proper



FIGURE 23: MARKET VALUE: - IMPORT VS. INDIGENOUS



infrastructure, unfavorable taxation, economic incentives, etc. This has resulted in widening the gap between demand and supply and rising share of imports. The figure below (Figure 24) indicates that the gap is expected to increase further in the next couple of years.

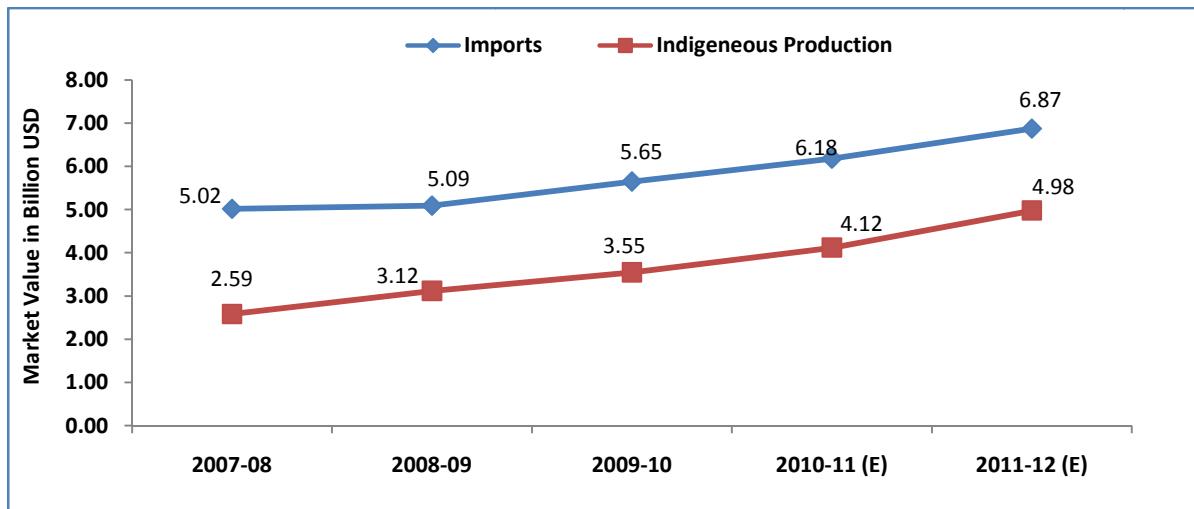


FIGURE 24: SHARE OF INDIGENOUS PRODUCTION VS. IMPORTS SINCE 2007

Over the years, both government and manufacturers have realized the potential that the country offers and are increasingly focusing on promoting indigenous manufacturing in India.

This has led to increase in the production and exports have also received a boost for certain components. The markets include Middle Eastern countries, Europe and Africa. However, exports are restricted to a few components like Optical disc, and electro-mechanical components such as connectors, cables, switches and PCB.

The export market was estimated at USD 1.14 Billion for the financial year FY 2009-10. Most industry experts believe that the export market is expected to increase in the next few years with most leading manufacturers are in the process of obtaining international certifications for their products manufactured.

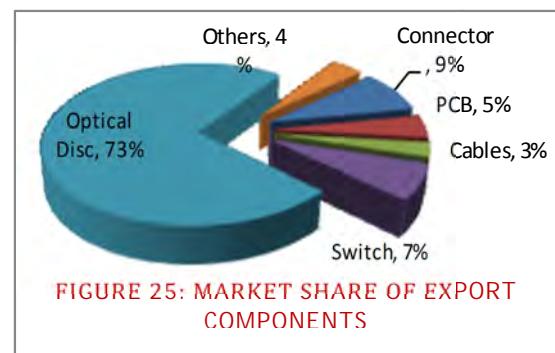


FIGURE 25: MARKET SHARE OF EXPORT COMPONENTS



Overview of the Electronic Components Manufactured in India.

The table below (Figure 26) provides the details of the market size and growth along with import and local manufacturing information for most of the key components that comprise the electronic component market of India.

Sl. No.	Components	Market Size		Imports		Indigenous Production	
		FY 09-10	CAGR	FY 09-10	CAGR	FY 09-10	CAGR
1	Wound Components	1413	14%	989	6%	424	39%
2	Integrated Circuits	1163	12%	1097	13%	66	NA
3	Cathode Ray Board (CRT)	789	12%	158	12%	631	12%
4	Printed Circuit Board (PCB)	630	-1%	473	-4%	157	11%
5	Connector	607	8%	351	2%	256	19%
6	Speakers	409	7%	82	-19%	327	19%
7	Switch	377	12%	151	-4%	226	30%
8	Cables	373	12%	73	-22%	300	30%
9	Optical Disc	298	22%	60	22%	238	22%
10	Capacitor	269	11%	221	11%	48	11%
11	Magnets	110	-5%	99	-6%	11	5
12	Diode	104	15%	84	15%	20	13%
13	Transistor	83	3%	66	3%	17	3%
14	Resistor	81	14%	59	20%	5	25%
15	LED	60	20%	55	20%	5	25%
16	Relays	31	9%	14	9%	17	9%
17	Fuse	15	7%	6	10%	9	6%
18	RF Tuners	100	10%	100	10%	Negligible Indigenous Manufacturing	
19	Heat Sinks	67	7%	67	7%		
20	Piezo-electric crystal	63	13%	63	13%		
21	Magnetron	55	17%	55	17%		
22	Crystal Oscillator	54	8%	54	8%		
23	Micro/Stepper Motor	22	9%	22	9%		
24	Magnetic Tapes	10	5%	10	5%		
25	Other Components	2022	10%	1820	10%		
26	Total Indian Electronic Component Market	9205	10%				

Figures in US\$ Millions; CAGR has been calculated for the next 3 years

FIGURE 26: SHARE OF ELECTRONIC COMPONENTS.



3.2 Understanding The Electronic Components Manufacturers

Based on the findings of the research, it is estimated that there are around 1600 organization that manufacture electronic components in India. These 1600 companies are further classified as follows:-

- Indigenous SSI Units - A manufacturing unit where investment in plant and machinery does not exceed USD 0.2 million
- Indigenous Non SSI Units &
- Multi-national companies (MNCs)

The Indigenous SSI units dominate the electronics component manufacturing market in India comprising about 80% of the total businesses. This is largely attributed to the following:

- Requirement for lower start-up capital
- Inclination to make high volume products which do not need significant technology implementation or automation
- Sops offered by the government.

These units largely manufacture passive components like wound components, resistor, etc.

The growing electronics industry also attracted several MNCs to set up manufacturing plants in India either on their own or through a joint venture with Indian companies. This includes large global organizations like Tyco electronics, FCI OEN, Molex, Vishay and EPCOS. However, they contribute to about 15% of the total universe of electronic component manufacturers in the country.

During the course of the research, it was also identified that there exist several organizations that have been manufacturing electronic components which have, over a period of time, moved to trading of components. This is largely because these companies found trading to be more profitable than manufacturing. This shift was largely attributed to the following challenges:-

- High cost of power leading to increase in overheads

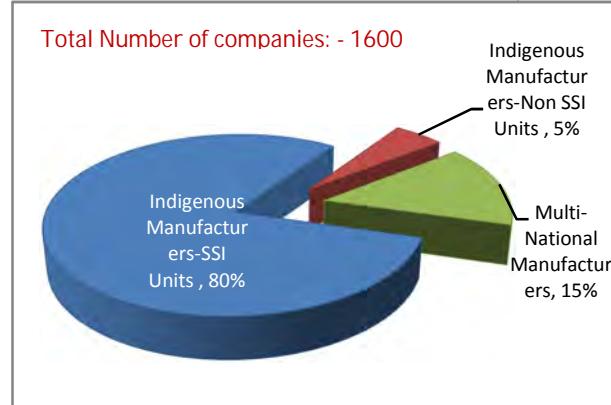


FIGURE 27: UNIVERSE OF ELECTRONIC COMPONENTS MANUFACTURERS



- High finance cost for working capital and term loans for equipment.
- Implementation of the "Zero duty regime" under the ITA-1 Agreement of WTO & Free Trade Agreements with leading manufacturing countries resulting in huge imports of electronic components and equipment.

Most of these organizations indicated that the above reasons coupled with the existing taxation structure put Indian manufacturers at a disadvantage against imports. Therefore, they shifted their focus to trading which yielded higher profits. Most manufacturers indicate that this trend is expected to intensify increase over the next 1-2 years especially among Indigenous SSI Units. Apart from Trading, the component manufacturers are also moving into contract manufacturing (Popularly known as Electronic Manufacturing Services (EMS)).

Overview of the Electronics Manufacturers in India

The table below (Figure 28) highlights the top Non SSI electronics component manufacturing companies in India. These companies have been arranged on the basis of their turnover.

Sl. No.	Name of Company	Type	Corporate Office	Products Manufactured
1	BEL	Indian (PSU)	Bangalore, Karnataka	Integrated Circuits (ICs), Small Signal transistors, Hybrid micro circuits, Oscillators & Amplifiers
2	Moser Baer	Indian	Delhi, India	Storage media, IT peripherals, Flash Device, Solar
3	Sterlite Technologies Limited	Indian	Pune, Maharashtra	Optical fibers, Fiber optic cables, Copper telecom cables, Structured data cables, Power transmission conductors.
4	Finolex Cables Limited	Indian	Pune, Maharashtra	Co-axial cables, Telecom Cables & power cables
5	Samtel Color Limited	Indian	New Delhi	Color picture tubes, Deflection yokes
6	JCT Electronics Limited	Indian	New Delhi	Color picture tubes
7	Tyco Electronics Corporation India Pvt. Ltd.	MNC	Bangalore, Karnataka	PCB Connectors, AV Connectors, Signal Connectors, RF Connectors
8	Molex India Pvt. Limited	MNC	Bangalore, Karnataka	Signal & Power Connectors
9	Epcos India Pvt. Ltd	MNC	Nashik, Maharashtra	Capacitors, Inductors, Ceramic components, SAW Components
10	Amphenol Interconnect India Pvt. Ltd	MNC	Pune, Maharashtra	MIL, AV & RF connectors
11	CDIL	Indian	New Delhi, India	Transistors, Diodes, Zener Diodes, Rectifiers, Bridges, Schottky, Thyristors DIAC, Triacs, SCRs, Voltage Regulators
12	Mahindra Hinoday	Indian	Pune, Maharashtra	Permanent magnets, Soft ferrite cores, Customized Magnetic Products



13	Vishay Components India Pvt. Ltd	MNC	Pune, Maharashtra	Film resistors, Capacitors
14	FCI OEN Connectors Ltd	Indian	Kochi, Kerala	PCB, Signal Connectors
15	AT&S	MNC	Nanjangud, Karnataka	Single Sided PCBs, Double Sided PCBs, Multi Layered PCBs
16	Ascent Circuits	Indian	Hosur, Tamil Nadu	Single Sided PCBs, Double Sided PCBs, Multi Layered PCBs
17	Sree Vishnu Magnetics Pvt. Ltd	Indian	Chennai, Tamil Nadu	Transformers, Coils, Inductors
18	Teknic Electromechanics Pvt. Ltd	Indian	Bangalore, Karnataka	Push Button Switches, Micro Switches, Rocker Switches, Toggle Switches
19	Dakshin Speaker manufacturing Pvt. Ltd	Indian	Chennai, Tamil Nadu	AV Speaker, Multimedia Speakers, Public address system
20	Deki Electronics Ltd	Indian	Noida, Uttar Pradesh	Plain Polyester, Metalized Polyester, Metalized polypropylene, Paint & Metalized Poly Polypropylene, Mixed Dielectric

FIGURE 28: LIST OF TOP 20 ELECTRONIC MANUFACTURERS

3.3 Understanding The Manufacturing Hubs in India

Most of the large electronic manufacturing companies (Indian or multinational) are located in top 5 cities of the country - Delhi NCR, Mumbai, Bangalore, Chennai and Pune. These cities are host to not only the electronic component companies but are also to companies from other sectors like Automobile, Health Care, FMCG, Telecom sector, etc.

Delhi NCR (which includes the Noida, Gurgaon, Ghaziabad & Faridabad region) is the largest manufacturing hub as it hosts a large number of component manufacturers. This is followed by Mumbai and Bangalore. Apart from these, cities like Hyderabad, Ahmedabad, Pune and Baroda are some of the upcoming manufacturing hubs in India. Figure 29 shows the breakup of organizations by the manufacturing hubs.

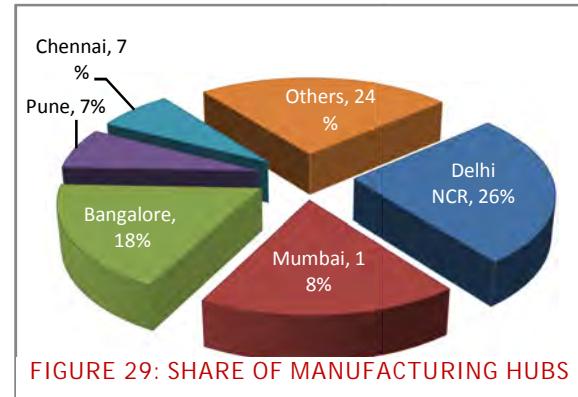


FIGURE 29: SHARE OF MANUFACTURING HUBS



FIGURE 30 : MAJOR ELECTRONICS HUBS IN INDIA

However, over the last few years, scarcity of land and high real estate prices has led companies to identify newer locations. Some of the emerging manufacturing hubs are Ahmedabad, Hyderabad and Kolkata.

Implementation of SEZs, EHTPs and Clusters

The confluence of technologies like miniaturization, artificial intelligence and convergence required component manufacturers to adopt newer technologies for manufacturing. This has also necessitated driving Foreign Direct Investments into the country. With the objective of creating facilities and infrastructure conducive to manufacturing of electronic components, the Government of India revamped the existing EPZ policy to incentivize the manufacturers. This policy was renamed as SEZ policy.

India was one of the first in Asia to realize the effectiveness of the Export Processing Zone (EPZ) model to promote exports. Asia's first EPZ was set up in Kandla

SEZ Rules:-

- *Simplified procedures for development, operation, and maintenance of the Special Economic Zones and for setting up units and conducting business in SEZs;*
- *Single window clearance for setting up of an SEZ;*
- *Single window clearance for setting up a unit in a Special Economic Zone;*
- *Single Window clearance on matters relating to Central as well as State Governments;*
- *Simplified compliance procedures and documentation with an emphasis on self*

in 1965 to promote exports. In April, 2000, the government of India revamped the EPZ policy to overcome the shortcomings experienced on account of the multiplicity of controls and clearances; absence of world-class infrastructure, an unstable fiscal regime and with a view to attract larger foreign investments in India.

This intention of SEZ policy was to make SEZs an engine for economic growth supported by quality infrastructure, an attractive fiscal package, both at the Centre and the State level, with the minimum possible regulations. In 2005, the government went one step ahead and formulated the SEZ rules to ensure equal treatment to all SEZs. Though India was amongst the first in Asia to realize the effectiveness of the Export Processing Zone (EPZ), it is only in recent times that the policy has taken shape.

In 2006, the Department of Commerce decided to set up an SEZ exclusively for electronics hardware and software, including Information Technology Enabled Services (ITES). The Area allotted for the SEZ would be around 10 hectares or more with a minimum built up processing area of one lakh square meters. Figure 31, indicates the existing and upcoming SEZs in India.

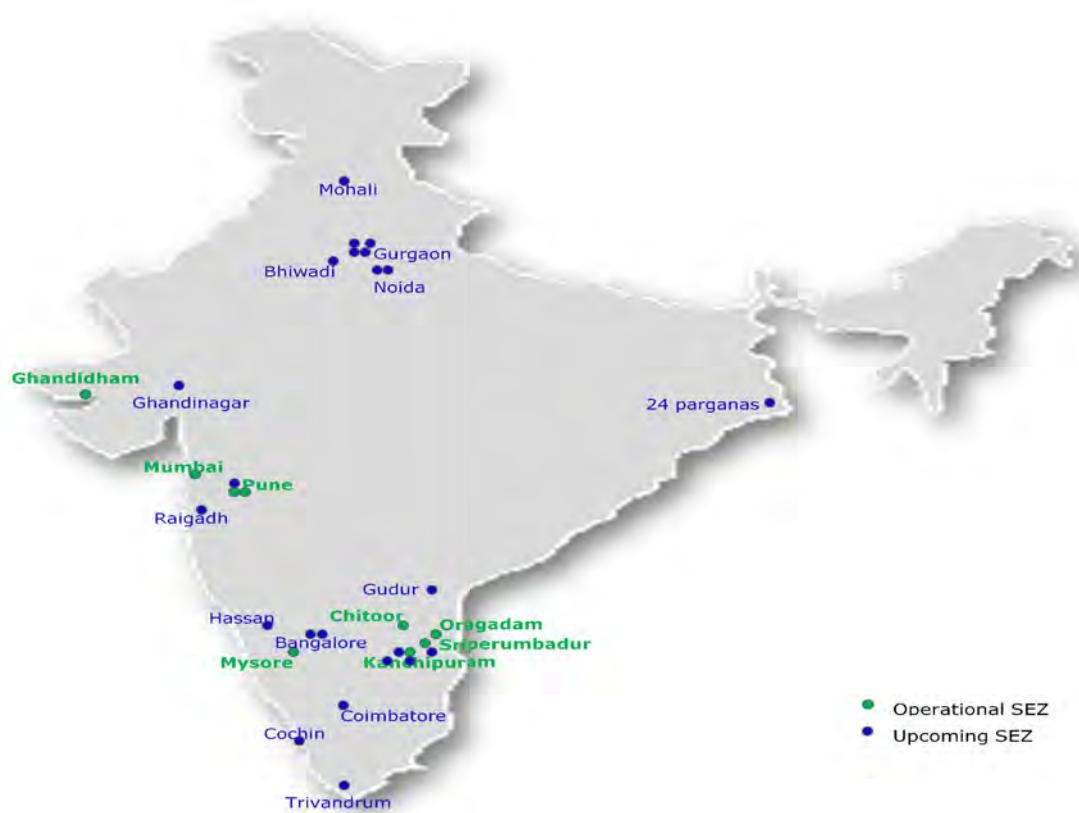


FIGURE 31: OPERATIONAL & UPCOMING SEZs IN INDIA



With the demand for electronic hardware components and equipment growing by leaps and bounds over the last decade and electronic manufacturing expanding, the government has created specific clusters and EHTPs for the promotion of such manufacturing. These clusters or EHTP (Electronics Hardware technology Park) are largely for export led manufacturing. However, the competency and technology adopted for this is expected to drive manufacturing for domestic consumption too. Figure 169 in Appendix list the upcoming SEZs and EHTPs.

3.4 Changing Trend in The Electronic Component Industry

The electronic industry is going through an exciting phase with growth in demand and importance of electronics as well as revolutionary changes in technology, launch of innovative products and the challenge of global competition. This is coupled with the growing demand from all sectors of the economy for electronics driven by growing purchasing power. This has necessitated the electronic product and component manufacturers to focus on continuous improvement in their products in order to stay ahead of the pack. These have resulted in several interesting trends in the industry that make this sector exciting and meta-resources for all other sectors.

1. **Convergence of Technologies:** Convergence of Technologies has become a reality in the last couple of years, the launch of main-line products enabling convergence. Convergence allows a single device to use multiple technologies/ services. A Smartphone is one of the key examples of the advent of convergence as it allows communication and computing using the same device. Convergence is moving beyond mobile phones to several other electronic devices like DVDs, music players, IPTV, I Pads etc. This trend is expected to convert most electronic products into multi-utility products, thereby, requiring high tech electronic components and technology.
2. **Miniaturization:** The dawn of convergence has led manufacturers to integrate multiple devices. At the same time, the demand from consumers to reduce the size of the products to make them easy to manage has led to these products increasingly becoming smaller in size. Miniaturization refers to this creation of smaller scale devices or components for mechanical, optical, and electronic products &devices. Miniaturization results in greater density of components which is usually possible through VLSI designs. This also enables lower cost of production resulting in reduction in the overall product pricing.



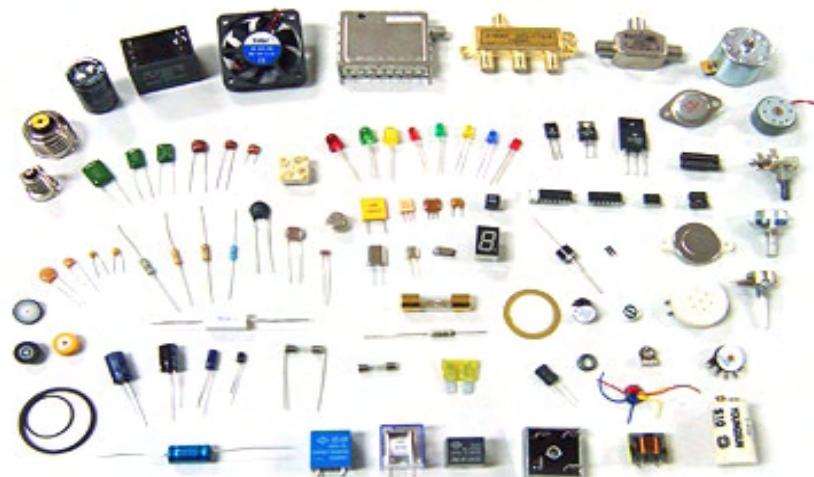
Miniaturization is expected to increase and will impact the traditional component market as most of the traditional components shall be replaced by chip components and integrated Circuits.

3. **Artificial Intelligence:** Consumers are becoming increasingly technology-conscious and are demanding products with built in intelligence. This is resulting in electronics and consumer durable products being manufactured with intelligent functions and logic. For example washing machines are now available that can sense the load and decide the appropriate washing cycles.

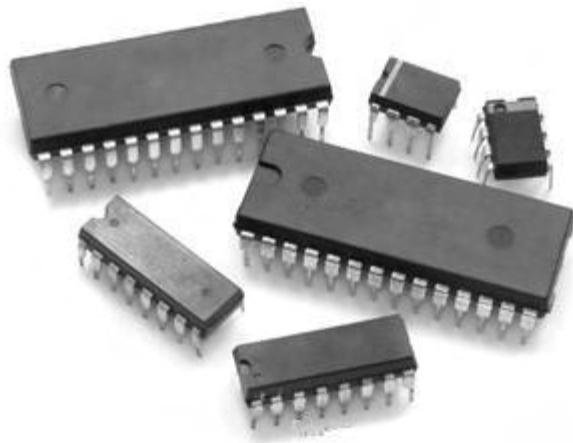
Intelligence has moved beyond consumer products and is also available in several medical electronics and industrial electronic products with CNC controlled functions.

The above changes in the technology are expected to change the landscape for electronic component manufacturing. Apart from the above, manufacturers across the globe have started moving towards Green Electronics and sustainable development with implementation of RoHS (Restriction of Hazardous Substance) and WEEE (Waste electrical and electronic equipments) regulations. In line with this trend, the Indian government too has issued notifications to regulate the use of Hazardous Substances (Lead, Cadmium, and Mercury etc.) and the proper disposal of WEEE. Similarly rules have also been notified with respect to energy efficiency norms and labeling of most consumer electronics and durables. The traditional components will increasingly face stiff competition from the Integrated Circuits and Surface Mount Technology (SMT) that will replace them in several electronic products. Therefore, in the near future, it is important for component manufacturers to shift focus from discrete components manufacturing to integrated components manufacturing so as to be able to benefit from the changing landscape of the country.

CHAPTER #4.0:- UNDERSTANDING THE ELECTRONICS COMPONENTS



CHAPTER # 4.1:- INTEGRATED CIRCUITS (ICS)



NIC Codes	368.6
HS Codes	8542



4.1.1 EXECUTIVE SUMMARY

A. Overview of the Indian Integrated Circuits (ICs) Market:

The following table provides an overview of the Indian Integrated Circuits (ICs) market.

Sl. No.	Heads	Description
1	Overall Indian Market Size in FY 2009-10	USD 1163 Million
2	Ratio of Imports: Indian Manufacturing in FY 2009-10	96:4
3	Growth in FY 2009-10	14%
4	Export in FY 2009-10	Negligible
5	Market Size by type of Integrated Circuits(IC)	Memory Integrated Circuit- USD 600 Million DSP ICs –USD 235 Million Logic Gates Circuits- USD 100 Million Microcontroller ICs-USD 111 Million SCR/DIAC/TRIAC- USD 17 Million Others ICs-USD 100 Million
6	Key Application Segments	Telecommunication, Consumer Durables and IT & Office automation
7	Estimated Growth in FY 2010-11	15%
8	Estimated Ratio of Imports : Indian Manufacturing in FY 2010-11	95:5

FIGURE 32: INDIAN INTEGRATED CIRCUIT MARKET- AN OVERVIEW

Salient Aspects of Indian Integrated Circuit Industry:-

- Continental Devices India Limited and Bharat Electronics limited are the two leading manufacturers of Integrated Circuits in India
- Telecommunication (25%) and Consumer Durables (25%) are the two largest sectors accounting for a major portion of the current demand for Integrated circuits in India.
- The demand for Integrated Circuit in India has been growing at a significant rate. The market is expected to grow at a CAGR of 15% over the next 2 years to reach USD 1529 Million in FY 2011-12
- About 96% of the current demand in India is met through imports from China, Taiwan, South Korea & Europe.

- Memory & DSP ICs account for 72% of the current Integrated circuit market and is expected to continue to account for 70% of the market in future.
- Lack of attractive incentive package & increasing requirement of high quality resources like Power & water, which is currently unavailable, is the reason cited for both Indian and global companies not venturing into manufacturing of Integrated circuits in India.

4.1.2 INDIAN INTEGRATED CIRCUIT MARKET- CURRENT & PAST TRENDS

Overall Market size in India(FY 2009-10) = USD 1163 Million

The overall market size for Integrated Circuit market in India is estimated at USD 1163 million for the FY 2009-10 with imports from China, Taiwan, South Korea and Europe accounting for 96 % of the total market.

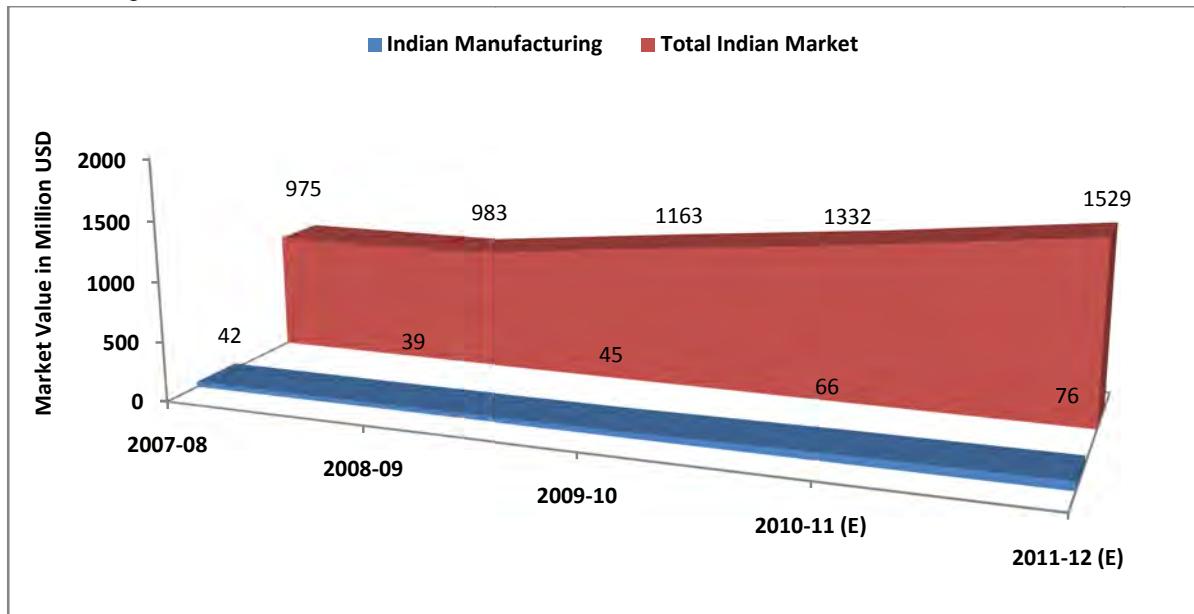


Figure 33:- Indian Integrated Circuit Market Size

Integrated Circuits have, over the years, evolved from having only a few components in a base (*called Small Scale Integration-SSI*) to a few hundred components in a base (*called Medium Scale-Integration (MSI)*) to a few hundred of thousands of components (*called Very Large scale Integration - VLSI*) in a chip. The next technology innovation in the IC segment is the emergence of the Super Chips which are expected to have more than a million components per chip. The growth of ICs has been in lines with the growth of the electronic industry and the recent economic slowdown had a very little impact on the growth.

India currently lags behind in the chip manufacturing market. The chip market is primarily dominated by the large Asian players like China, Taiwan, Malaysia, etc. However, India is one of

the major hubs for chip designing with most of the major semiconductor firms having their presence in India.

The Government had taken an initiative to drive IC manufacturing in India through a special Incentives Package Scheme (which was a part of the IC policy released in FY 2007-08). However, the impact of the initiative has not yet been demonstrated with large global manufacturers having already established their setup elsewhere.

4.1.3 TYPES OF INTEGRATED CIRCUITS (IC)

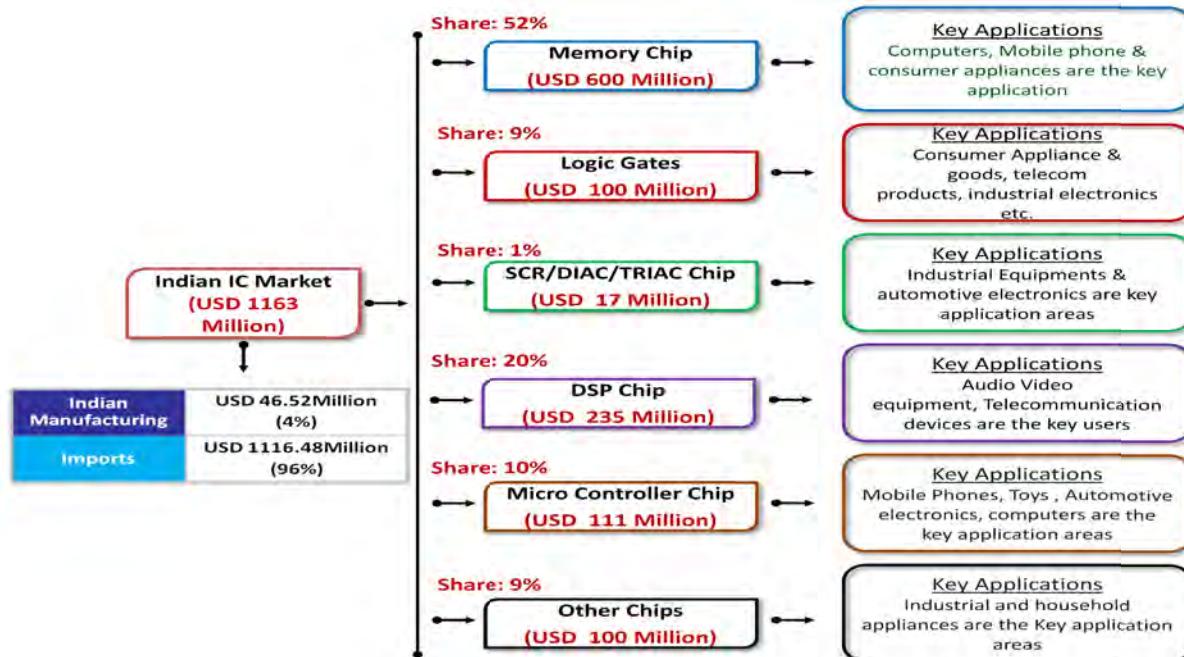


FIGURE 34: TYPES OF INTEGRATED CIRCUITS

With increasing demand for memory, mobile SIMs, telecom equipments, automotive systems, intelligent consumer electronics appliances, higher capacity add-on cards in imaging product, etc. the market for DSP, Memory chips is expected to drive the market in the next 1-2 years.

4.1.4 INDIAN INTEGRATED CIRCUITS(IC) MARKET- MARKET SIZE BROKEN BY INDUSTRY SECTORS

The contribution of various application sectors in which Integrated Circuits are used is shown below:-

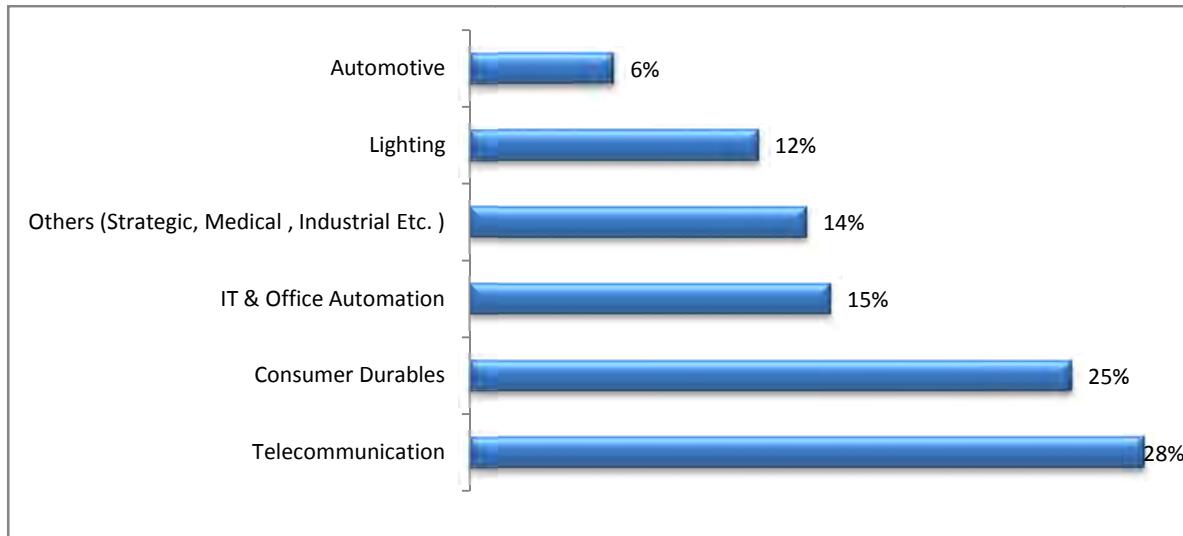


FIGURE 35: INDIAN INTEGRATED CIRCUITS MARKET SIZE - BY APPLICATION SECTOR

4.1.5 FUTURE TRENDS IN APPLICATION SECTOR GROWTH

Telecommunication and automotive are the two IC application sectors with the maximum growth rate, followed by IT & Office automation.

Sl. No.	Application Sector	Growth rate
1	Telecommunication esp. Mobile Phones	30%
2	Automotive	25%
3	Consumer Durables like Digital Camera, etc.	18%
4	IT & Office Automation esp. Flash Memory, Pen drives	20%
5	Medical Electronics	17%
6	Lighting	12%
7	Industrial Electronics	7%
8	Strategic electronics	15%

FIGURE 36 :- KEY APPLICATION SECTORS- FUTURE OUTLOOK

4.1.6 DETAILS OF INDIAN INTEGRATED CIRCUIT MANUFACTURERS

Local manufacturing accounts for only 4% of the demand for Integrated circuits. BEL and CDIL are the prominent manufacturers of ICs in India. The details of the Key IC Manufacturers are given in Figure 170 at Appendix.

CHAPTER #4.2:-CATHODE RAY TUBE



NIC Codes	368.10
HS Codes-Color Picture Tube	85.40.11
HS Code- Black & White Picture Tube	8540.12.00



4.2.1 EXECUTIVE SUMMARY

A. Overview of the Indian Cathode Ray Tubes (CRTs) Market:

The following table provides an overview of the Indian CRT market:-

Sl. No.	Heads	Description
1	Overall Indian Market Size in FY 2009-10	USD 789 Million
2	Ratio of Imports: Indian Manufacturing in FY 2009-10	20:80
3	Growth in FY 2009-10	18%
4	Export in FY 2009-10	USD 7 Million
5	Market Size by type of CRT	14" CRTs -USD 211 Million 21" CRTs -USD 493 Million Others CRTs -USD 85 Million
6	Key Application Segments	Consumer Durables
7	Estimated Growth in FY 2010-11	-14%
8	Estimated Ratio of Imports : Indian Manufacturing in FY 2010-11	25:75

FIGURE 37: INDIAN CATHODE RAY TUBE (CRT) MARKET- AN OVERVIEW

Salient Aspects of Indian Cathode Ray Tube Industry:-

- India is nearly self-sufficient in the CRT market with players like the Samtel Group & JCT Electronics Ltd driving the indigenous manufacturing.
- The Cathode Ray Tube Market is estimated to be around USD 789 Million in FY 2009-10, with a growth rate of 18%.
- The demand for Cathode Ray Tubes is largely driven by products purchased in the Indian hinterland. However, with the declining price and increasing awareness of alternate technologies, the demand for CRTs is expected to decline over the next few years.

4.2.2 INDIAN CATHODE RAY TUBE MARKET- CURRENT & PAST TRENDS

Overall Market size in India(FY 2009-10) = USD 789 Million

The overall market size for the Cathode Ray Tube in India is estimated at **USD 789 million** for FY 2009-10. About 80% of the total market is contributed by Indian manufacturers.

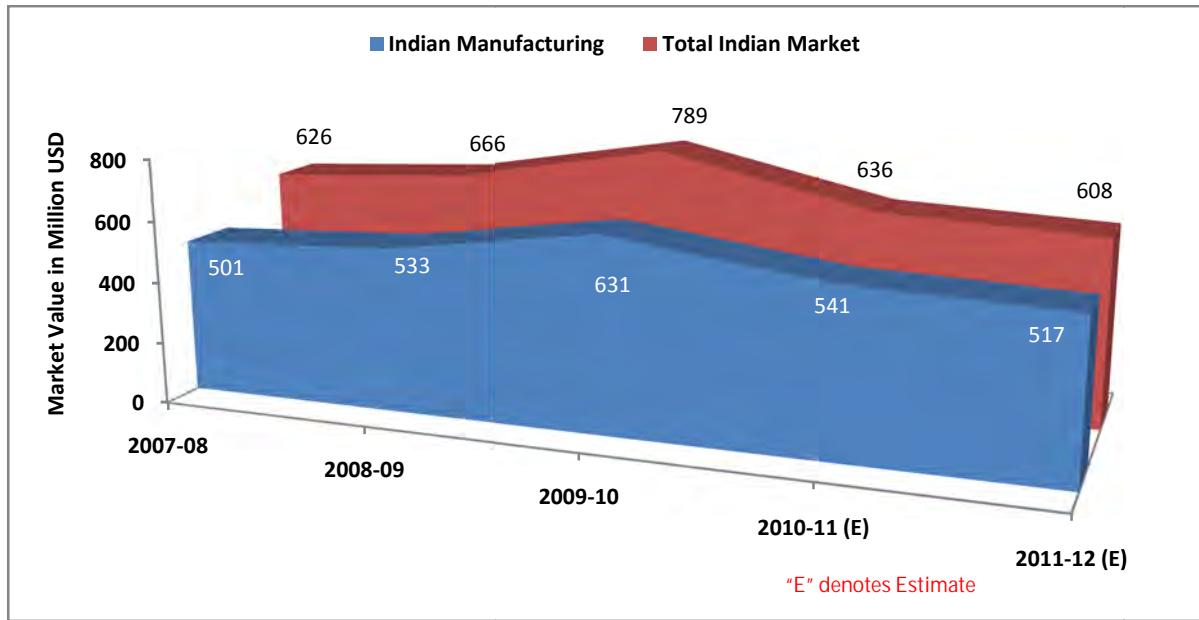


FIGURE 38: INDIAN CATHODE RAY TUBE (CRT) MARKET SIZE

CRT has been dominating the consumer electronic market due to its technology, image quality, and performance/ price ratio. However, over the past few years, the market has witnessed a slowdown and has recorded a growth of about 5% year-on-year over the last two years. In FY 2009-10, the market witnessed a sharp rise in growth due to the purchase of 13.5 Million Units of 14" Color TV by the Tamil Nadu Government for distribution to households. However, since this was a one-time purchase, the market is expected to witness a decline in FY 2010-11.

Most CRT manufacturers believe that the market for CRT would subsequently remain stagnant for a couple of years. This stagnancy is largely due to the increased penetration of television in the rural Indian households. However, the demand for CRTs is expected to decline substantially post FY 2011-12 with the newer technologies (Like LCD, LED, Plasma, and HDMI) expected to become more affordable.

The leading manufacturers of CRT in India also cater to the demands from the developing countries in Africa, South America, and South East Asia. The export market is estimated to be around USD 7 Million for FY 2009-10. However, with the worldwide demand diminishing, the export market is also expected to decrease over the next 1-2 years.

4.2.3 TYPES OF CATHODE RAY TUBES

Cathode Ray Tubes are classified on the basis the size of the tube. The popular sizes of the CRT are as follows:-

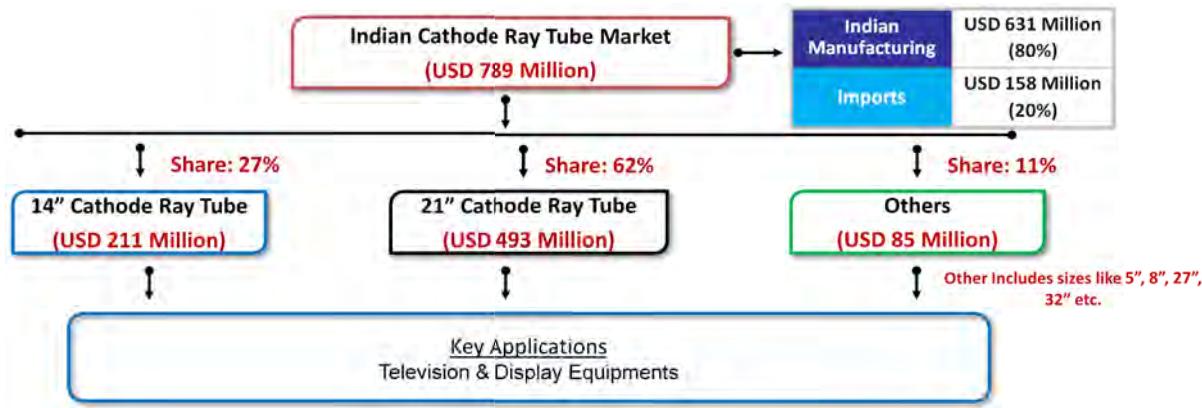


FIGURE 39: TYPES OF CATHODE RAY TUBES (CRT)

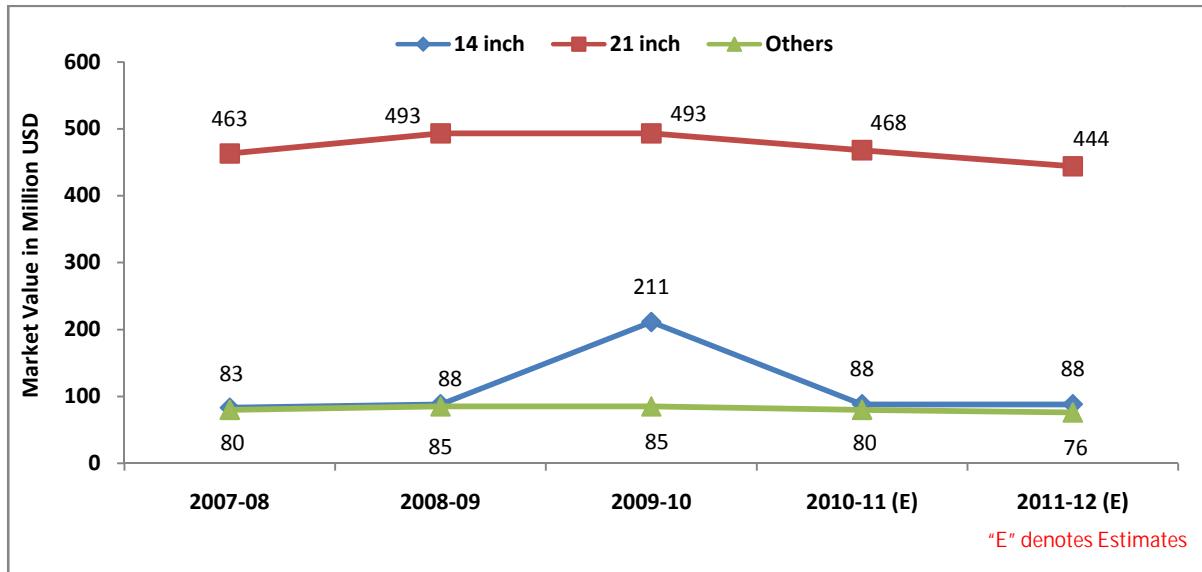


FIGURE 40: TYPES OF CATHODE RAY TUBES (CRT)

4.2.4 INDIAN CATHODE RAY TUBE MARKET- MARKET SIZE BROKEN BY INDUSTRY SECTORS

The contribution of various application sectors in which Cathode Ray Tubes are used is shown below:-

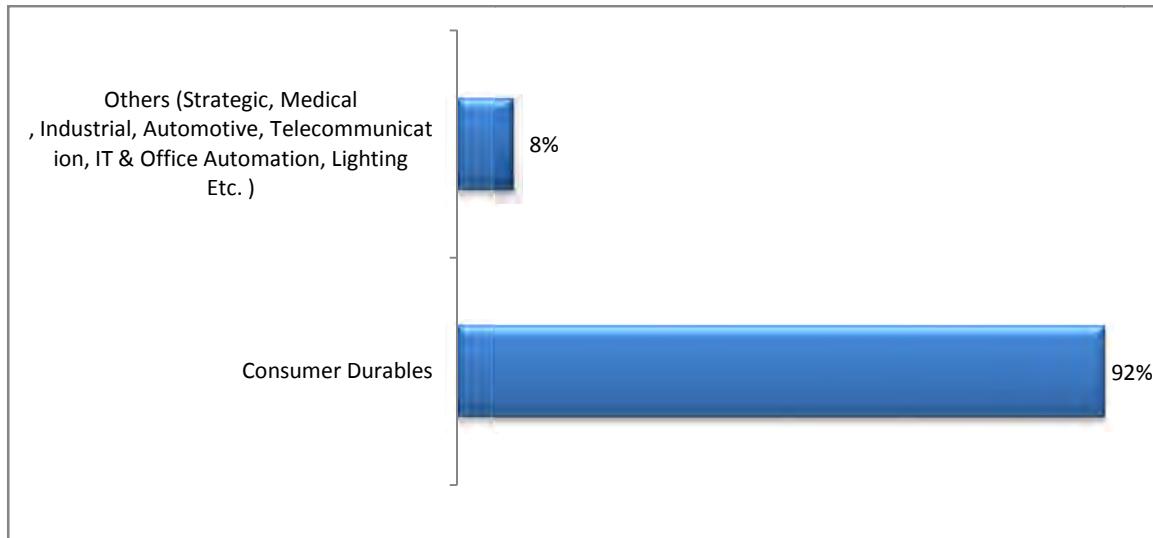


FIGURE 41: INDIAN CATHODE RAY TUBE (CRT) MARKET SIZE- BY APPLICATION SECTOR

4.2.5 FUTURE TRENDS IN APPLICATION SECTOR GROWTH

CRT is mostly used in the consumer durable sector which is expected to grow at 18%

Sl. No.	Application Sector	Growth rate
1	Telecommunication	30%
2	Automotive	25%
3	Consumer Durables	18%
4	IT & Office Automation	20%
5	Medical Electronics	17%
6	Lighting	12%
7	Industrial Electronics	7%
8	Strategic Electronics	15%

FIGURE 42: KEY APPLICATION SECTORS- FUTURE GROWTH RATE

4.2.6 DETAILS OF INDIAN CATHODE RAY TUBE MANUFACTURERS

The major share of the Indian market is contributed by the two companies - Samtel Color Limited and JCT Electronics Limited, which are profiled in Table no. 171 in Appendix

CHAPTER #4.3.-DIODE



NIC Codes	368.50
HS Codes	8541.10.00



4.3.1 EXECUTIVE SUMMARY

A. Overview of the Indian Diode Market:

The following table provides an overview of the Indian Diode market.

Sl. No.	Heads	Description
1	Overall Indian Market Size in FY 2009-10	USD 104 Million
2	Ratio of Imports: Indian Manufacturing in FY 2009-10	80:20
3	Growth in FY 2009-10	6%
4	Export in FY 2009-10	USD 2 Million
5	Market Size by type of Diode	Rectifier Diode-USD 70 Million Zener Diode –USD 21 Million Other Diodes- USD 13 Million
6	Key Application Segments	Consumer Durable & Lighting
7	Estimated Growth in FY 2010-11	16%
8	Estimated Ratio of Imports : Indian Manufacturing in FY 2010-11	79:21

FIGURE 43: INDIAN DIODE MARKET- AN OVERVIEW

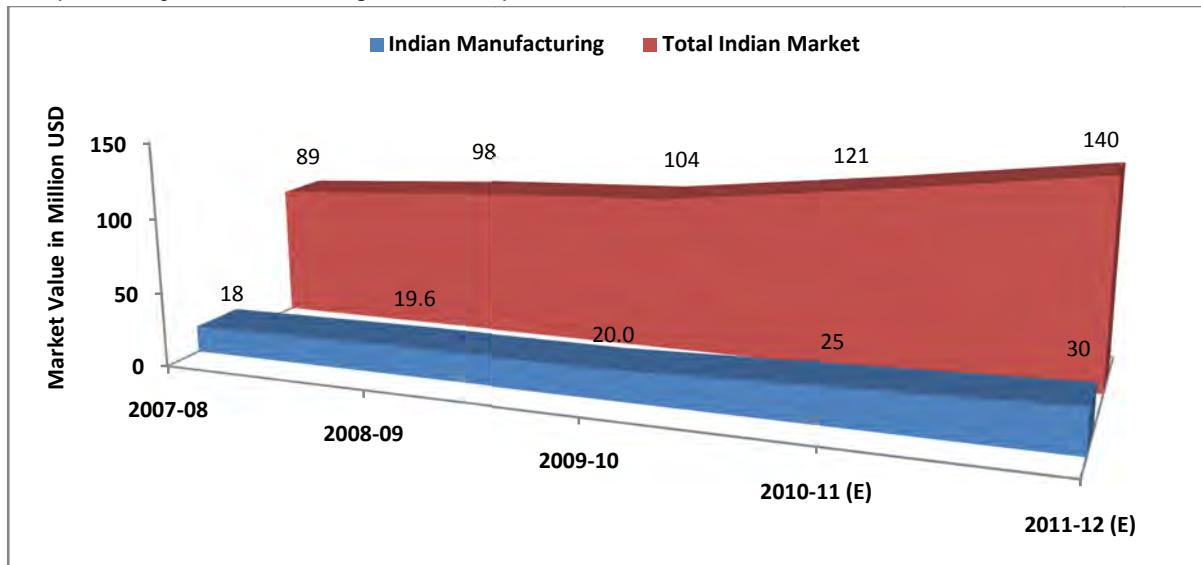
Salient Aspects of Indian Diode Industry:-

- Consumer Durables (30%) and Lighting (25%) are the two largest sectors that account for the major portion of the current demand for Diodes.
- The market is estimated to grow at 16% per annum in the next two years and reach a value of USD 140 Million in FY 2011-12. The growth will be driven by Consumer Durables and Lighting which are expected to grow at 18% and 12% respectively apart from the Automotive and telecommunication.
- The demand for Zener & Other diode is largely met through imports. This is largely attributed to the non availability of right technology for production and competitive pricing offered by products imported from China and Taiwan.
- Miniaturization of electronics products is expected to result in the increased demand for chip based diodes, thus, moving away from leaded diodes. This change in trend has also driven some of the leading players to revamp their existing facilities to cater to this demand.

4.3.2 INDIAN DIODE MARKET- CURRENT & PAST TRENDS

Overall Market size in India(FY 2009-10) = USD 104 Million

The overall market size for the Diodes in India is estimated at USD 104 million for the FY 2009-10 with indigenous manufacturing accounting for 20% of the total market. The rest of demand is met through imports from China and Taiwan where these are manufactured more competitively because of larger scale of production.



"E" denotes Estimate

FIGURE 44: INDIAN DIODE MARKET SIZE

The year FY 2009-10 saw a moderate growth of 6% and expected to grow at 16% in the next 2 years. This year also saw the increase in demand for non leaded diodes compared to the last few years. With the applications industries moving to surface mount technology (miniaturization) for production of PCBs, the demand for non-leaded diodes is expected to grow in the next few years.

Lack of access to cost effective technology & machinery to produce chip based diodes and Zener diode is the reason attributed by the Indian manufacturers for a lower contribution of indigenous production.

According to the industry experts, Europe, Asia-pacific and Japan dominate the world diode market with a combined market share of over 76%. Among this Asia is the largest regional market contributing around 60% of the total demand, followed by Europe & Japan. The Indian export is estimated to be around USD 2 Million in FY 2009-10, which accounts for about 0.1% of the total Asian outputs.

4.3.3 TYPES OF DIODE

Diodes are classified basis the configurations of the P-N junction. Some of popular classifications of diodes are listed in the below figures.

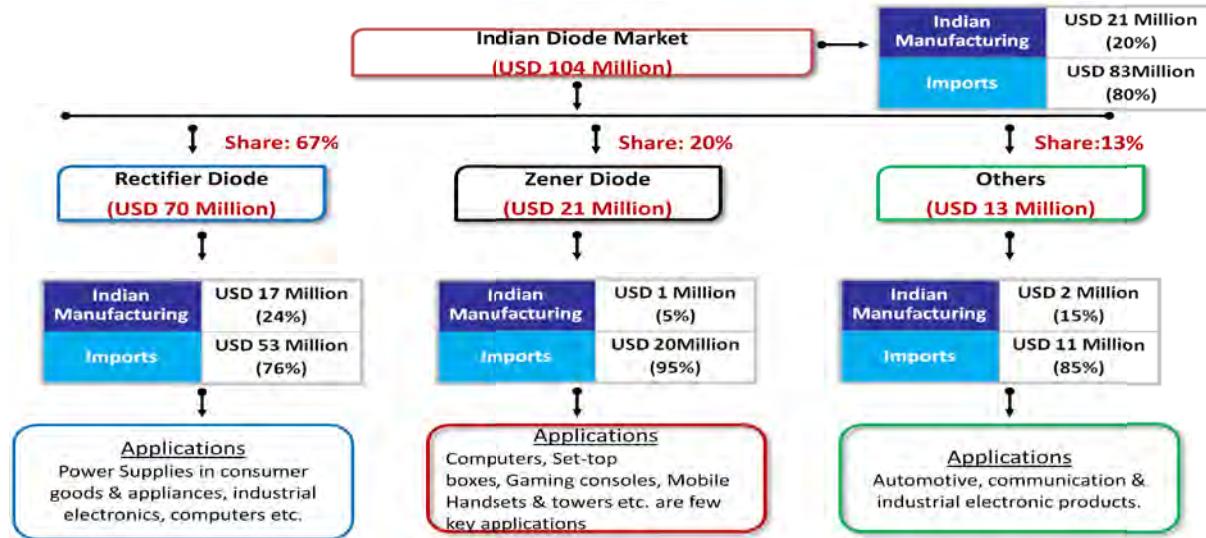


FIGURE 45: TYPES OF DIODE

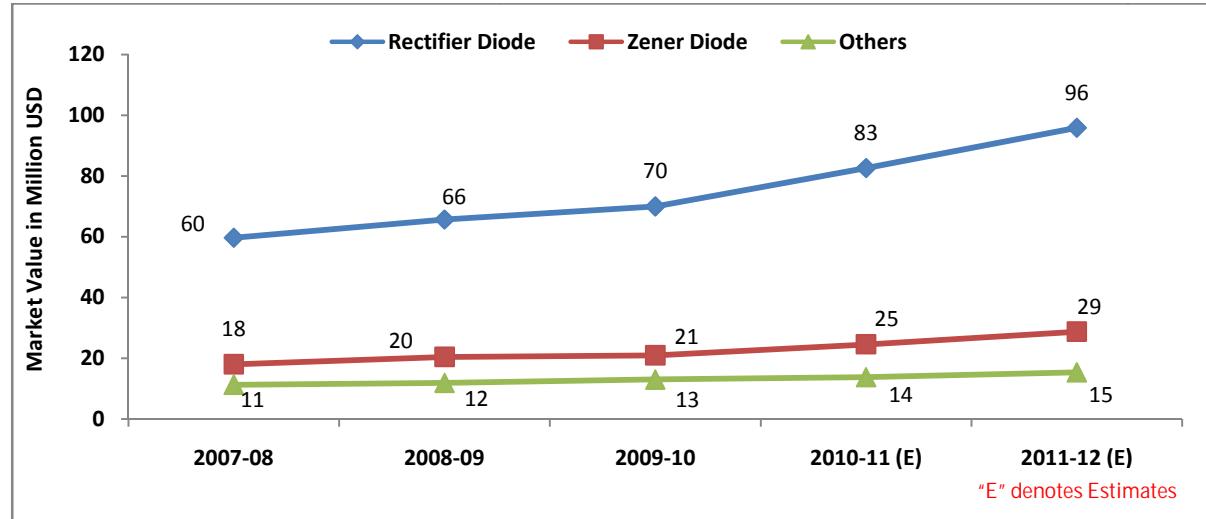


FIGURE 46: TYPES OF DIODE

With the major end-user industries focused on miniaturization, lower power consumption, higher integration and compact packaging, the market for diode is also expected to undergo a major shift. This has driven some of the leading players (like CDIL & Vishay) to revamp their existing set-up to cater to this chip based diodes. According to industry experts, this forward thinking by the Indian manufacturers would help drive the Indian diode market in the future.



4.3.4 INDIAN DIODE MARKET- MARKET SIZE BROKEN BY INDUSTRY SECTORS

The contribution of various application sectors in which Diode are used is shown below:-

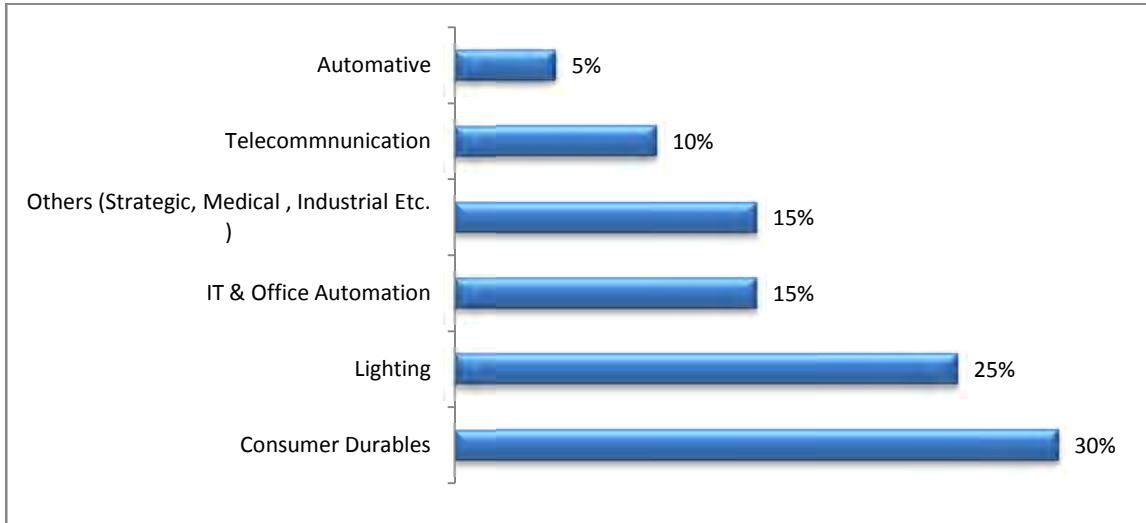


FIGURE 47: INDIAN DIODE MARKET SIZE BY APPLICATION SECTOR

4.3.5 FUTURE TRENDS IN APPLICATION SECTOR GROWTH

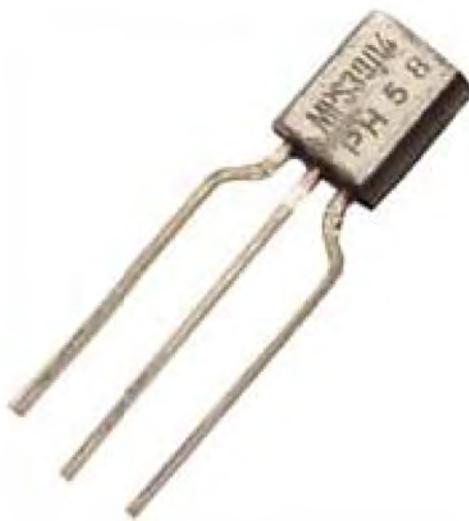
Sl. No.	Application Sector	Growth rate
1	Telecommunication	30%
2	Automotive	25%
3	Consumer Durables	18%
4	IT & Office Automation	20%
5	Medical Electronics	17%
6	Lighting	12%
7	Industrial Electronics	7%
8	Strategic electronics	15%

FIGURE 48: KEY APPLICATION SECTORS - FUTURE GROWTH RATE

4.3.6 DETAILS OF INDIAN DIODE MANUFACTURERS

It is estimated that there are close to 30 diode manufacturing units operating in India with more than 50% of them being classified under small scale industry. Some of the large manufacturers of Diode in India are listed in Table no. 172 in Appendix.

CHAPTER #4.4:- TRANSISTOR



NIC Codes	368.50
HS Codes	8541.21.00



4.4.1 EXECUTIVE SUMMARY

A. Overview of the Indian Transistor Market:

The following table provides an overview of the Indian Transistor market.

Sl. No.	Heads	Description
1	Overall Indian Market Size in FY 2009-10	USD 83 Million
2	Ratio of Imports: Indian Manufacturing in FY 2009-10	80:20
3	Growth in FY 2009-10	1%
4	Export in FY 2009-10	USD 3 Million
5	Market Size by type of Transistor	Bipolar Junction Transistor (BJT), Field Effect Transistor (FET), Metal Oxide Field Effect Transistor (MOSFET), Insulated Gate Bipolar Transistor (IGBT)
6	Key Application Segments	Consumer durables & Lighting
7	Estimated Growth in FY 2010-11	12%
8	Estimated Ratio of Imports : Indian Manufacturing in FY 2010-11	70:30

FIGURE 49: INDIAN TRANSISTOR MARKET- AN OVERVIEW

Salient Aspects of Indian Transistor Industry:-

- Continental Devices India Limited and Bharat Electronics limited are the two leading manufacturers of transistors in India
- Consumer Durable (35%) and lighting (25%) are the two application sectors driving the current demand for Diodes.
- The Indian transistor market is estimated to grow at a CAGR of 11% for the next 3 years and the market size in FY2011-12 is expected to reach USD 104 Million.
- Growing demand in the automotive and consumer durable market are the two key factors that is expected to drive the transistor industry, thus positively affecting its growth rate.
- Insulated Gate Bipolar Transistor (IGBT) and Metal Oxide Field Effect Transistor (MOSFET) are expected to grow at a faster rate compared to the others due to its usage in devices like Power supply units and mobile handsets respectively.

- Non Availability of raw materials like molding compound, silicone wafer, lead frames etc., high import duties on raw material and competitive component pricing from players in China are cited as the key restraints for the transistor manufacturing industry in India
- The share of indigenous production as compared to that of imports is expected to increase as the two major manufacturers namely Continental Devices India limited and Bharat Electronics limited are planning to expand their facilities.

4.4.2 INDIAN TRANSISTOR MARKET- CURRENT & PAST TRENDS

Overall Market size in India(FY 2009-10) = USD 83 Million

The overall market size for transistors in India is estimated at **USD 83 million** for the FY 2009-10 with imports accounting for 80 % of the total market. The transistors are largely imported from China & Taiwan. In addition, a considerable proportion of transistors used in automotive and power electronics are imported from Europe owing to its high quality.

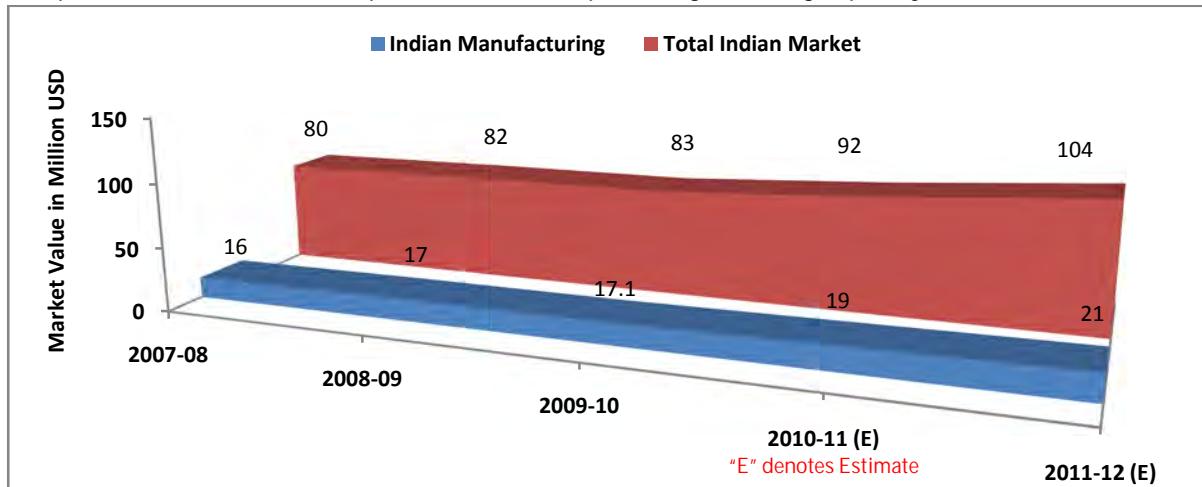


FIGURE 50: INDIAN TRANSISTOR MARKET SIZE

As a ubiquitous component that is found in most modern electronics equipment/gadget, transistors have evolved since it came to its existence in early 1950s. Over the years, the size of transistor has undergone a tremendous change starting from 10 millionth of a meter to 300 billionth of a meter (popularly known as Nano-transistor). The decrease in size of transistor has lead to decrease in size of most of its application product like television, mobile phones etc. The increase tremendous growth of the electronic industry as well as development of newer devices has fuelled the growth of the transistors. The Indian export is estimated to be around USD 3 Million in FY 2009-10. The demand is mainly from markets like South America and Africa.

4.4.3 TYPES OF TRANSISTOR

Transistors are classified based on the types of majority and minority charge carriers introduced in the silicon.

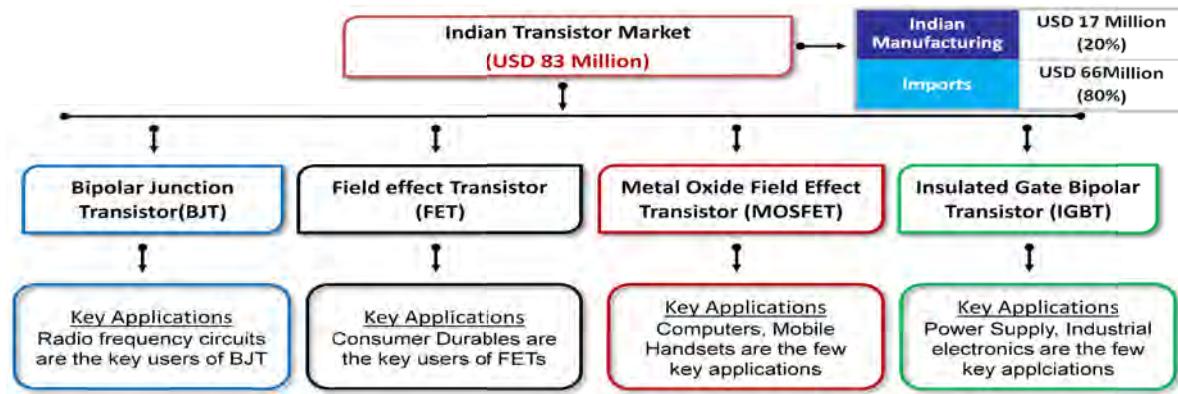


FIGURE 51: TYPES OF TRANSISTOR

With the increase in sales of consumer durables and mobile phone, the Insulated Gate Bipolar Transistor (IGBT) and Metal Oxide Field Effect Transistor (MOSFET) are expected to grow at a faster rate than Bipolar Junction Transistor (BJT) and Field effect Transistor (FET).

Key Technological Trends in Transistors:-

The key technology trends that are expected to drive the Transistor Industry in the next 2-3 years are:-

- Increasing usage of Nano -transistors in ICs sectors like mobile phones, computers etc.
- Advent of lithography-free fabrication would aid in fabricating clean and high graphene devices. This method of fabrication would help in production of Transistor which operates in the GHz. Range. This would be the key driver in RF communication in the next few years.

4.4.4 INDIAN TRANSISTOR MARKET- MARKET SIZE BROKEN BY INDUSTRY SECTORS

The contribution of various application sectors in which Transistor are used is shown below:-

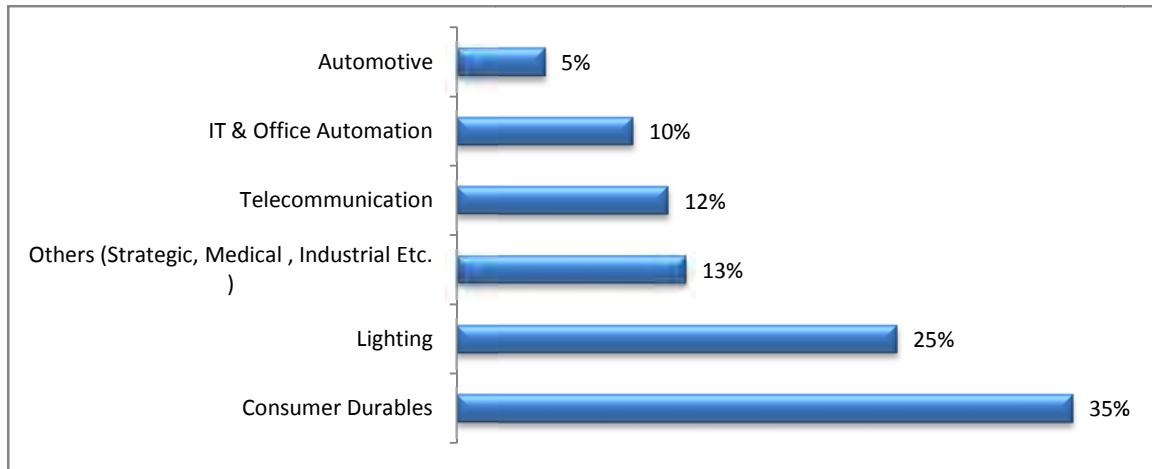


FIGURE 52: INDIAN TRANSISTOR MARKET SIZE- BY APPLICATION

4.4.5 FUTURE TRENDS IN APPLICATION SECTOR GROWTH

Apart from the consumer durable and lighting industry, industries such as telecommunication and automotive which are growing a significant pace are also expected to add to the existing demand of transistors.

Sl. No.	Application Sector	Growth rate
1	Telecommunication	30%
2	Automotive	25%
3	Consumer Durables	18%
4	IT & Office Automation	20%
5	Medical Electronics	17%
6	Lighting	12%
7	Industrial Electronics	7%
8	Strategic electronics	15%

FIGURE 53: KEY APPLICATION SECTORS - FUTURE GROWTH RATE

4.4.6 DETAILS OF INDIAN TRANSISTOR MANUFACTURERS

It is estimated that there are more than 20 Transistor manufacturing units operating in India, with 80% of them being classified under small scale industry. The industry is largely dominated by Trader who import transistor from China & Taiwan. The two dominant players in the Indian market are Continental Devices and BEL. In addition, other companies like Semikron and Arihant manufacture IGBTs for niche industrial products. Some of the large manufacturers of Transistor in India are listed in Table no 173 in Appendix.

CHAPTER #4.5:- LIGHT EMITTING DIODE (LED)



NIC Codes	368.5
HS Codes	8541.40.20



4.5.1 EXECUTIVE SUMMARY

A. Overview of the Indian LED Market:

The following table provides an overview of the Indian LED market.

Sl. No.	Heads	Description
1	Overall Indian Market Size in FY 2009-10	USD 60 Million
2	Ratio of Imports: Indian Manufacturing in FY 2009-10	92:8
3	Growth in FY 2009-10	20%
4	Export in FY 2009-10	Negligible
5	Market Size by type of LED	Miniature LED – USD 10 Million Power LED- USD 50 Million
6	Key Application Segments	Lighting
7	Estimated Growth in FY 2010-11	40%
8	Estimated Ratio of Imports : Indian Manufacturing in FY 2010-11	90:10

FIGURE 54: INDIAN LED MARKET - AN OVERVIEW

Salient Aspects of Indian LED Industry:-

- The requirement of LED is mostly met through imports. Less than 10% of the requirement is manufactured in India.
- Lighting Industry accounts for 83% of the current demand for LED.
- The market is estimated to grow at 40% per annum in the next two years and reach a value of USD 118 Million in FY 2011-12.
- The exponential growth in LED market is driven primarily by the lighting segment. The government's initiative to replace the existing incandescent street lighting with eco-friendly LED lighting is expected to provide a huge opportunity for the growth of LED industry.
- There is a great opportunities to manufacturer LEDs in India as the volume of imports is very high.
- The share of indigenous production is expected to increase in the next few years with large companies planning to expand the existing facilities and new companies planning to set up plants in the next 1-2 years.

- The industry players are looking forward to special incentive from the Government to promote local manufacturing and create awareness of LED lighting among the consumers.

4.5.2 INDIAN LED MARKET- CURRENT & PAST TRENDS

Overall Market size in India(FY 2009-10) = USD 60 Million

The overall market size for the Light Emitting Diode in India is estimated at **USD 60 million** for FY2009-10 with imports accounting for 92% of the total market.

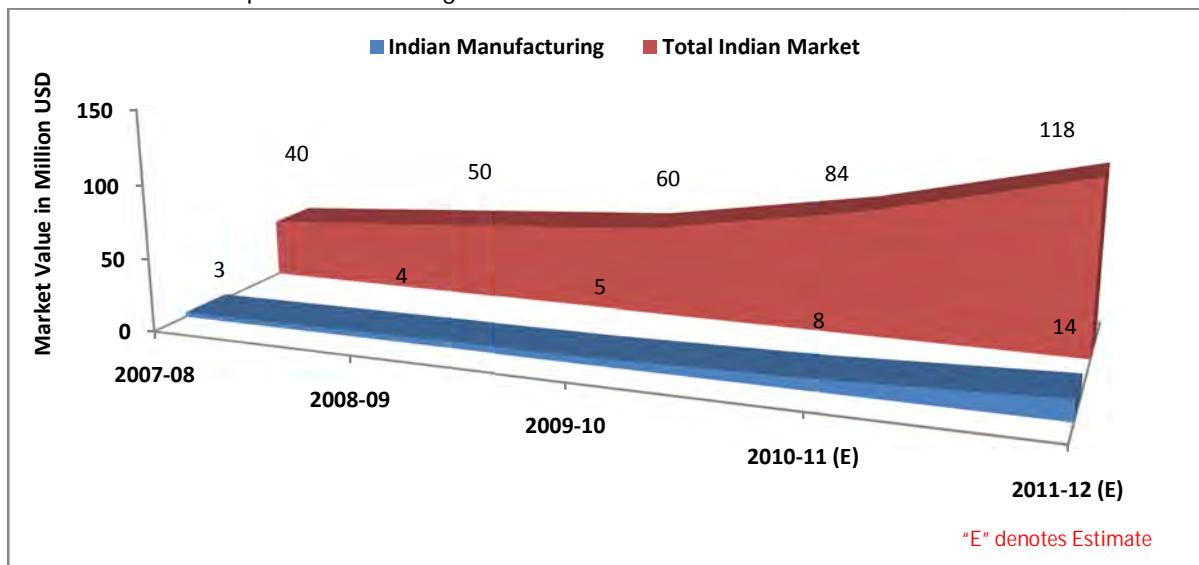


FIGURE 55: INDIAN LED MARKET SIZE

The LED market has been witnessing exponential growth in the last few years. This is largely attributed to the increase in usage of LEDs in the Lighting Industry. Higher luminary efficacy, better energy efficiency, lower maintenance cost and longer life has resulted in a significantly higher demand for LED lighting in both industrial and consumer segments.

The current share of indigenous production is only 8% of the total demand. The key challenges hampering local production are issues related to component pricing, IP (Intellectual Property) and cross licensing. In addition, lack of end product manufacturing also act as a deterrent to increased manufacturing of LED in India. Most manufacturers believe that it would take 4-5 years for Indian manufacturers to start manufacturing LED in India.

The industry players have been lobbying with the government to formulate policies and standard for LED products in addition to provide special incentive to encourage companies to invest in this sector. These initiatives (if approved by the Government) is expected to drive the LED products and, subsequently, the LED chip manufacturing opportunities in India

4.5.3 TYPES OF LED

Light emitting diodes (LED) are largely classified basis the application or usage. Some of the popular classifications are as follows:-

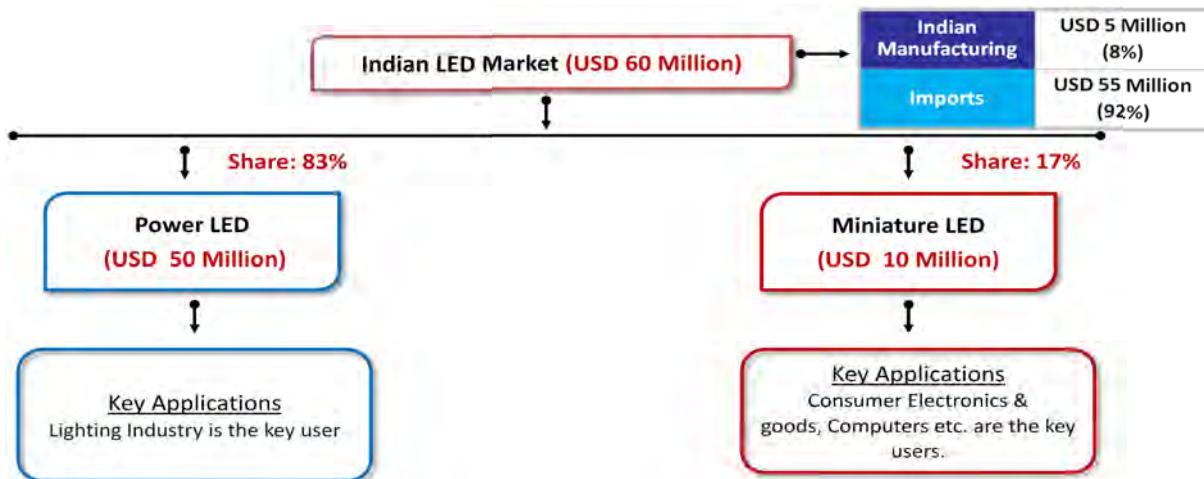


FIGURE 56: TYPES OF LED

With the large business and manufacturing plants moving to LED lighting instead of CFL lighting the demand for power LED is expected to increase in the next 1-2 years. Apart from the increasing demand for LED TVs is also expected to drive the demand for Power LEDs.

4.5.4 INDIAN LED MARKET- MARKET SIZE BROKEN BY INDUSTRY SECTORS

The contribution of various application sectors in which LED are used is shown below:-

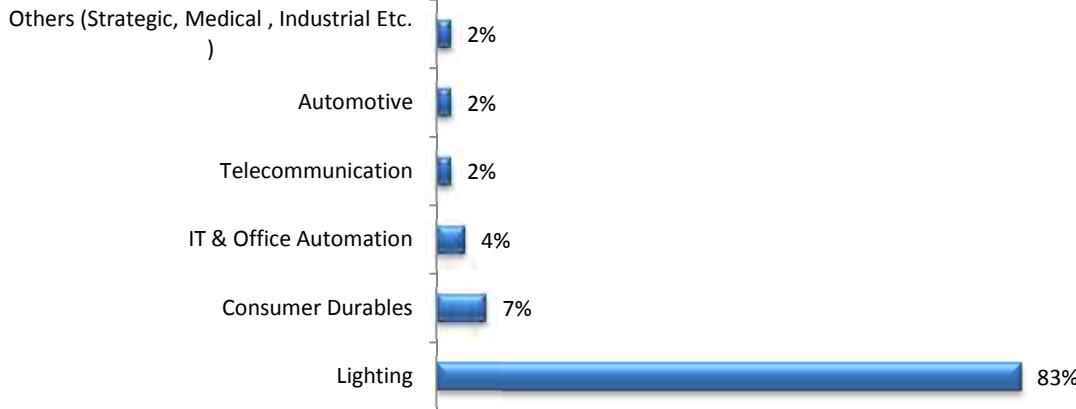


FIGURE 57: INDIAN LED MARKET SIZE - BY APPLICATION SECTOR

4.5.5 FUTURE TRENDS IN APPLICATION SECTOR GROWTH

In the post recession period, most sectors project a positive outlook. With sectors like Lighting & Consumer durables showing a significant growth, the growth of LED is evident. One of the popular applications of LEDs apart from Lighting fixtures in the future is the signage industry i.e. signs outside the stores & outdoor advertising.

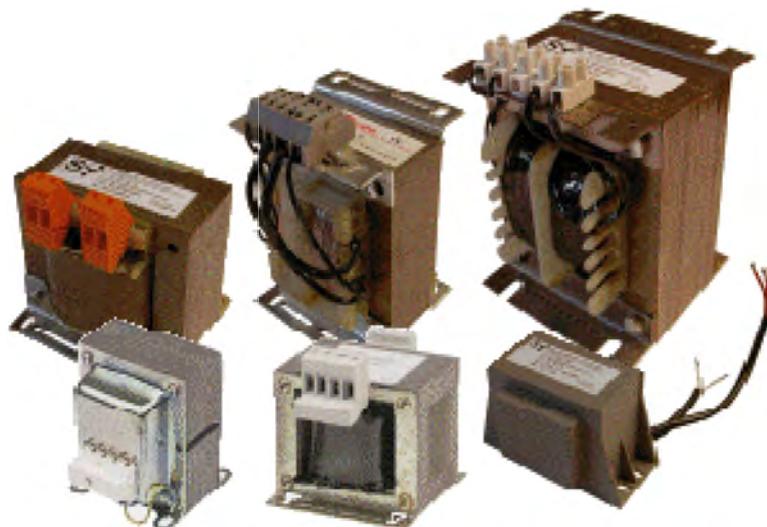
Sl. No.	Application Sector	Growth rate
1	Telecommunication	30%
2	Automotive	25%
3	Consumer Durables	18%
4	IT & Office Automation	20%
5	Medical Electronics	17%
6	Lighting	12%
7	Industrial Electronics	7%
8	Strategic electronics	15%

FIGURE 58: KEY APPLICATION SECTORS - FUTURE GROWTH RATE

4.5.6 DETAILS OF LED MANUFACTURERS

It is estimated that there are only about 8-10 LED manufacturing units operating in India, with a majority of them being classified under small scale industry. Some of the large manufacturers of LED in India are listed in Table no. 174 in Appendix

CHAPTER #4.6:-WOUND COMPONENTS



NIC Codes	360.2
HS Codes- Inductor	8504.50
HS Codes-Choke Coils	8504.50.10
HS Codes-Other Chokes	8504.50.90
HS Codes- Transformer	8504.31.00



4.6.1 EXECUTIVE SUMMARY

A. Overview of the Indian Wound Component Market:

The following table provides an overview of the Indian Wound Component market.

Sl. No.	Heads	Description
1	Overall Indian Market Size in FY 2009-10	USD 1413 Million
2	Ratio of Imports: Indian Manufacturing in FY 2009-10	70:30
3	Growth in FY 2009-10	12%
4	Export in FY 2009-10	USD 17 Million
5	Market Size by type of Wound Components	Transformers – USD 922 Million Inductor – USD 322 Million Chokes- USD 99 Million
6	Key Application Segments	Consumer Durables, Industrial, Medical electronics.
7	Estimated Growth in FY 2010-11	20%
8	Estimated Ratio of Imports : Indian Manufacturing in FY 2010-11	70:30

FIGURE 59: INDIAN WOUND COMPONENT MARKET - AN OVERVIEW

Salient Aspects of Indian Wound Component Industry:-

- The Indian wound components market is primarily dominated by small scale indigenous manufacturers
- Growth has been largely driven by growth in the Consumer Durables, Medical electronics and Industrial electronics.
- The Indian wound component market has been witnessing a steady growth in the last few years and is estimated to reach USD 2035 Million in FY 2011-12. This growth is expected to be driven by the steady growth in consumer durables which are expected to grow at 18%.
- Most of the demand of Inductors is met by Indigenous manufacturing; Chokes & Transformers are largely imported from China, Taiwan and South Korea.



- Requirement of lower initial investment, availability of inexpensive labor, qualified professional and suitable infrastructure facilities are some of key reasons for the presence of large number of small scale indigenous manufacturers in the country.

4.6.2 INDIAN WOUND COMPONENT MARKET- CURRENT & PAST TRENDS

Overall Market size in India(FY 2009-10) = USD 1413 Million

The overall market size for the wound component in India is estimated at USD 1413 million for the FY 2009-10 with indigenous manufacturing contributing close to 30% of the demand. The wound components, especially chokes and transformers, are imported largely from China, Taiwan and South Korea. Most of the demand for inductor is met by indigenous manufacturing.

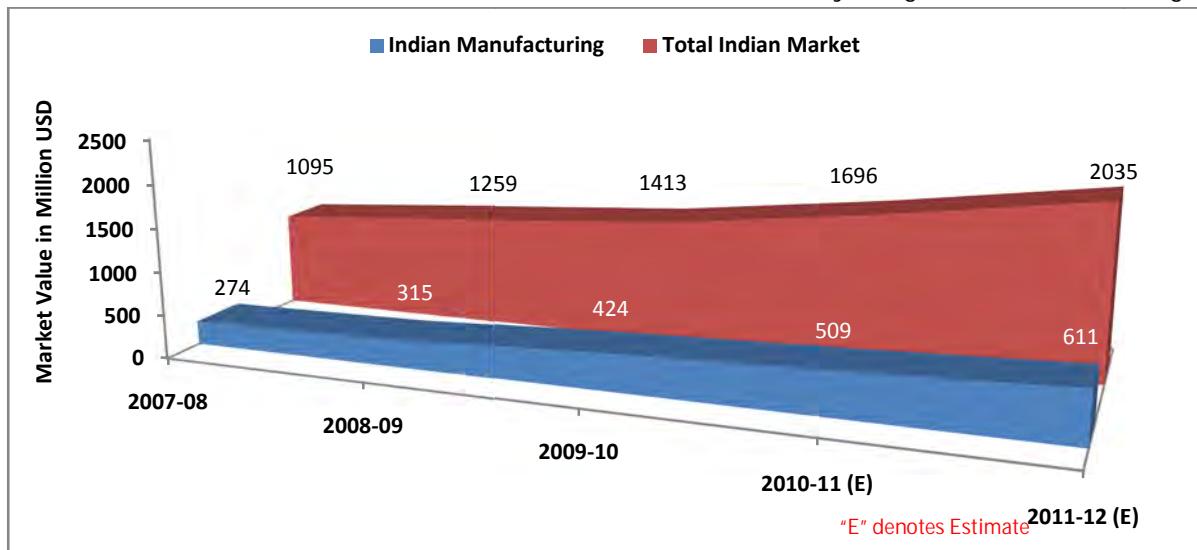


FIGURE 60: INDIAN WOUND COMPONENT MARKET SIZE

The domestic production witnessed a significant growth during FY 2009-10, thus, increasing the share of indigenous manufacturing. This was largely because of the decrease in imports from countries like China and Taiwan during the economic slowdown. Even with the revival of the global economy, the Indian manufacturers are expected to continue maintaining their share in the overall market.

Apart from the large small scale sector that exists, India also has a few very large companies in India which manufacture wound components in India and also exports them to the global markets. The key export markets include Singapore, Malaysia, UK and South America with the total export estimated at USD 17 Million for FY 2009-10.

4.6.3 TYPES OF WOUND COMPONENTS

Wound components are normally classified based on the usage. The following is the breakup of the wound components market:

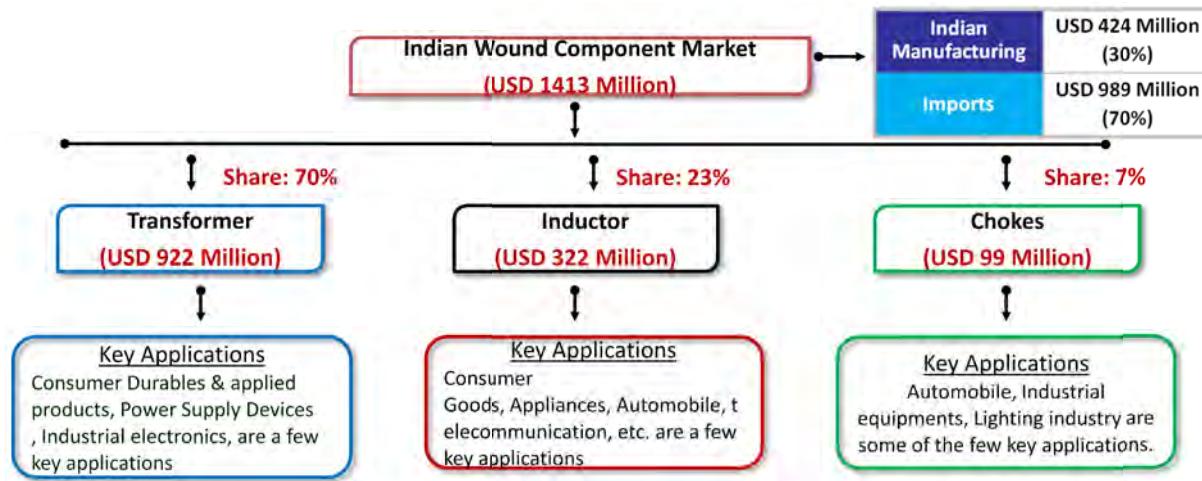


FIGURE 61: TYPES OF WOUND COMPONENTS

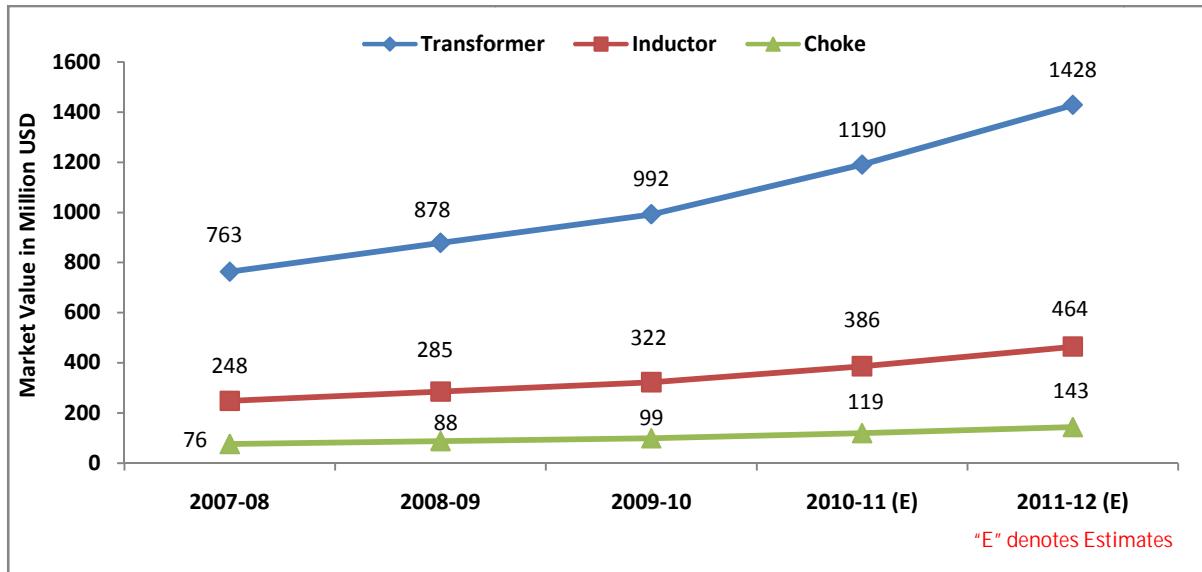


FIGURE 62: TYPES OF WOUND COMPONENTS



4.6.4 INDIAN WOUND COMPONENT MARKET- MARKET SIZE BROKEN BY INDUSTRY SECTORS

The contribution of various application sectors in which Wound Components are used is shown below:-

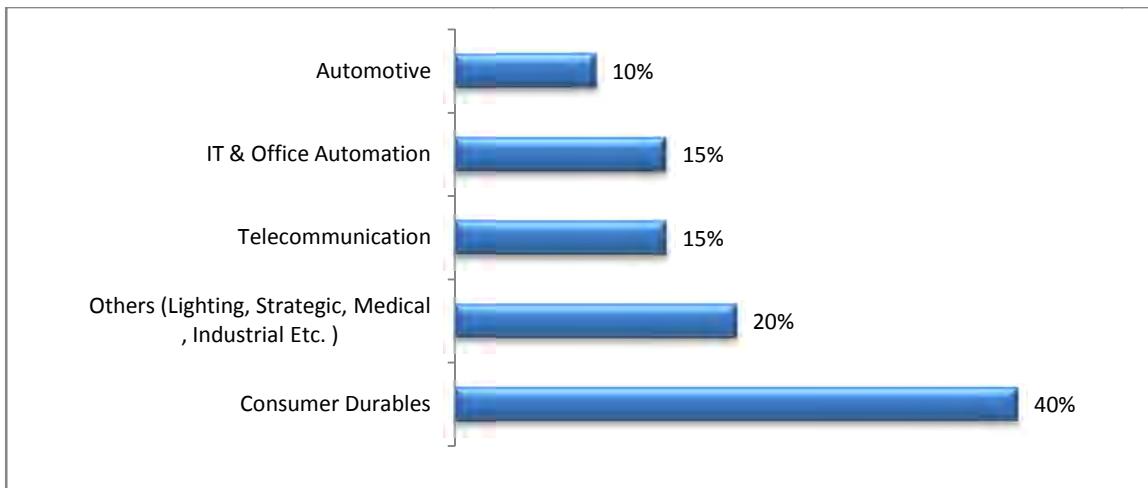


FIGURE 63: INDIAN WOUND COMPONENT MARKET SIZE – BY APPLICATION SECTOR

4.6.5 FUTURE TRENDS IN APPLICATION SECTOR GROWTH

The growth in consumer durable sector followed by lighting, Medical, industrial is expected to drive the demand for wound components significantly.

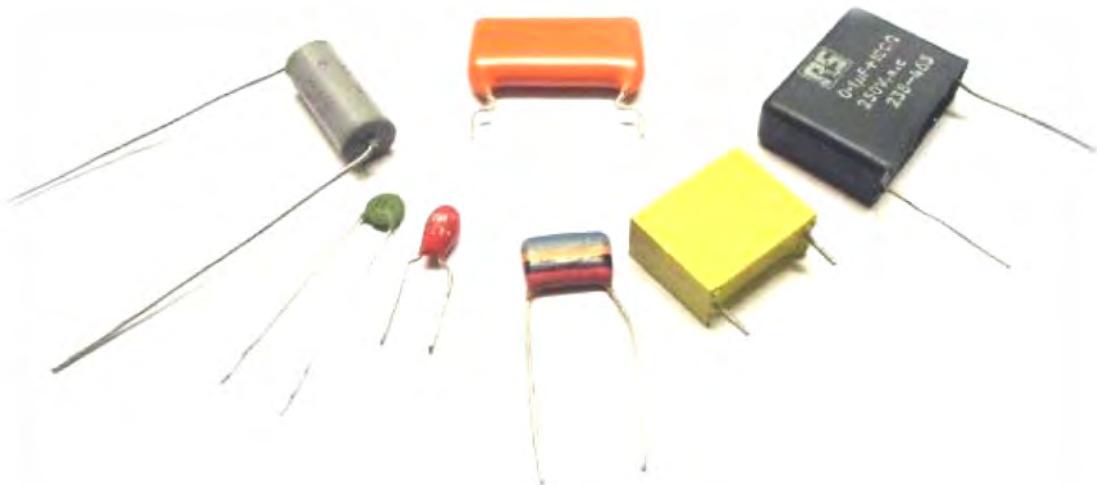
Sl. No.	Application Sector	Growth rate
1	Telecommunication	30%
2	Automotive	25%
3	Consumer Durables	18%
4	IT & Office Automation	20%
5	Medical Electronics	17%
6	Lighting	12%
7	Industrial Electronics	7%
8	Strategic electronics	15%

FIGURE 64: KEY APPLICATION SECTORS - FUTURE GROWTH RATE

4.6.6 DETAILS OF INDIAN WOUND COMPONENTS MANUFACTURERS

It is estimated that there are more than 200 Wound Component Manufacturing units operating in India, with most of them being classified as small scale industry. Some of the Key manufacturers of Wound Components in India are listed in Table no 175 in Appendix.

CHAPTER #4.7:- CAPACITORS



NIC Codes	368.2
HS Codes – Capacitors	8532.00.00
HS Codes – Aluminum Electrolyte	8532.22.00
HS Codes- Plastic/Metal/BOPP Film	8532.25.00
HS Codes-Multilayer	8532.24.00
HS Codes-Ceramic	8532.23.00
HS Codes-Tantalum	8532.21.00



4.7.1 EXECUTIVE SUMMARY

A. Overview of the Indian Capacitor Market:

The following table provides an overview of the Indian Capacitor market.

Sl. No.	Heads	Description
1	Overall Indian Market Size in FY 2009-10	USD 269 Million
2	Ratio of Imports: Indian Manufacturing in FY 2009-10	82:18
3	Growth in FY 2009-10	10%
4	Export in FY 2009-10	USD 40 Million
5	Market Size by type of Capacitors	Electrolytic Capacitors - USD 101 Million Film Capacitors- USD 89 Million Ceramic Capacitors - USD 57 Million Other Capacitors - USD 22 Million
6	Key Application Segments	Consumer Durables & Telecommunication
7	Estimated Growth in FY 2010-11	13%
8	Estimated Ratio of Imports : Indian Manufacturing in FY 2010-11	82:18

FIGURE 65: INDIAN CAPACITOR MARKET - AN OVERVIEW

Salient Aspects of Indian Capacitor Industry:-

- Consumer Durables (35%) and Telecom (20%) are two of the largest demand drivers for capacitors in India
- The market is estimated to grow at 13% and 14% respectively in FY 2010-11 and FY 2011-12 to reach a value of USD 346 Million in FY 2011-12. The growth will continue to be driven by Consumer Durables and Telecom which are expected to grow at 18% and 30% respectively.
- Imports contribute a significant share to the total Indian capacitor market. Most Indian manufacturers largely produce film and electrolytic capacitors
- Ceramic capacitors are largely imported. Lack of availability of ceramic coupled with lack of technology to produce cost effective capacitors hinder the production of ceramic capacitors in India.

- The capacitor manufacturers are concerned about the increasing cost of raw materials and the decreasing revenue realization on the final component. The decreasing revenue realization is largely due to the availability of cheaper import options for capacitors

4.7.2 INDIAN CAPACITOR MARKET- CURRENT & PAST TRENDS

Overall Market size in India(FY 2009-10) = USD 269 Million

The overall market size for Capacitors in India is estimated at USD 269 million for the FY 2009-10. Local manufacturing accounts for 18% of the total market while the rest is accounted for by imports.

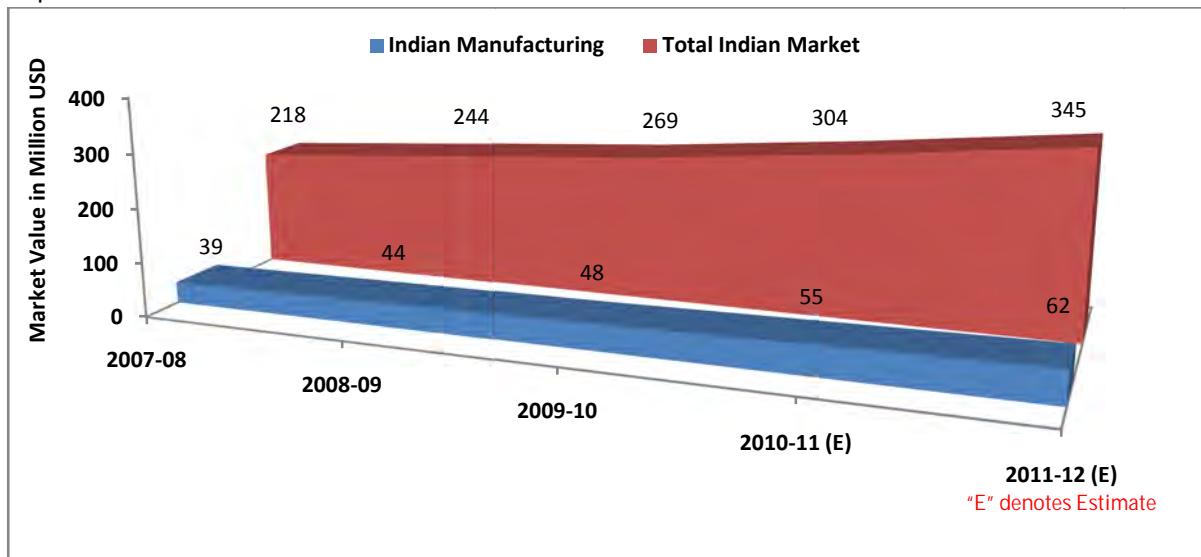


FIGURE 66: INDIAN CAPACITOR MARKET SIZE

FY 2009-10 saw a growth of 10% in the capacitor market. This has largely been driven by the increased demand for consumer electronics and telecommunication products post the recession. With telecommunication and consumer durables category expected to witness robust growths in the near future, the market for capacitor is also expected to record a growth of 13% in FY 2010-11. Technology developments are expected to further fuel this sector in the near future.

Indian capacitor manufacturers largely manufacture film capacitors while the other capacitors are largely imported. The film capacitors manufactured in India are also exported to countries like Europe, Hong Kong, Thailand, Philippines, Malaysia, South Korea and Middle East. The export market for capacitors is estimated at USD 40 Million in FY 2009-10.

4.7.3 TYPES OF CAPACITORS

Capacitors are classified based on their dielectric used. They are broadly classified into 4 types of capacitors as detailed below:

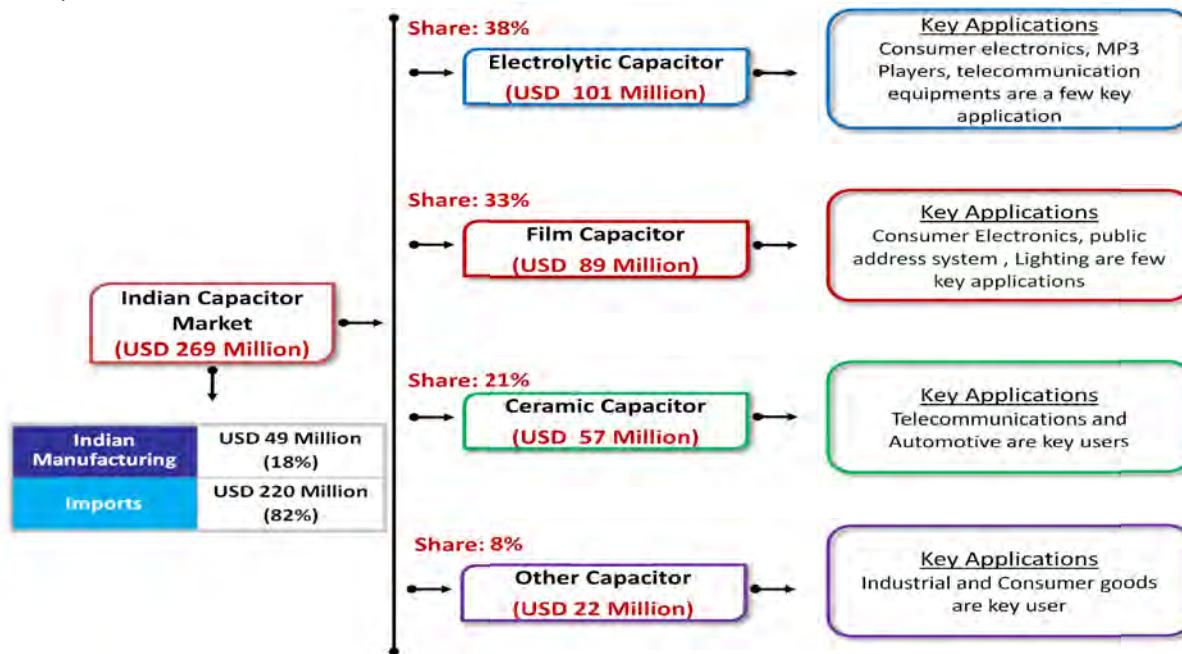


FIGURE 67: TYPES OF CAPACITORS

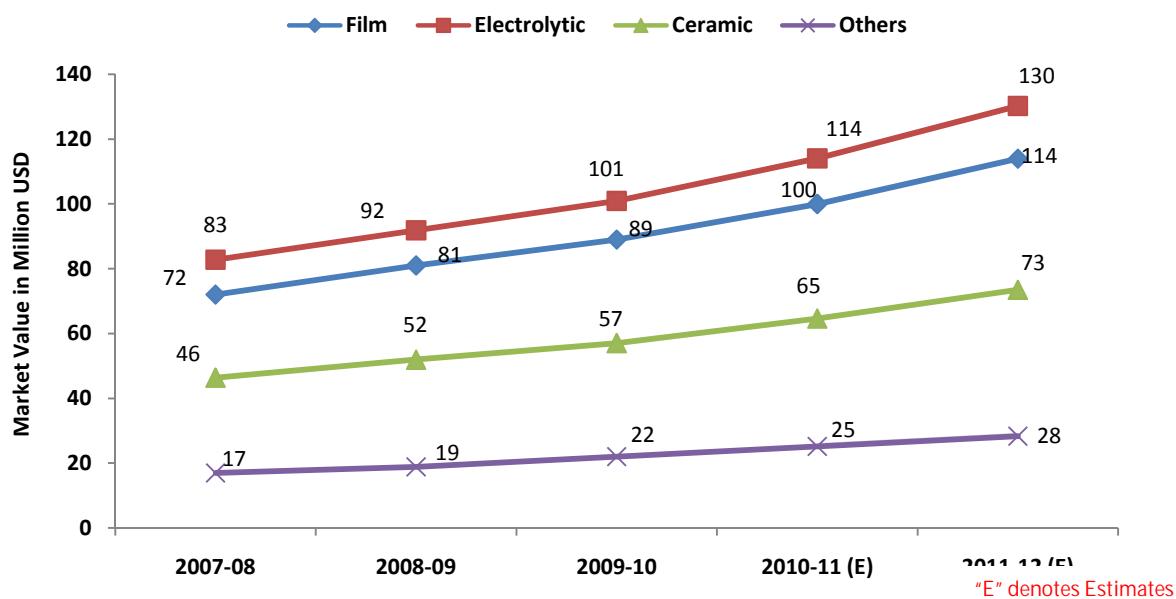


FIGURE 68: TYPES OF CAPACITORS

Key Technology Trends in Capacitors:-

Several experiments are currently on to design and develop capacitors that can hold the charge for a longer period. This will enable them to be used in several other fields. Some of the global trends in capacitors include the following:

- With the world moving towards developing energy efficient devices, super capacitors and ultra capacitors are gaining importance.
 - o Super capacitors are expected to replace traditional storage battery as these have a lower discharge loss than traditional storage battery.
 - o Ultra capacitors are expected to help us in engaging fuel efficient transport as well as in renewable energy.
- Niobium oxide (NbO) capacitors are being increasingly preferred over the conventional Aluminum electrolyte capacitors as these capacitors have stable electrical parameters like capacitance, ESR, leakage current. These features make it more suitable for being used in Audio devices, PCs, Automobiles and miniature devices like portable digital sound processors, echoes, gates, microphone amplifiers, DVD players etc.

4.7.4 INDIAN CAPACITOR MARKET - MARKET SIZE BROKEN BY INDUSTRY SECTORS

The contribution of various application sectors in which Capacitors are used is shown below:-

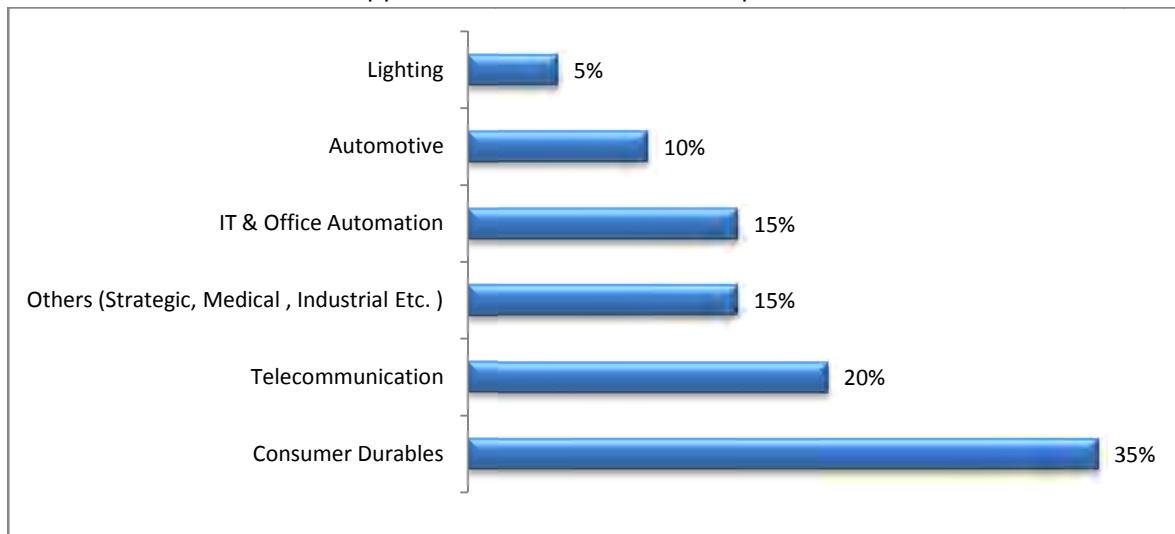


FIGURE 69: INDIAN CAPACITOR MARKET SIZE - BY APPLICATION SECTOR



4.7.5 FUTURE TRENDS IN APPLICATION SECTOR GROWTH

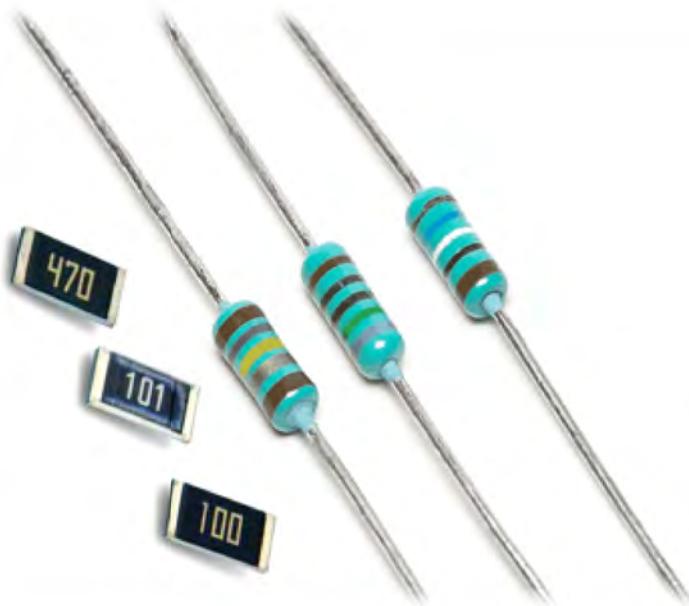
Sl. No.	Application Sector	Growth rate
1	Telecommunication	30%
2	Automotive	25%
3	Consumer Durables	18%
4	IT & Office Automation	20%
5	Medical Electronics	17%
6	Lighting	12%
7	Industrial Electronics	7%
8	Strategic electronics	15%

FIGURE 70: KEY APPLICATION SECTORS - FUTURE GROWTH RATE

4.7.6 DETAILS OF INDIAN CAPACITOR MANUFACTURERS

The market is dominated by three major players namely Epcos India Pvt. Ltd., Deki Electronics Limited and Vishay Component India Pvt. Ltd, which are profiled in Table no. 176 in Appendix

CHAPTER #4.8:- RESISTORS



NIC Codes	368.30
HS Codes	8533.10.00/ 8533.31.90



4.8.1 EXECUTIVE SUMMARY

A. Overview of the Indian Resistor Market:

The following table provides an overview of the Indian resistor market.

Sl. No.	Heads	Description
1	Overall Indian Market Size in FY 2009-10	USD 81 Million
2	Ratio of Imports: Indian Manufacturing in FY 2009-10	73: 27
3	Growth in FY 2009-10	12%
4	Export in FY 2009-10	USD 2.83 Million
5	Market Size by type of resistors	Wire wound Resistor-(USD 20Million) Thin Film Resistor – (USD 30 Million) Other Resistor- (USD 31 Million)
6	Key Application Segments	Consumer Durables & Telecommunication
7	Estimated Growth in FY 2010-11	15%
8	Estimated Ratio of Imports : Indian Manufacturing in FY 2010-11	80:20

FIGURE 71: INDIAN RESISTOR MARKET - AN OVERVIEW

Salient Aspects of Indian Resistor Industry:-

- The resistor market in India is largely dominated by the top 5-6 manufacturers.
- Key sectors driving the resistor market in India are Telecom & Consumer Durables.
- The market is expected to grow at 15% per annum in the next two years to reach a value of USD 111 million in FY 2011-12. This growth is largely driven by Telecommunication, consumer durable and automotive sectors.
- Thin film and chip resistor currently have relatively lower demand in the Indian market. This trend is an indication of the lack of specialized electronic products manufacturing in the country that use such resistors. However, most manufacturers still perceive that the future of resistor manufacturing lies in the thick film and chip resistor.

4.8.2 INDIAN RESISTOR MARKET- CURRENT & PAST TRENDS

Overall Market size in India(FY 2009-10) = USD 81 Million

The overall market size for the Resistors in India is estimated at **USD 81 million** for FY 2009-10 with indigenous manufacturing contributing about 27% of the total demand.

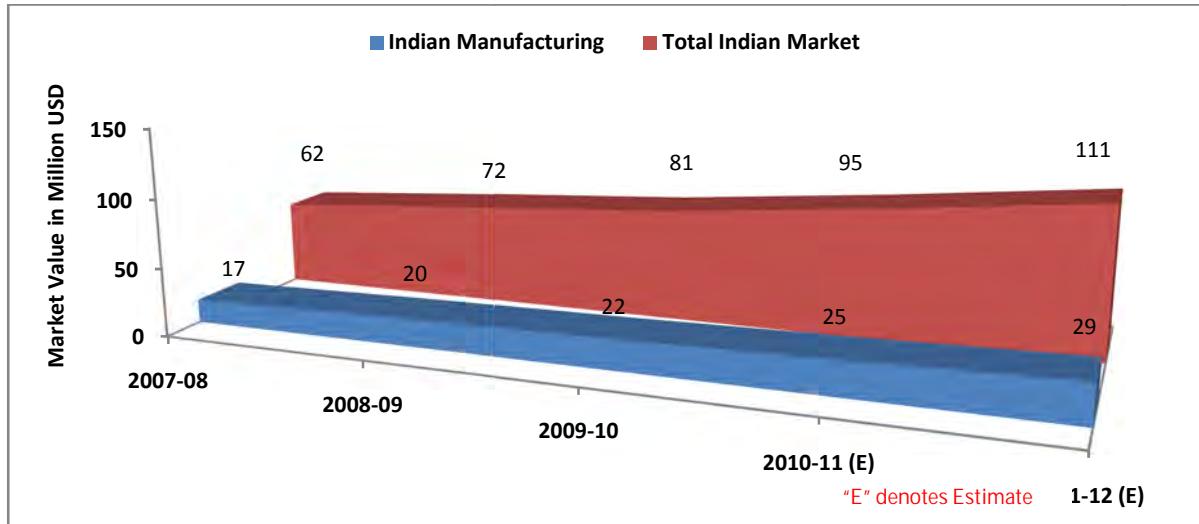


FIGURE 72: INDIAN RESISTOR MARKET SIZE

The Resistor market has shown a steady growth in FY 2009-10, mirroring the growth of the electronics industry. The market is expected to grow at about 15% in the next one year. This is driven by the increased demand for products like consumer electronics, and telecom electronics in the Indian market.

Some of the leading manufacturers cater to both the local demand as well as the growing international market. These manufacturers export to countries like Australia, Germany, UK, Spain, Sweden, Switzerland, Hong Kong, Russia, Middle East and Brazil. The export market is estimated to be around USD 2.83 Million in FY 2009-10.

4.8.3 TYPES OF RESISTORS

Conventionally, Resistors are classified into Fixed & Variable Resistors. However the manufacturers classify the resistors based on the manufacturing process. The popular classifications are listed in the following figure:-

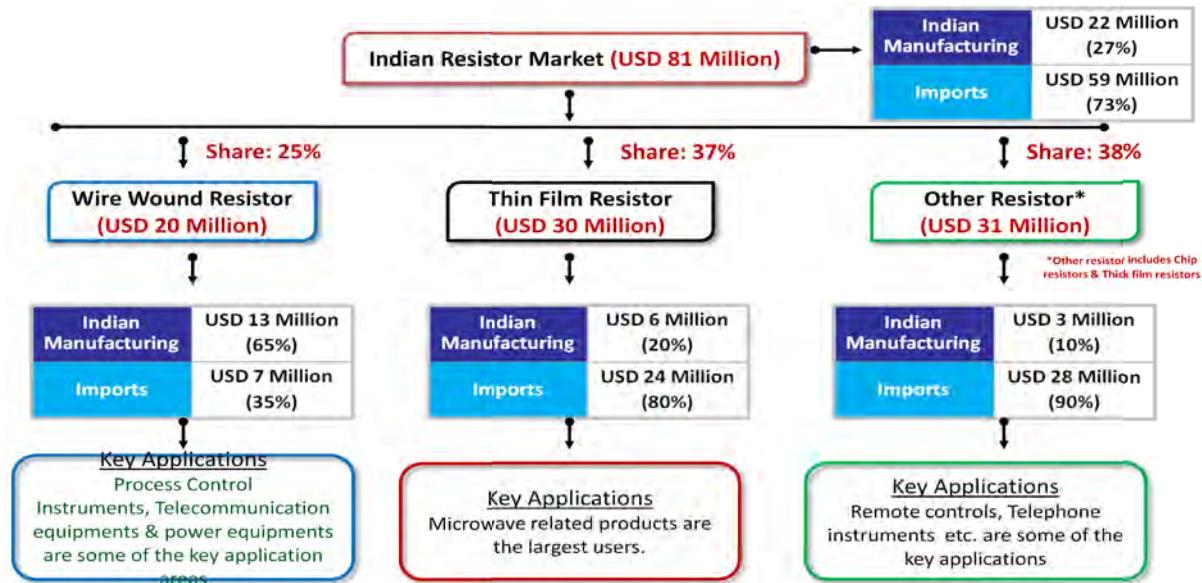


FIGURE 73: TYPES OF RESISTORS

Wire wound resistor is the most commonly manufactured resistor type in India followed by thin film resistor. This could be due to the fact that these manufacturing plants do not need significant capital investments and are labor intensive setups. In case of other types of resistors, the demand is largely met through imports from countries like China, Taiwan and parts of Europe.

Most manufacturers cite the unavailability of raw materials, high initial investment cost and rising infrastructure cost as some of the restraints that is negatively impacting growth in the resistor market in India. However, many manufacturers have of late realized the high revenue returns in this business, and are planning to explore manufacturing chip resistors in the near future.

Key Technology Trends in Resistors:-

Miniaturization of electronic product, which is expected to grow significantly over the next few years, will require chip resistors. Chip resistors have lower resistance and low temperature coefficient of resistance, making it suitable for use in power supply circuit.

India is yet to see widespread use of Hybrid and contactless potentiometers. It is expected that these will replace the conventional potentiometers in the near future. These potentiometers are used as position sensors in automotive industry and in the field of Robotics.



4.8.4 INDIAN RESISTOR MARKET- MARKET SIZE BROKEN BY INDUSTRY SECTORS

The contribution of various application sectors in which Resistors are used is shown below:-

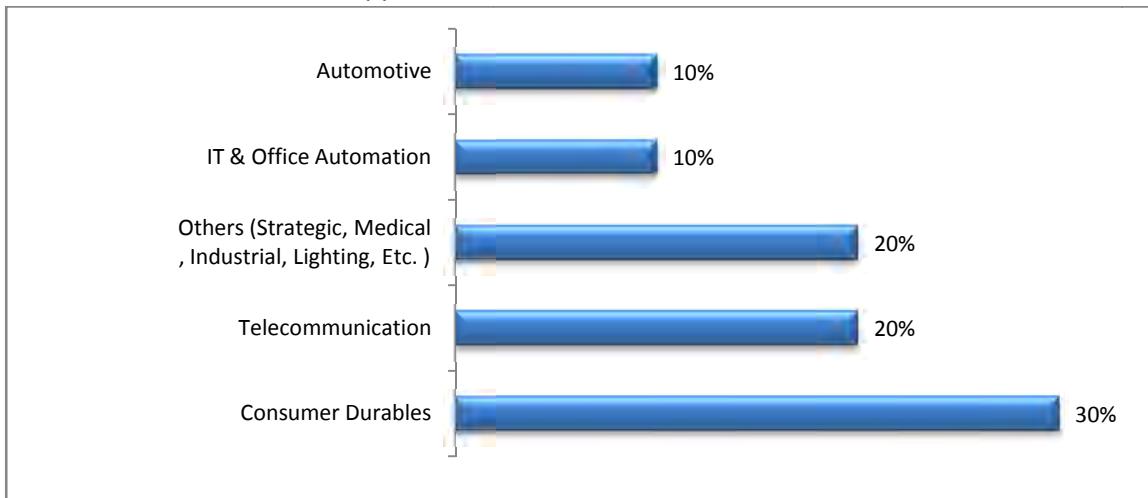


FIGURE 74: INDIAN RESISTORS MARKET SIZE - BY APPLICATION SECTOR

4.8.5 FUTURE TRENDS IN APPLICATION SECTOR GROWTH

Some of the key application sectors of resistors with high growth rate are telecommunications (30%), automotive (25%) and IT & Office automation (20%).

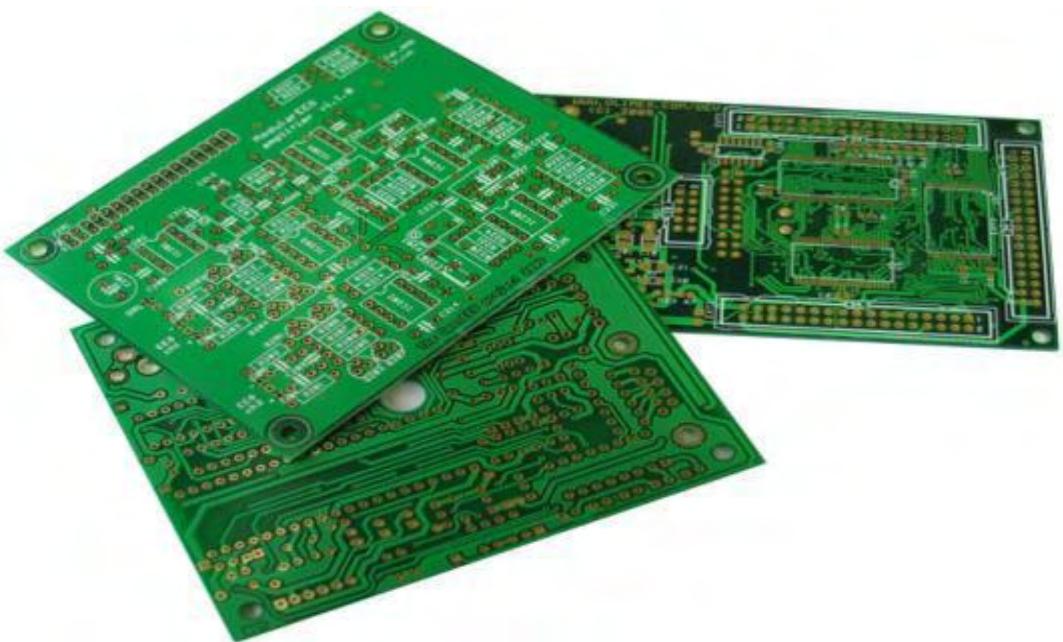
Sl. No.	Application Sector	Growth rate
1	Telecommunication	30%
2	Automotive	25%
3	Consumer Durables	18%
4	IT & Office Automation	20%
5	Medical Electronics	17%
6	Lighting	12%
7	Industrial Electronics	7%
8	Strategic electronics	15%

FIGURE 75: KEY APPLICATION SECTORS - FUTURE GROWTH RATE

4.8.6 DETAILS OF INDIAN RESISTOR MANUFACTURERS

The major share of the Indian resistor market is contributed by the top 6 players, namely Vishay Components, Stead Electronics, Hi-tech Resistors, Cermet Resistronics, Watts Electronics & PEC. Some of the large resistor manufacturers in India are listed in Table no. 177 in Appendix

CHAPTER #4.9:- PRINTED CIRCUIT BOARDS (PCBs)



NIC Codes	368.40
HS Codes	8534.00.00



4.9.1 EXECUTIVE SUMMARY

A. Overview of the Indian PCB Market:

The following table provides an overview of the Indian PCB market.

Sl. No.	Heads	Description
1	Overall Indian Market Size in FY 2009-10	USD 630 Million
2	Ratio of Imports: Indian Manufacturing in FY 2009-10	75:25
3	Growth in FY 2009-10	10%
4	Export in FY 2009-10	USD 52 Million
5	Market Size by type of PCB	Single Sided PCBs- USD 280 Million Multi Layered PCBs- USD 350 Million
6	Key Application Segments	Telecommunication & Consumer Durables
7	Expected Growth in FY 2010-11	12%
8	Estimated Ratio of Imports : Indian Manufacturing in FY 2010-11	60:40

FIGURE 76: INDIAN PRINTED CIRCUIT BOARD (PCB) MARKET - AN OVERVIEW

Salient Aspects of Indian Printed Circuit Board Industry:-

- Multinational companies dominate the Indian manufacturing of PCBs
- Telecommunication(30%) and Consumer Durables(25%) are the two largest sectors that account for the major portion of the current demand for PCBs
- The market is estimated to grow at 12% per annum in the next two years and reach a value of USD 819 Million in FY 2011-12. The growth will be driven by telecommunication and automobile sectors which are expected to grow at 30% and 25% respectively.
- Single sided Printed Circuit Boards dominate the Indian production. Multi layered Printed Circuit Boards are imported mainly from China and countries in Europe. The use of Multi layered PCB is expected to grow faster than that of single sided printed circuit boards.
- Around 25% of the PCBs manufactured by the Indian manufacturers are exported to countries in Europe, Middle East and South America. This is driven by the fact that many



of the western countries are moving to Third world countries because of strict environmental restrictions in production of PCBs in these countries.

- The share of indigenous production as compared to that of imports is expected to increase as the current manufacturers are planning to expand the production capacity of the units in India in a big way.

4.9.2 INDIAN PCB MARKET- CURRENT & PAST TRENDS

Overall Market size in India(FY 2009-10) = USD 630 Million

The overall market size for PCBs in India is estimated at **USD 630 million** for the FY 2009-10 with imports accounting for 75 % of the market. The PCBs are imported mainly from China, Taiwan, Japan and South Korea. In addition, a significant portion of the PCB's used in the automotive sector is imported from Europe.

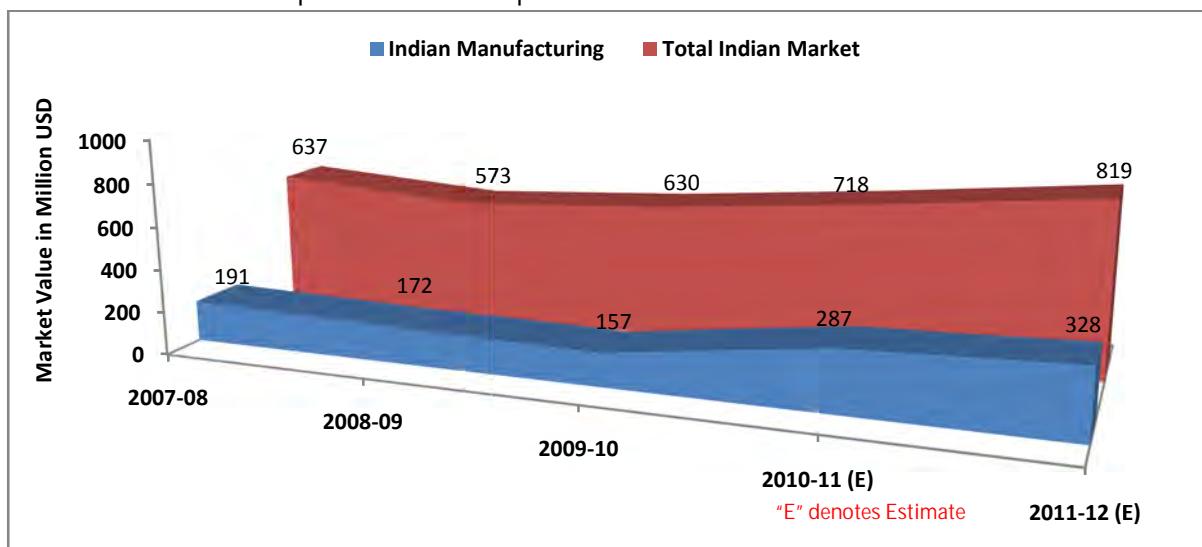


FIGURE 77: INDIAN PRINTED CIRCUIT BOARD MARKET SIZE

Over the years, PCBs have evolved from uncomplicated single and double-sided, plated through-hole (pth) to multi-layered PCBs. The multilayered PCBs are expected to grow at a higher rate in future as the user industries are likely to switch to multilayered PCB for many applications. The current share of indigenous production is only 25 % of the total demand. The main reasons for the lower share of Indigenous production are as follows:-

- Large Capital investments required for setting up PCB manufacturing unit, inhibiting manufacturers to set up new units especially for manufacturing multilayered PCBs which is expected to grow at a significant rate.

- Lack of availability of skilled labor
- Lack of availability of raw materials like, pure grade silicon, Copper laminates, required for fabrication of the printed circuit boards.
- Lack of availability of raw materials at competitive prices.
- Lack of access to new technology

As for exports, some of the leading manufacturers like AT&S and Ascent Circuits export PCBs to Europe, North America and South America. The exports are estimated at USD 52 million in FY 2009-10 and it is expected to grow significantly in future.

4.9.3 TYPES OF PRINTED CIRCUIT BOARDS

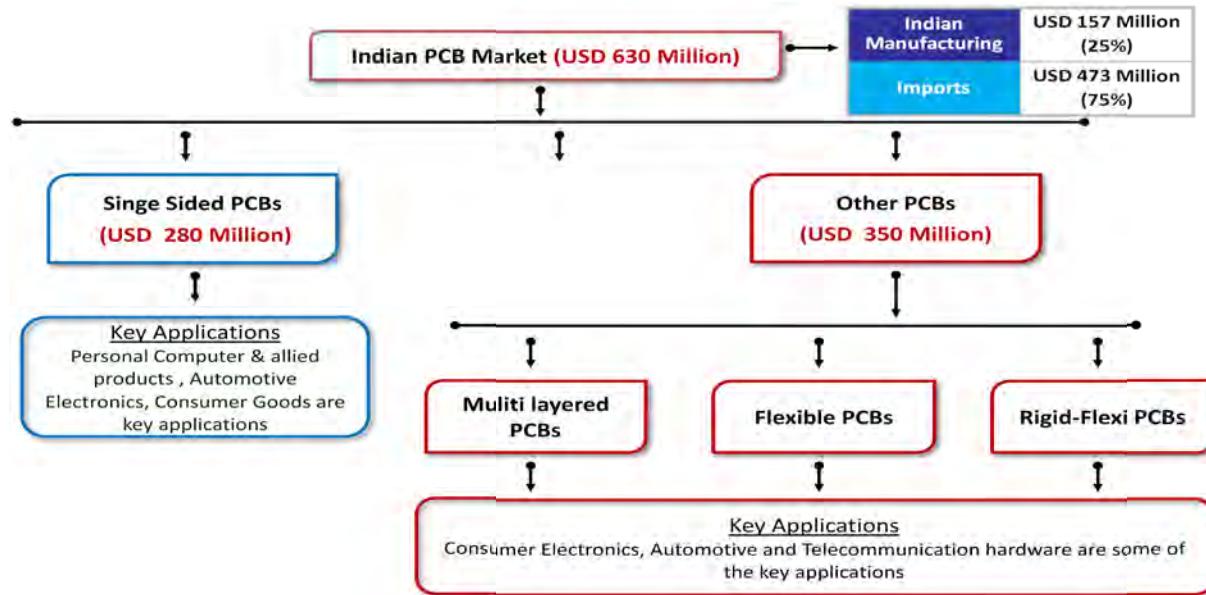


FIGURE 78: TYPES OF PRINTED CIRCUIT BOARDS

Note: - There are other types of PCB for e.g. Special grade PCBs' with gold plated contacts which are used in very small quantities for special applications.

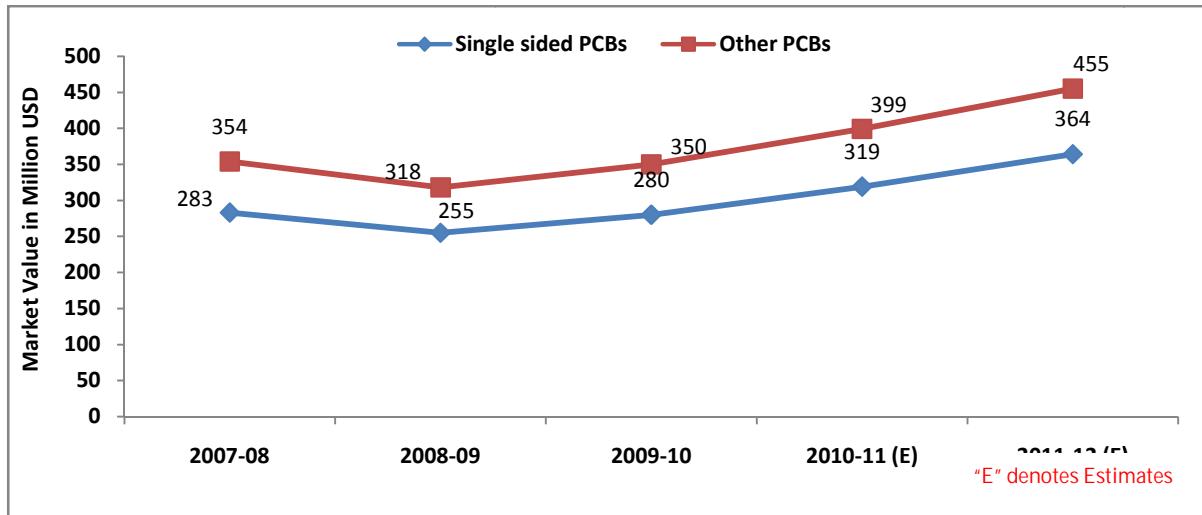


FIGURE 79: TYPES OF PRINTED CIRCUIT BOARDS

Most Indian manufacturers produce single layered PCBs only while a few large manufacturers produce double-side plated through-hole (pth) and double layered PCBs. Most of the multi layered printed circuit boards and flexible PCBs are imported into India. With the application industry moving towards miniaturization, the demand for Flexi and Rigid-Flexi PCBs is expected to increase in the next 1-2 year.

Key Technology Trends in PCBs:-

The key trends that are expected to drive the PCB Industry in the next 2-3 years are:-

- Increasing usage of embedded technology in the Consumer durable & Telecom Industry
- High Density Interconnect technology (HDI) in the Telecom Industry.
- Increasing usage of Optics in Telecom & IT sectors is expected to increase the usage of Optical PCBs.
- Adoption of Special grade PCB's with gold plated contacts by Indian Manufacturers

The adoption of special grade PCB's with gold plated contacts is very small currently owing to its high cost. However, in the recent time some of the large manufacturers have started using this for manufacturing specialized products.

4.9.4 INDIAN PCB MARKET- MARKET SIZE BROKEN BY INDUSTRY SECTORS

The contribution of various application sectors in which PCBs are used is shown below:-

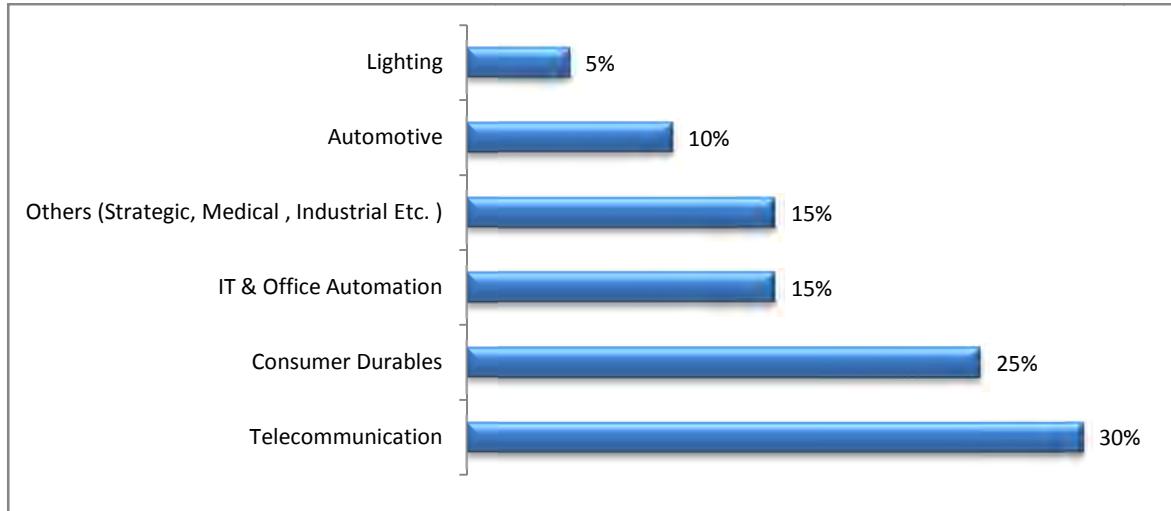


FIGURE 80: INDIAN PCB MARKET SIZE - BY APPLICATION SECTOR

4.9.5 FUTURE TRENDS IN APPLICATION SECTOR GROWTH

In the post recession period, most sectors project a positive outlook. With sectors like telecommunication, Automotive showing a significant growth, the growth of PCB is evident.

Sl. No.	Application Sector	Growth rate
1	Telecommunication	30%
2	Automotive	25%
3	Consumer Durables	18%
4	IT & Office Automation	20%
5	Medical Electronics	17%
6	Lighting	12%
7	Industrial Electronics	7%
8	Strategic electronics	15%

FIGURE 81: KEY APPLICATION SECTORS - FUTURE GROWTH RATE

4.9.6 DETAILS OF INDIAN PRINTED CIRCUIT BOARD MANUFACTURERS

It is estimated that there are more than 200 PCB manufacturing units operating in India, with 60% of them being classified under small scale industry. Some of the large manufacturers of PCBs in India are listed in Table no. 178 in Appendix

CHAPTER #4.10:- CONNECTORS



NIC Codes	308.30
HS Codes	8536.70.00
	8536.69.90



4.10.1 EXECUTIVE SUMMARY

A. Overview of the Indian Connector Market:

The following table provides an overview of the Indian connector market.

Sl. No.	Heads	Description
1	Overall Indian Market Size in FY 2009-10	USD 607 Million
2	Ratio of Imports: Indian Manufacturing in FY 2009-10	58:42
3	Growth in FY 2009-10	6%
4	Export in FY 2009-10	USD 97 Million
5	Market Size by type of connectors	RF Connector-USD 146 Million PCB Connector –USD 136 Million AV Connector – USD 133 Million Signal Connector- USD 103 Million Power Connector- USD 76 Million MIL Connector- USD 13 Million
6	Key Application Segments	Consumer Electronics , Telecommunication, IT & office automation
7	Estimated Growth in FY 2010-11	16%
8	Estimated Ratio of Imports : Indian Manufacturing in FY 2010-11	60:40

FIGURE 82: INDIAN CONNECTOR MARKET - AN OVERVIEW

Salient Aspects of Indian Connector Industry:-

- Multinational Companies dominate the local connector manufacturing. Limited Indian companies manufacture connectors in India
- Consumer Durables (30%), Telecommunication (27%), and IT& Office Automation (24%) are the sectors that account for the major portion of the current demand for Connectors.
- The market is estimated to grow at 16% per annum in the next two years to reach a value of USD 819 Million in FY 2011-12. The growth will be driven by telecommunication and consumer durables sectors which are expected to grow at 30% and 18% respectively.



- The demand for RF connector is expected to grow faster than the other types of connectors. The growth in the RF connector segment is expected to be driven by the growth in the telecom segment.
- The countries that India exports to include countries like USA, UK, South Africa, Australia, Italy, Russia etc. The export market is estimated to be around USD 97 Million in FY 2009-10.

4.10.2 INDIAN CONNECTOR MARKET- CURRENT & PAST TRENDS

Overall Market size in India(FY 2009-10) = USD 607 Million

The overall market size for the Connector in India is estimated at **USD 607 million** for the FY 2009-10. Local manufacturing accounts for 42% of the total market while the rest of the market share is from imports.

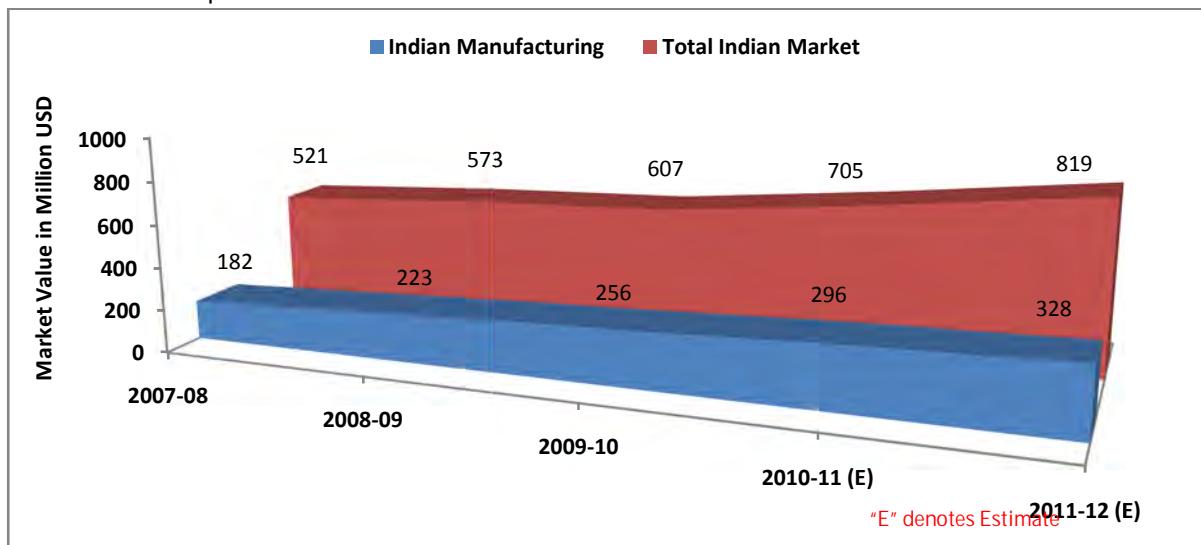


FIGURE 83: INDIAN CONNECTOR MARKET SIZE

With global companies setting up production or assembly plants, connector manufacturers are optimistic that these companies would initiate sourcing of components from India rather than importing them from countries like China and South Korea. This will, in turn, increase the local production.

The export market is estimated to be around USD 97 Million in FY 2009-10. The export market is expected to grow exponentially over the next few years with companies like Amphenol and Tyco electronics increasing their production capacity to cater to both local and international demands.

4.10.3 TYPES OF CONNECTORS

Connectors are classified based on their shape or by the application. Manufacturers in India classify the connectors based on the application. They are broadly classified into 6 types as stated in the below figure.

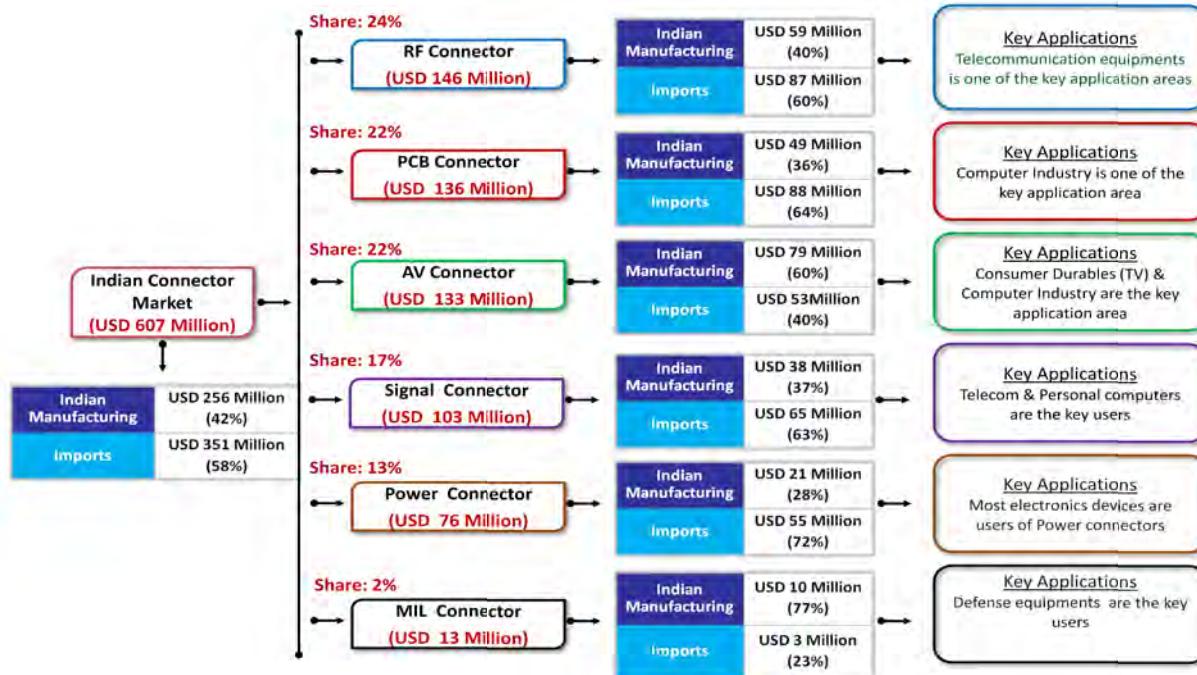


FIGURE 84: TYPES OF CONNECTORS

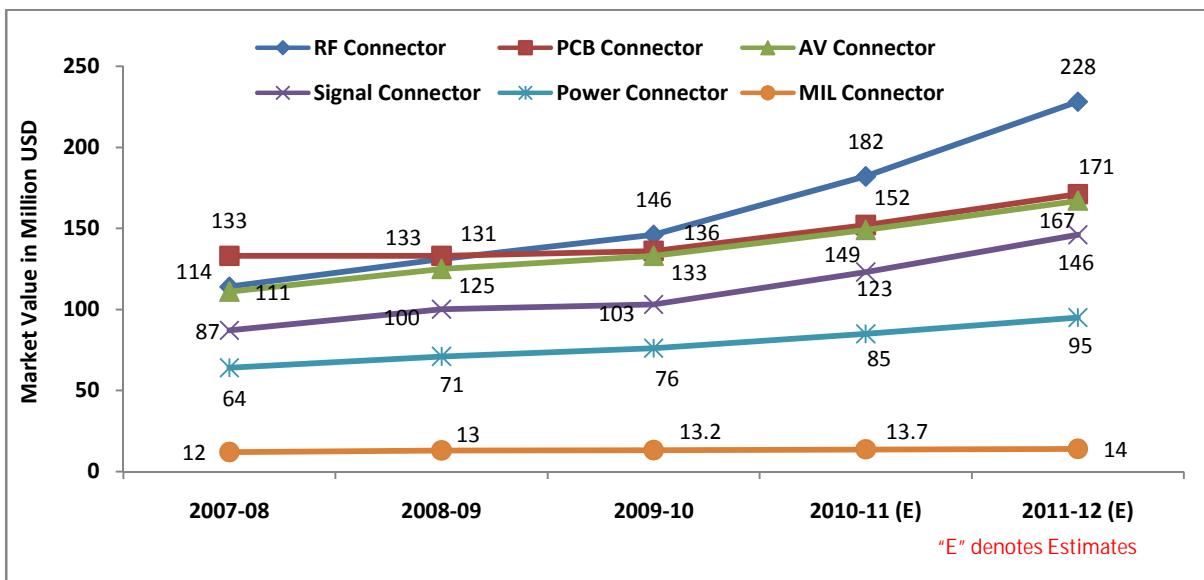


FIGURE 85: TYPES OF CONNECTORS



The growth in the RF connector segment is expected to be driven by the growth in the telecom segment. The government is planning to install an additional 11,000 towers in 500 districts in rural areas to provide network for mobile and landline.

The growth in the PCB connectors & signal connectors is expected due to the growth in the computer industry.

Consumer electronics market is one of the largest segments in the electronics industry in India. This, in turn, is expected to drive the AV connector growth.

With spends in defense increasing significantly over the next few years, the demand for MIL connectors is also slated to witness a growth. However, requirement of High Skilled labor & high precision equipment make manufacturing of such components unviable in India currently.

India continues to be a large consumer of electronics products and the rate of growth of adoption has increased over the last few years. With the reduction in the cost of LCD TVs, thus, making it affordable to the masses, the overall TV segment is poised for the next big growth. A similar growth opportunity is exhibited by the mobile handset market too. With companies like Nokia and Samsung setting up their assembly/ production plants in the country, India could emerge as a potentially large market for components like AV, PCB Connectors in the next 2-3 years.

4.10.4 INDIAN CONNECTOR MARKET- MARKET SIZE BROKEN BY INDUSTRY SECTORS

The contribution of various application sectors in which Connectors are used is shown below:-

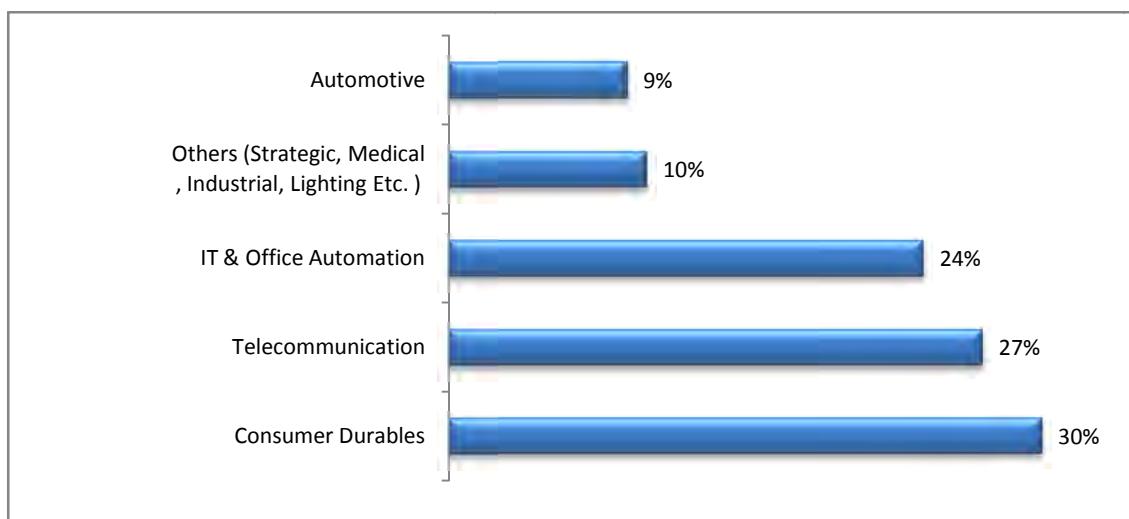


FIGURE 86: INDIAN CONNECTOR MARKET SIZE - BY APPLICATION SECTOR



4.10.5 FUTURE TRENDS IN APPLICATION SECTOR GROWTH

Consumer durables and Telecommunication industry are the largest consumers of Connectors and with these industries slated to grow significantly over the next few years; the demand for Connectors is also expected to increase significantly.

Sl. No.	Application Sector	Growth rate
1	Telecommunication	30%
2	Automotive	25%
3	Consumer Durables	18%
4	IT & Office Automation	20%
5	Medical Electronics	17%
6	Lighting	12%
7	Industrial Electronics	7%
8	Strategic electronics	15%

FIGURE 87: KEY APPLICATION SECTORS - FUTURE GROWTH RATE

4.10.6 DETAILS OF INDIAN CONNECTOR MANUFACTURERS

It is estimated that there are about 40 Connector manufacturing units operating in India, with 70% of them being classified under small scale industry. The major share of the Indian market is contributed by the 5 companies namely Tyco Electronics Corporation India Pvt. Ltd., Molex India Pvt. Ltd., Amphenol Interconnect India Pvt. Ltd., FCI OEN Connectors Ltd. & TEI Technologies Private Limited. Some of the key manufacturers of Connectors in India are listed in Table no. 179 in Appendix

CHAPTER #4.11:- SPEAKERS



NIC Codes	366.90
HS Codes	8518.21/22/29



4.11.1 EXECUTIVE SUMMARY

A. Overview of the Indian Speaker Market:

The following table provides an overview of the Indian speaker market.

Sl. No.	Heads	Description
1	Overall Indian Market Size in FY 2009-10	USD 409 Million
2	Ratio of Imports: Indian Manufacturing in FY 2009-10	20:80
3	Growth in FY 2009-10	5%
4	Export in FY 2009-10	USD 2 Million
5	Market Size by type of speakers	Audio Speaker, Public Address systems & Multimedia Speaker
6	Key Application Segments	Consumer Durables and Telecommunication
7	Estimated Growth in FY 2010-11	15%
8	Estimated Ratio of Imports : Indian Manufacturing in FY 2010-11	15:85

FIGURE 88: INDIAN SPEAKER MARKET - AN OVERVIEW

Salient Aspects of Indian Speaker Industry:-

- The Indian speaker market is dominated by small scale indigenous speaker manufacturers. Low initial investment along with availability of labor is the key reasons for such players to set up in India.
- Consumer Durables(50%) and Telecommunication(25%) account for most of the demand for speakers in India
- The market is estimated to grow at 15% per annum in the next two years to reach a value of USD 541 Million in FY 2011-12. This growth is largely attributed to the growth that is observed in the consumer durable sector
- Local production dominates with a share of 80%. The export market is evaluated to be around USD 2 Million.

4.11.2 INDIAN SPEAKER MARKET- CURRENT & PAST TRENDS

Overall Market size in India(FY 2009-10) = USD 409 Million

The overall market size for the Speakers in India is estimated to be at **USD 409 million** for the FY 2009-10 with local manufacturing contributing about 80% of the total market.

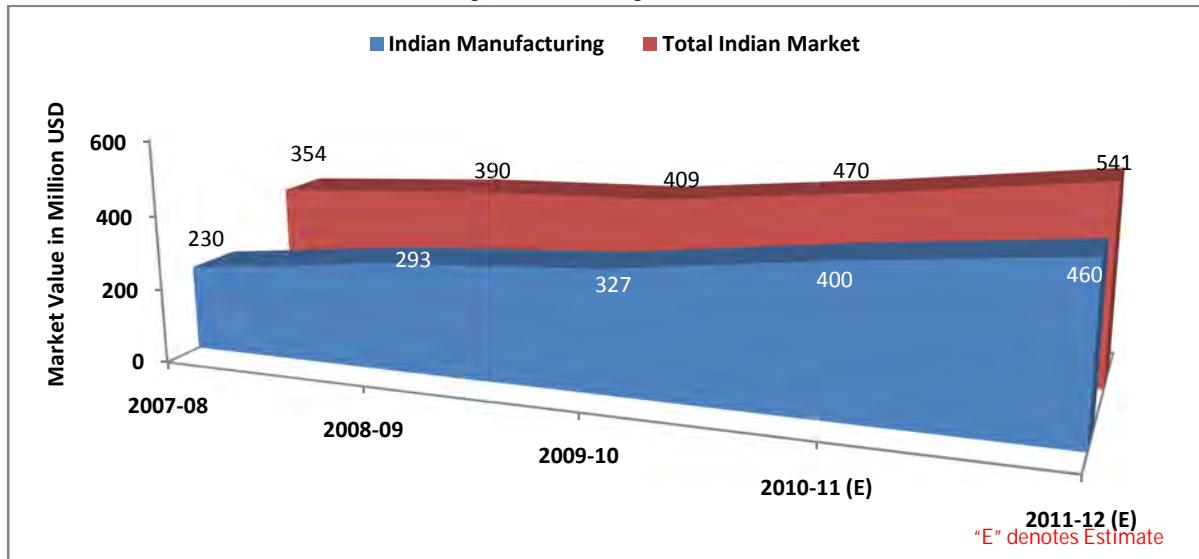


FIGURE 89: INDIAN SPEAKER MARKET SIZE

The market for speakers has been on an upward growth for the last few years and is expected to grow at the rate of 15% year-on-year for the next 2 years. This growth is largely attributed to the growth that is observed in the consumer durable sector.

According to the industry, following are some of the key factors driving the Indian manufacturing in the speaker:-

- Low Initial investment
- Availability of Man power; it does not required specialized or trained manpower
- Lower complexity in the manufacturing process- results in low cost manufacturing

Over the years, the speaker manufacturers have been targeting the international markets. USA, Europe, Middle East & parts of Asia are some of the key markets to which speakers are exported from India. The export market is estimated to be around USD 2 Million.

4.11.3 TYPES OF SPEAKERS

Generally, speakers are classified based on the technology used in manufacturing namely- Electromagnetic Speakers, Electrostatic Speakers & Piezoelectric Speakers. However, manufacturers in India classify speakers based on their usage namely, Audio Speakers (which are largely used in music systems, car audio systems, etc), Public Address Systems & Multimedia speakers (which are largely used for PCs and phones)

However, most manufacturers feel that the differentiation across these three categories is increasingly becoming blurred with technology convergence and increased sophistication of the product category

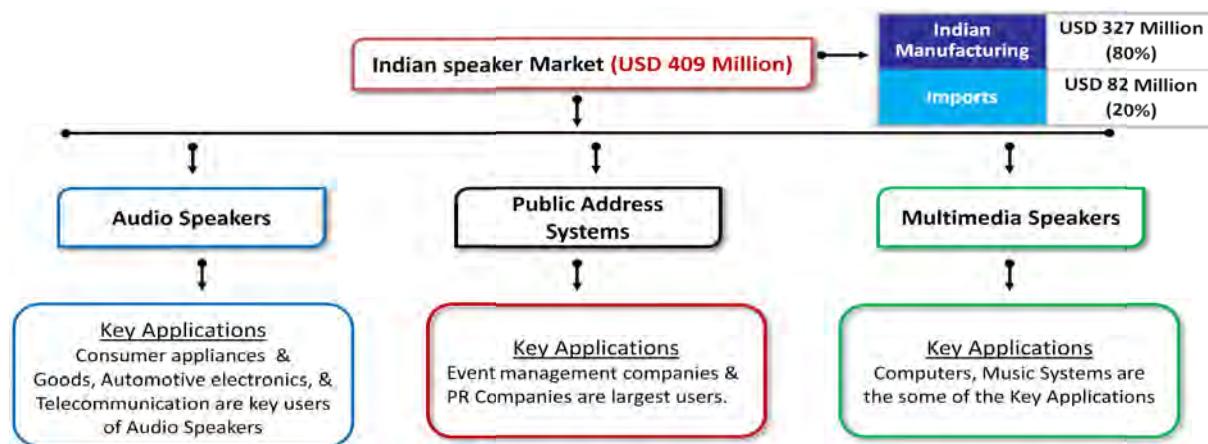


FIGURE 90: TYPES OF SPEAKERS

Ceramic Speakers is one of the sunrise products in the market and several Indian manufacturers are planning to manufacture ceramic speakers.

Most manufacturers feel that increasing miniaturization of electronic product would lead to increase in sales of Multimedia speaker.

With technological advancement, production & sales of sophisticated products like MP3 Players, home theatre systems, high end speaker systems, music system with sub-woofers etc are on the rise.

Key Technology Trends in Speakers:-

The ultra-thin waterproof piezoelectric speakers are gaining popularity especially in mobile handsets as these speakers do not need a plastic coating over the speaker and are small in size. The advantage of these speakers is the increase in the audio quality and decrease in the space used and power consumed. These speakers are also ideal for portable music players, digital cameras etc.



4.11.4 INDIAN SPEAKER MARKET- MARKET SIZE BROKEN BY INDUSTRY SECTORS

The contribution of various application sectors in which Speakers are used is shown below:-

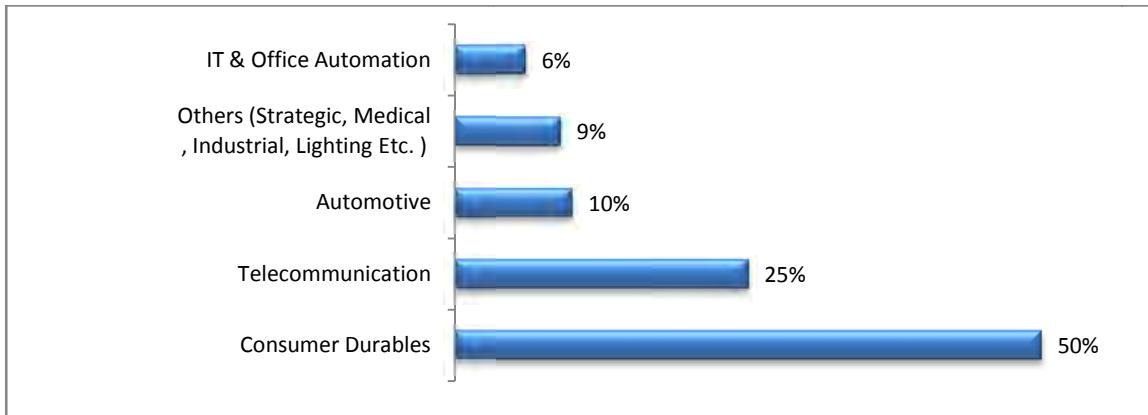


FIGURE 91: INDIAN SPEAKER MARKET SIZE - BY APPLICATION SECTOR

4.11.5 FUTURE TRENDS IN APPLICATION SECTOR GROWTH

With sectors like Telecommunication and Consumer Durables showing a significant growth, the growth of Speakers is evident.

Sl. No.	Application Sector	Growth rate
1	Telecommunication	30%
2	Automotive	25%
3	Consumer Durables	18%
4	IT & Office Automation	20%
5	Medical Electronics	17%
6	Lighting	12%
7	Industrial Electronics	7%
8	Strategic electronics	15%

FIGURE 92: KEY APPLICATION SECTORS - FUTURE GROWTH RATE

4.11.6 DETAILS OF INDIAN SPEAKER MANUFACTURERS

It is estimated that there are more than 100 Speaker manufacturing units operating in India, with most of them being classified under small scale industry. Some of the Key manufacturers of Speakers in India are listed in Table no. 180 in Appendix

CHAPTER #4.12:- SWITCH



NIC Codes	308.30
HS Codes	8536.50.90



4.12.1 EXECUTIVE SUMMARY

A. Overview of the Indian switch Market:

The following table provides an overview of the Indian switch market.

Sl. No.	Heads	Description
1	Overall Indian Market Size in FY 2009-10	USD 377 Million
2	Ratio of Imports: Indian Manufacturing in FY 2009-10	40:60
3	Growth in FY 2009-10	15%
4	Export in FY 2009-10	USD 80 Million
5	Market Size by type of switches	Push Button Switch- USD 129 Million Micro Switch- USD 107 Million Rotary Switch- USD 66 Million Rocker Switch- USD 43 Million Toggle Switch- USD 32 Million
6	Key Application Segments	Consumer Durables & Telecommunication
7	Estimated Growth in FY 2010-11	15%
8	Estimated Ratio of Imports : Indian Manufacturing in FY 2010-11	40:60

FIGURE 93: INDIAN SWITCH MARKET - AN OVERVIEW

Salient Aspects of Indian Switch Industry:-

- Consumer Durables (30%) and Telecommunication (25%) are the two largest sectors that drive the current demand for Switches.
- The market is estimated to grow at 15% per annum in the next two years and reach a value of USD 498 Million in FY 2011-12. The growth will be driven by telecommunication and Consumer Durables sectors which are expected to grow at 30% and 18% respectively.
- Push button Switches have the highest market share (34%) followed by Micro switches (28%).
- The local production is a major contributor to the market with a share of about 60%. The Indian production has been helped by relatively better availability of raw materials, like plastic, for the manufacturing of switches in India. However, the manufacturers are concerned that increasing raw material cost & decreasing revenue due to competitive import pricing could result in the domestic industry losing out share to imports.

- Around 26% of the Switch manufactured in India is exported to countries like Australia, Canada, Chile, Egypt, France, Germany, South Africa, Sri Lanka, Middle East and USA. Competitive pricing & Quality certified products are the reasons attributed to exports from India.

4.12.2 INDIAN SWITCH MARKET- CURRENT & PAST TRENDS

Overall Market size in India(FY 2009-10) = USD 377 Million

The overall market size for the switches in India is estimated at **USD 377 million** for the FY 2009-10 with imports accounting for 40% of the total market.

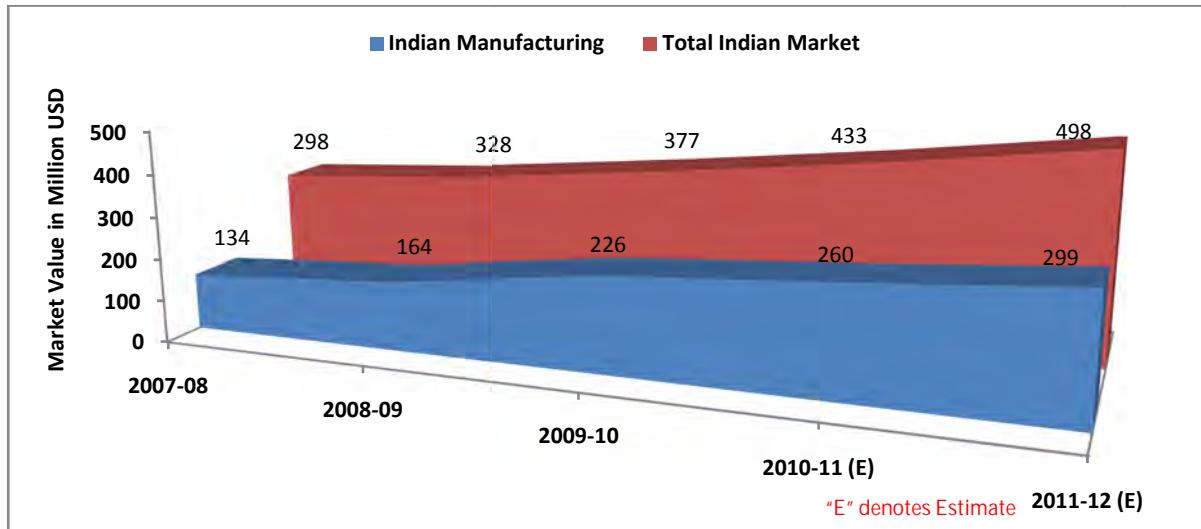


FIGURE 94: INDIAN SWITCH MARKET SIZE

The Indian export is estimated to be around USD 80 Million which is 26% of the total switches manufactured in India. With the western markets showing a recovery post recession and demand for switches in India increasing, most manufacturers are optimistic of developing this component into a mainstay for Indian electronic component manufacturing Industry.

4.12.3 TYPES OF SWITCHES

Switches can be broadly classified based on their application. The figure below (Figure 95) shows the various types of Switches and their key applications.

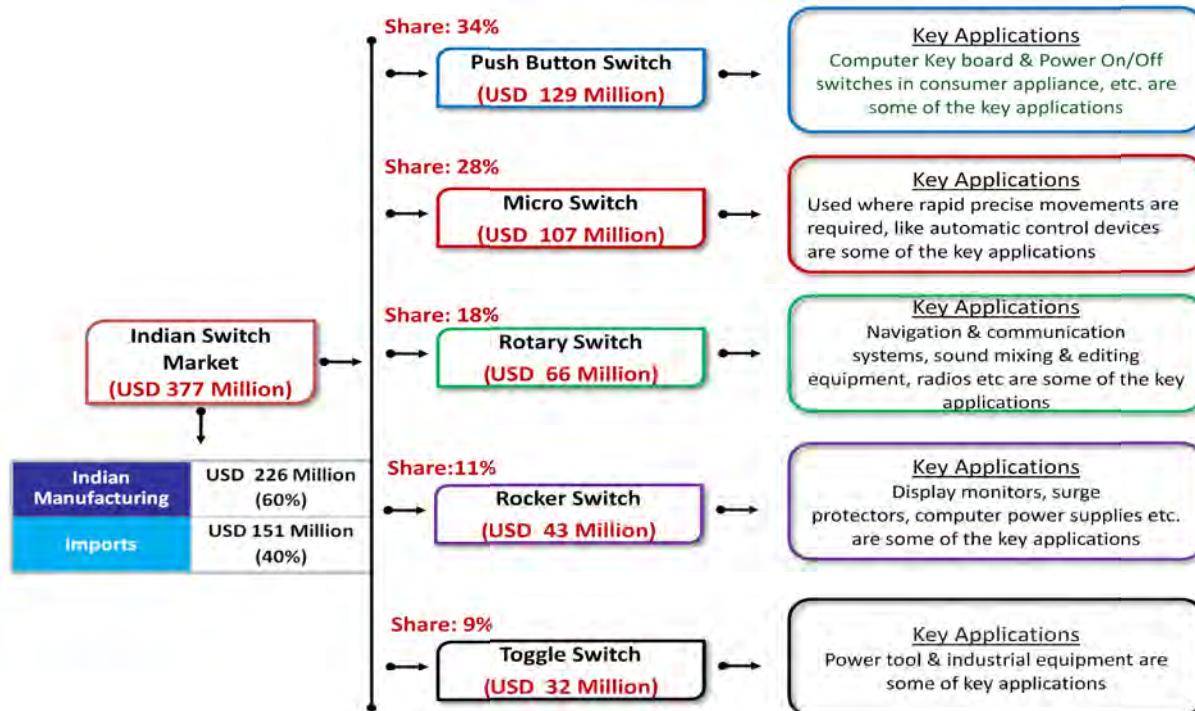


FIGURE 95: TYPES OF SWITCHES

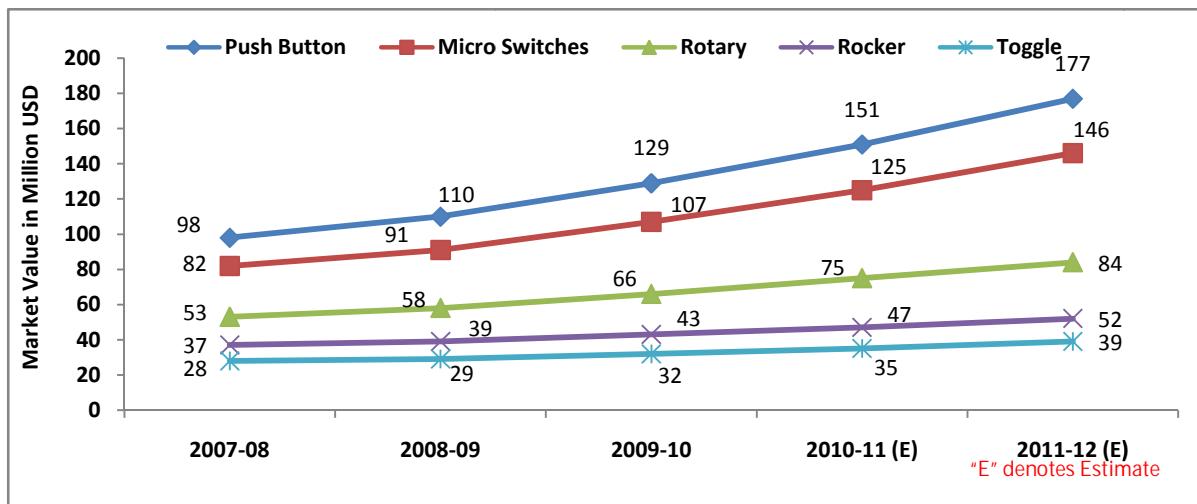


FIGURE 96: TYPES OF SWITCH

Push button Switches have the highest market share and growth rate followed by Micro switches. The high growth of Push button switch is largely attributed to the increase in production of consumer electronic devices like Computer Keyboard, calculator, push button phones, etc. One of the major industrial applications of push button switch is the "Emergency Stop" button in the machines which is also one of the reasons for these switches being exported.



4.12.4 INDIAN SWITCH MARKET- MARKET SIZE BROKEN BY INDUSTRY SECTORS

The contribution of various application sectors in which Switch are used is shown below:-

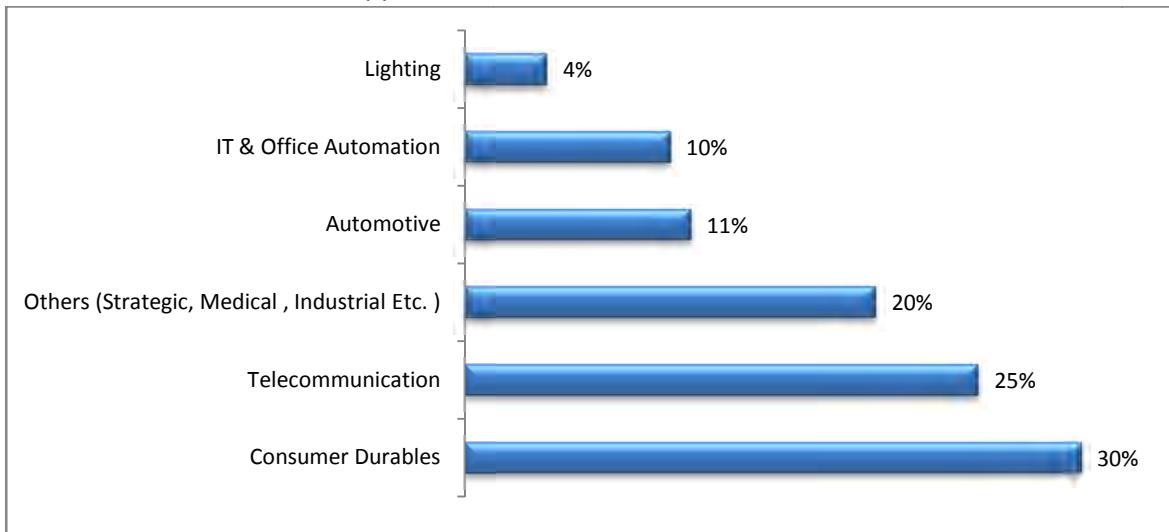


FIGURE 97: INDIAN SWITCH MARKET SIZE - BY APPLICATION SECTOR

4.12.5 FUTURE TRENDS IN APPLICATION SECTOR GROWTH

Switches find wide usage in the electronics industry. Consumer durables and Telecommunication industry continue to be the largest consumers of switches. With these industries slated to grow over the next few years, the demand for Switch is also expected to be high.

Sl. No.	Application Sector	Growth rate
1	Telecommunication	30%
2	Automotive	25%
3	Consumer Durables	18%
4	IT & Office Automation	20%
5	Medical Electronics	17%
6	Lighting	12%
7	Industrial Electronics	7%
8	Strategic electronics	15%

FIGURE 98: KEY APPLICATION SECTORS - FUTURE GROWTH RATE

4.12.6 DETAILS OF INDIAN SWITCH MANUFACTURERS

It is estimated that there are more than 300 Switch manufacturing units operating in India. Some of the Key manufacturers of Switches in India are listed in Table no. 181 in Appendix

CHAPTER #4.13:- CABLES



NIC Codes	361.00
HS Codes- Co-axial Cable	8544.20.00
HS codes- Telecom Cable	8544.42.91/92/93
HS Codes-Jelly Filled cables	8544.42.99
HS Codes-Optical Fiber Cable	8544.70.00



4.13.1 EXECUTIVE SUMMARY

A. Overview of the Indian Cable Market:

The following table provides an overview of the Indian cable market.

Sl. No.	Heads	Description
1	Overall Indian Market Size in FY 2009-10	USD 373 Million
2	Ratio of Imports: Indian Manufacturing in FY 2009-10	20:80
3	Growth in FY 2009-10	1%
4	Export in FY 2009-10	USD 33 Million
5	Market Size by type of cables	Fiber Optic Cable- USD 172 Million LAN Cable – USD 111 Million Telecom Cable- USD 78 Million Coaxial Cable- USD 12 Million
6	Key Application Segments	Telecommunication, IT & Office Automation
7	Estimated Growth in FY 2010-11	17%
8	Estimated Ratio of Imports : Indian Manufacturing in FY 2010-11	15:85

FIGURE 99: INDIAN CABLE MARKET - AN OVERVIEW

Salient Aspects of Indian Cable Industry:-

- The Indian cable industry is highly fragmented with a large number of small manufacturers.
- Telecom and Government funded infrastructure projects are the key drivers of the industry. The telecom sector, with favorable demographics and increased discretionary spending, has been the key reason for fueling the growth of the cable industry.
- Over the last five years, the cable industry has registered a CAGR of 11%. Apart from a year of recession during 2008-09, the industry has seen a consistent year-on-year growth.
- Indigenous manufacturing dominates the market. Companies have also established technical collaboration with foreign organizations to help develop technical and operational expertise.
- The share of imports is further expected to reduce as most of the major Indian companies are expanding their capacities. Some possible reasons for expansion are :

- Growing Demand –With the Indian economy emerging stronger and more resilient after the global melt-down, there is a higher focus on improvement of infrastructure in the country.
- Economies of scale- Increased production leads to economies of scale in terms of savings on raw materials and thus, results in a reduced price per unit.

4.13.2 INDIAN CABLE MARKET- CURRENT & PAST TRENDS

Overall Market size in India(FY 2009-10) = USD 373 Million

The overall market size for cables (excluding the Power cables) in India is estimated at **USD 373 million** for the FY 2009-10. Local manufacturing accounts for 80% of the total market while the rest of the market share is from imports.

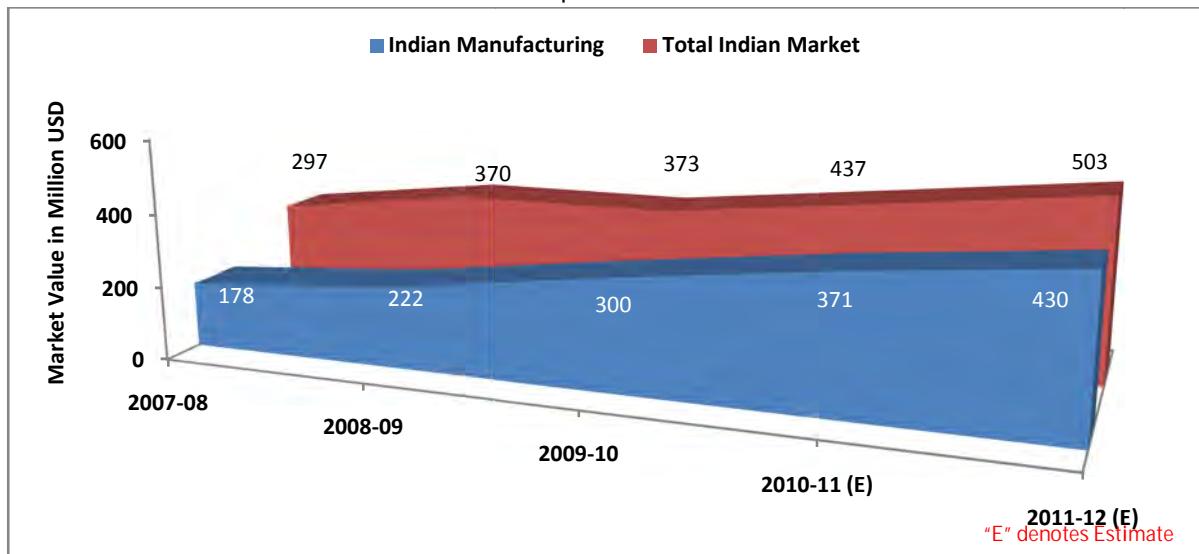


FIGURE 100: INDIAN CABLE MARKET SIZE

The global meltdown of 2008-09 resulted in delayed execution of several infrastructural expansion plans like laying of optical fibers. However, with the global manufacturing reducing during this period, most of the local demand for cables was met by the Indian players.

However, the industry showed strong positive signs of recovery in the last two years. Strong focus by the government in increasing optical fiber connectivity coupled with a growing demand for broadband, 3G and other high traffic services are expected to fuel the growth of this market. The industry is expected to witness a year-on-year growth of about 17% in 2010-11.

The Indian cable manufacturers export cables to countries like China, Russia, America, UAE, UK, Denmark, South Africa, Sri Lanka, Pakistan, Bhutan, Nepal and Bangladesh. The Indian export is estimated to be around USD 33 Million in FY 2009-10.

4.13.3 TYPES OF CABLES

Cables can be broadly classified into distribution and communication cables. The scope of the study includes only communication cable. The communication cables include LAN Cables, Fiber Optic Cables, Telecom Cables and Coaxial Cables.

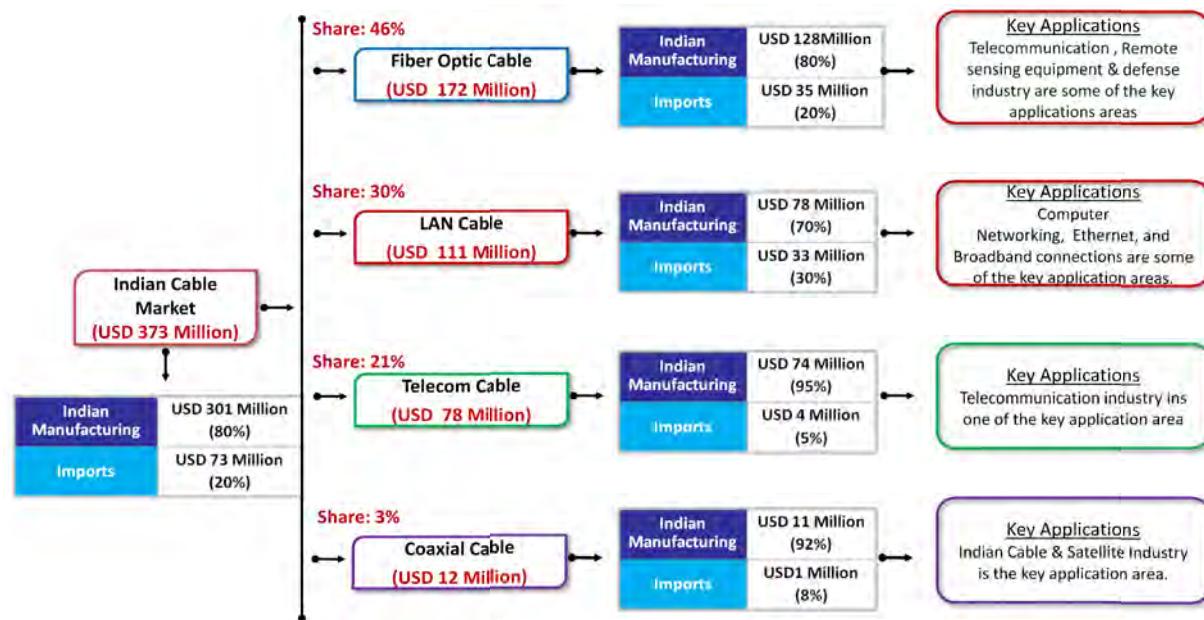


FIGURE 101: TYPES OF CABLES

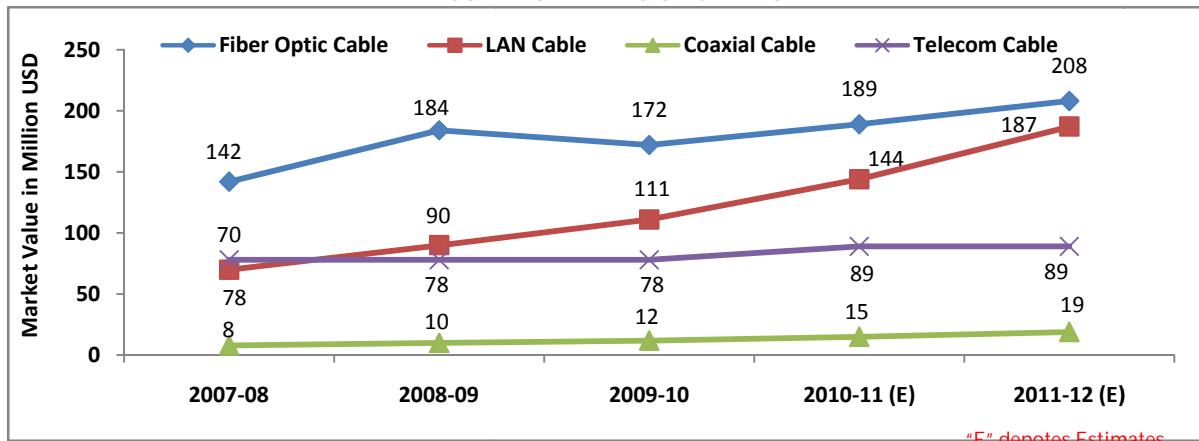


FIGURE 102: TYPES OF CABLES



LAN Cables are expected to show the highest growth amongst all the forms of cables. This is due to the revival of the realty sector and the mounting demand for networking.

The demand for telecom cables will be more or less stagnant due to the decline in demand for wired communication services that largely use such cables. These cables are sought largely for repair and maintenance.

Key Technology Trends in Cables:-

The demand for bandwidth intensive applications like High speed internet, IPTV, HDTV, and 3D TV is on the rise which has intensified the need for the last mile Fiber Network Deployment or Fiber to the Home (FTTH). With the implementation of FTTH, the demand for the optic fiber is slated to increase significantly.

4.13.4 INDIAN CABLE MARKET- MARKET SIZE BROKEN BY INDUSTRY SECTORS

The contribution of various application sectors in which cable are used is shown below:-

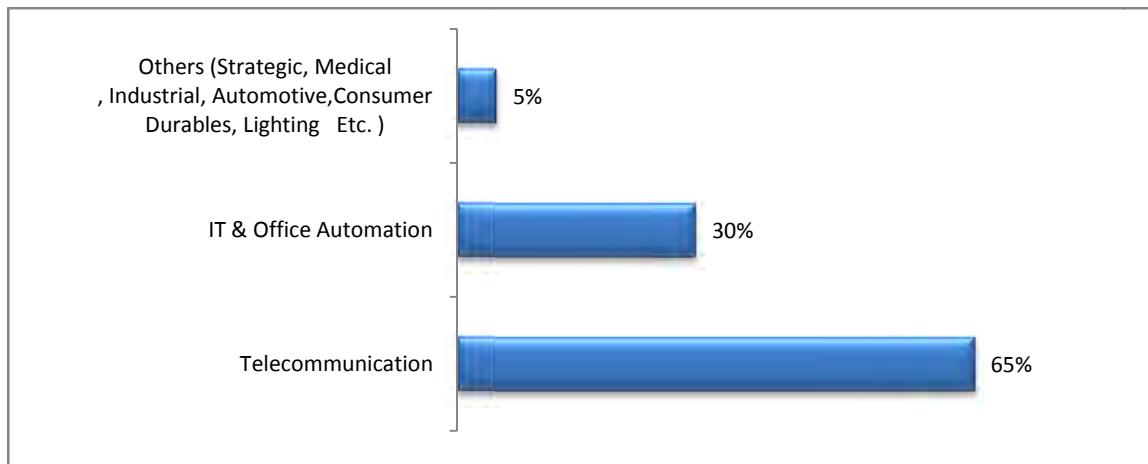


FIGURE 103: INDIAN CABLE MARKET SIZE - BY APPLICATION SECTOR

4.13.5 FUTURE TRENDS IN APPLICATION SECTOR GROWTH

With the telecommunication showing a significant growth, the demand for Cable is expected to increase further.

Sl. No.	Application Sector	Growth rate
1	Telecommunication	30%
2	Automotive	25%
3	Consumer Durables	18%



4	IT & Office Automation	20%
5	Medical Electronics	17%
6	Lighting	12%
7	Industrial Electronics	7%
8	Strategic electronics	15%

FIGURE 104: KEY APPLICATION SECTORS - FUTURE GROWTH RATE

4.13.6 DETAILS OF INDIAN CABLE MANUFACTURERS

Sterilite Technologies, Finolex Cables, M.P Birla Group (Birla Ericsson & Vindhya Telelinks) & Aksh Optifber are some of the leading players in this category. Some of the large manufacturers of cables in India are listed in Table no. 182 in Appendix

CHAPTER #4.14:- RELAYS



NIC Codes	308.3
HS Codes	8536.41.00



4.14.1 EXECUTIVE SUMMARY

A. Overview of the Indian Relay Market:

The following table provides an overview of the Indian Relay market.

Sl. No.	Heads	Description
1	Overall Indian Market Size in FY 2009-10	USD 31 Million
2	Ratio of Imports: Indian Manufacturing in FY 2009-10	45:55
3	Growth in FY 2009-10	11%
4	Export in FY 2009-10	USD 2 Million
5	Market Size by type of Relays	Electro mechanical Relays Solid State Relays
6	Key Application Segments	Telecom, Automotive
7	Estimated Growth in FY 2010-11	13%
8	Estimated Ratio of Imports : Indian Manufacturing in FY 2010-11	45:55

FIGURE 105: INDIAN RELAY MARKET - AN OVERVIEW

Salient Aspects of Indian Relay Industry:-

- The Indian manufacturing of relays is dominated by small scale industries.
- Telecommunication (35%) and Automotive (30%) are the key sectors driving the current demand for relays.
- The market for relays has been on a growth trajectory over the last few years and is expected to grow by 13% in FY 2010-11 and 14% in FY 2011-12 to reach USD 40 Million.
- Electromechanical relays are most common relays that are manufactured in India. The solid state relays are largely imported from countries like China, Taiwan and South Korea
- Indian manufacturers largely manufacture electromechanical relays which are exported to countries in Europe and North America. The export market is estimated to be around USD 2 Million in FY 2009-10.

4.14.2 INDIAN RELAY MARKET- CURRENT & PAST TRENDS

Overall Market size in India(FY 2009-10) = USD 31 Million

The overall market size for the Relays in India is estimated at USD 31 million for the FY 2009-10 with indigenous manufacturing contributing about 55% of the total market. Most of the demand for electromechanical relays is met by Indian manufacturers while solid state relays are mostly imported.

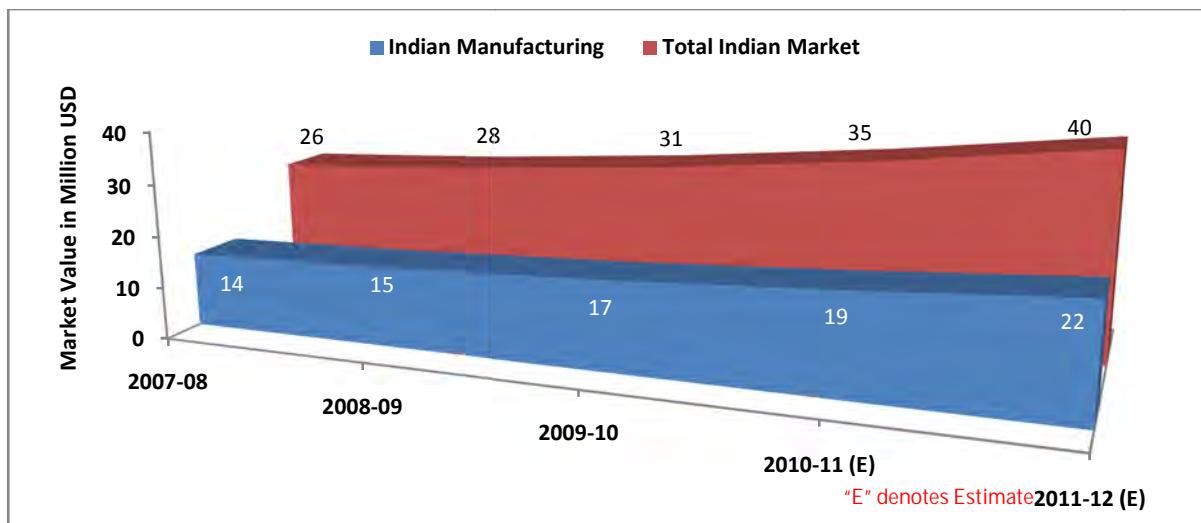


FIGURE 106: INDIAN RELAY MARKET SIZE

Asia-pacific is the largest and fastest growing region for production of relays globally with China leading the production.

Labor Intensive manufacturing process, lower investment required to set-up & higher demand for cost-effective relays from countries like North America & Europe are the reason cited by indigenous manufacturers for higher production of electro mechanical relays.

4.14.3 TYPES OF RELAYS

Conventionally, relays can be broadly classified basis the type of contacts. The two most popular types are electromechanical relays and solid state relays (contact less relays)

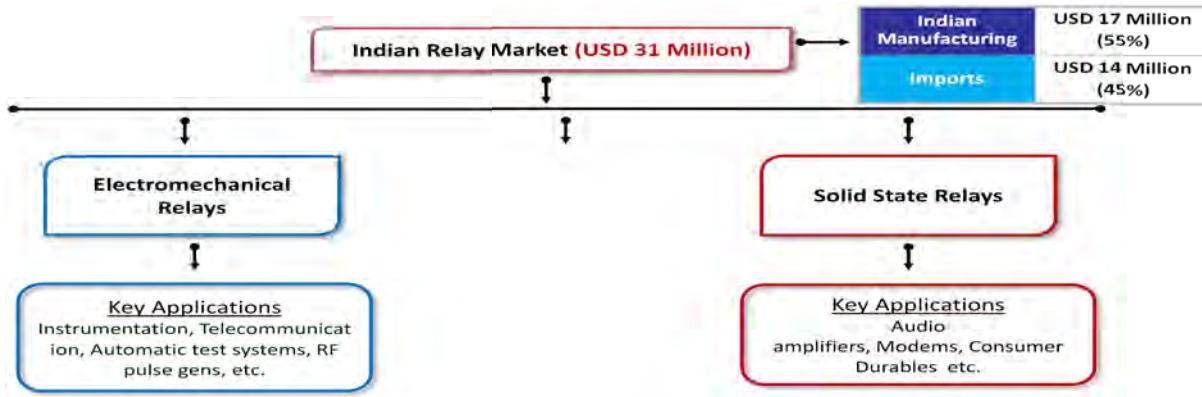


FIGURE 107: TYPES OF RELAYS

According to industry experts, solid state relays are expected to witness a higher growth in the Indian market when compared to electromechanical relay. This is largely attributed to the increase in the production of consumer durable in the country which utilizes solid state relays.

Key Technology Trends in Relays:-

In the Automotive relay segment, the relays are finding newer application because of the ever-increasing upgrade of vehicle equipment and the rising needs around new applications like vehicle safety, fuel consumption reductions and vehicle comfort - all of which create new requirements for on-board power supply.

With miniaturization of electronic products, the size of the relays needs to reduce. Thus, the solid state relays will show an increased demand.

4.14.4 INDIAN RELAY MARKET- MARKET SIZE BROKEN BY INDUSTRY SECTORS

The contribution of various application sectors in which Relays are used is shown below:-

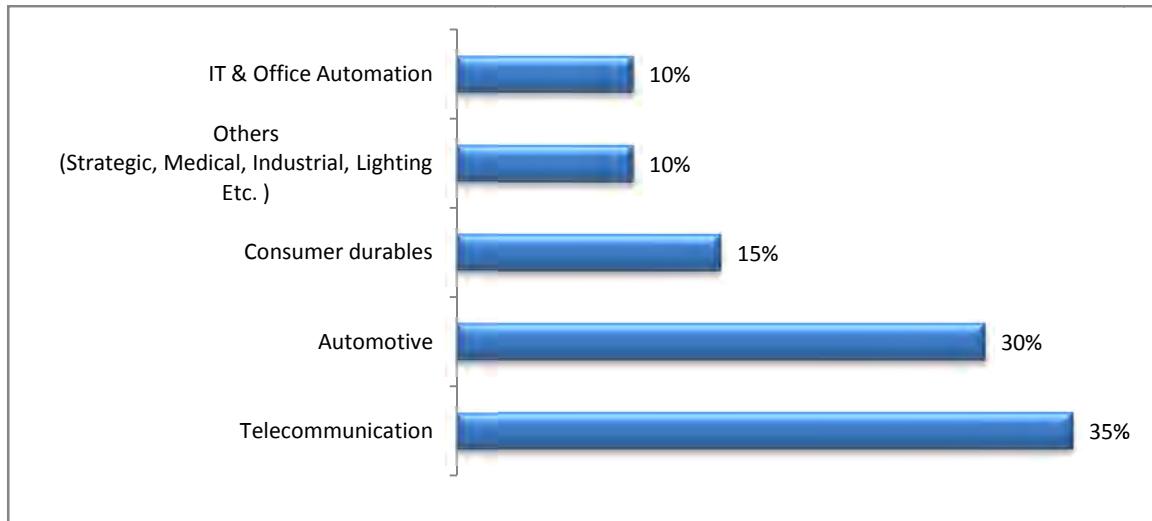


FIGURE 108: INDIAN RELAY MARKET SIZE - BY APPLICATION SECTOR

4.14.5 FUTURE TRENDS IN APPLICATION SECTOR GROWTH

This growth expected in the relay market is attributed to increasing usage of electronics in automotive sectors which is growing a significant rate of 25%. Apart from Automotive sector, the telecommunication sector is also expected to drive the demand for relays in India.

Sl. No.	Application Sector	Growth rate
1	Telecommunication	30%
2	Automotive	25%
3	Consumer Durables	18%
4	IT & Office Automation	20%
5	Medical Electronics	17%
6	Lighting	12%
7	Industrial Electronics	7%
8	Strategic electronics	15%

FIGURE 109: KEY APPLICATION SECTORS - FUTURE GROWTH RATE

4.14.6 DETAILS OF RELAY MANUFACTURERS

It is estimated that there are more than 100 relay manufacturing units operating in India and most of them are small scale industries. Some of the key manufacturers of Relays in India are listed in Table no. 183 in Appendix

CHAPTER #4.15:- FUSE



HS Code

8536.10.60



4.15.1 EXECUTIVE SUMMARY

A. Overview of the Indian Fuse Market:

The following table provides an overview of the Indian fuse market.

Sl. No.	Heads	Description
1	Overall Indian Market Size in FY 2009-10	USD 15 Million
2	Ratio of Imports: Indian Manufacturing in FY 2009-10	40:60
3	Growth in FY 2009-10	5%
4	Export in FY 2009-10	USD 1 Million
5	Market Size by type of fuse	Slow blow/ time lag/ Time Delay Fast Acting Very Fast Acting
6	Key Application Segments	Consumer durables & Automotives
7	Estimated Growth in FY 2010-11	13%
8	Estimated Ratio of Imports : Indian Manufacturing in FY 2010-11	40:60

FIGURE 110: INDIAN FUSE MARKET - AN OVERVIEW

Salient Aspects of Indian Fuse Industry:-

- The key sectors driving the fuse market in India are automotive and consumer electronics.
- The market has been showing a consistent growth in the last few years and is expected to reach USD 19.2 Million in FY 2011-12.
- The Indigenous production is dominated by small scale manufacturers and contributes to about 60% of the total demand.

4.15.2 INDIAN FUSE MARKET- CURRENT & PAST TRENDS

Overall Market size in India(FY 2009-10) = USD 15 Million

The overall market for fuses in India is estimated at **USD 15 million** for FY 2009-10 with imports accounting for 40% of the total market.

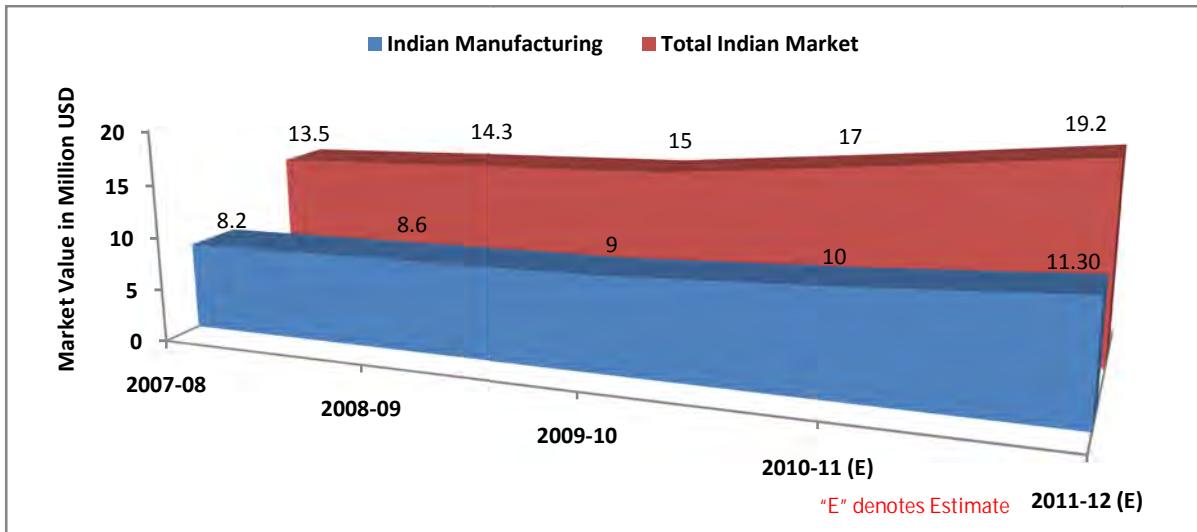


FIGURE 111: INDIAN FUSE MARKET SIZE

The Indian fuse market registered a growth of 5% in FY 2008-09. The growth trend is expected to continue with automobile and consumer electronics segments estimated to grow at 25% and 18% respectively in FY 2010-11.

India exports fuses to South Asian countries like Sri Lanka, Bangladesh, Singapore and Malaysia. Competitive pricing & quality certified products are the reasons attributed to the exports. Indian export, which is around USD 1 million in value terms, comprises of 10% of the total Indian production. With manufacturers exploring export opportunities to countries like Africa and South America, a steady growth in export over the next 2-3 years is expected.

4.15.3 TYPES OF FUSES

Traditionally, the industry classifies fuses based on the response time i.e. the time required to respond to an over-current condition. The various types of fuses are as follows:-

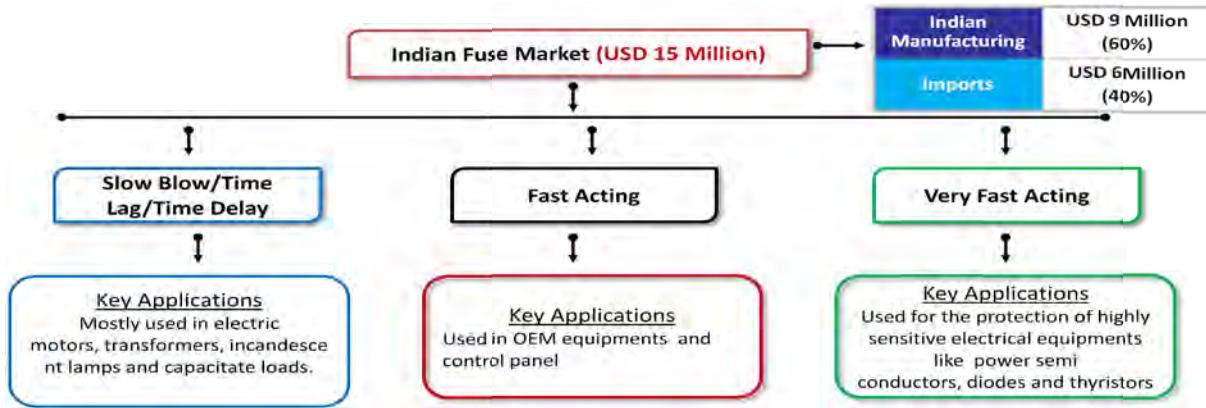


FIGURE 112: TYPES OF FUSES

However, over the years, the industry also classified the fuses basis the application. Some of the common types of fuses are as follows:-

- Resettable Fuse: As the name suggests, these are self resetting fuses, mostly used in aerospace/nuclear applications and computer motherboard.
- Thermal Fuse: These are non-resettable ones, which need to be replaced once blown. These are mostly used as a safety device in heat-producing consumer equipment like microwaves, hair-dryers or coffee makers.
- Automotive Fuses: Mostly used in vehicles, they can be of four types like Blade fuses, Glass tube or Bosch, Fusible links, Fuse limiters

4.15.4 INDIAN FUSE MARKET- MARKET SIZE BROKEN BY INDUSTRY SECTORS

The contribution of various application sectors in which fuses are used is shown below:-

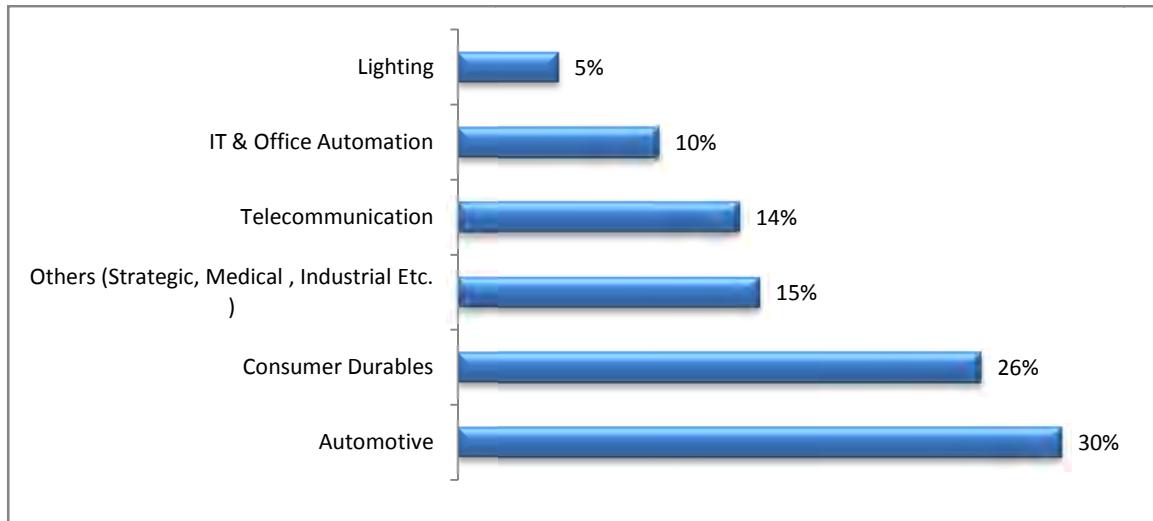


FIGURE 113: INDIAN FUSE MARKET SIZE - BY APPLICATION SECTOR

4.15.5 FUTURE TRENDS IN APPLICATION SECTOR GROWTH

Telecommunication and automotive are the key application sectors driving the demand for the fuse market.

Sl. No.	Application Sector	Growth rate
1	Telecommunication	30%
2	Automotive	25%
3	Consumer Durables	18%
4	IT & Office Automation	20%
5	Medical Electronics	17%
6	Lighting	12%
7	Industrial Electronics	7%
8	Strategic electronics	15%

FIGURE 114: KEY APPLICATION SECTORS - FUTURE GROWTH RATE

4.15.6 DETAILS OF INDIAN FUSE MANUFACTURERS

Some of the large manufacturers of fuses in India are listed in Table no. 184 in Appendix

CHAPTER #4.16:- OPTICAL DISC



HS Code- CD (Audio)	8523.40.40
HS Code- CD (Video)	8523.40.50



4.16.1 EXECUTIVE SUMMARY

A. Overview of the Indian Optical Disc Market:

The following table provides an overview of the Indian Optical Disc market.

Sl. No.	Heads	Description
1	Overall Indian Market Size in FY 2009-10	USD 298 Million
2	Ratio of Imports: Indian Manufacturing in FY 2009-10	20:80
3	Growth in FY 2009-10	29%
4	Export in FY 2009-10	USD 834 Million
5	Market Size by type of Optical Disc	Compact Disc (CD)- USD 122 Million Digital Video Disc(DVD) - USD 153 Million Blu-ray Disc- USD 23 Million
6	Key Application Segments	Entertainment & Information technology Sector
7	Estimated Growth in FY 2010-11	21%
8	Estimated Ratio of Imports : Indian Manufacturing in FY 2010-11	20:80

FIGURE 115: INDIAN OPTICAL DISC MARKET - AN OVERVIEW

Salient Aspects of Indian Optical Disc Industry:-

- Moser Baer is the largest manufacturer of optical discs in India and the second largest manufacturer in the world.
- The growth of the Optical Disk segment is due to the growth observed in the IT segment and in the Media & Entertainment sectors.
- The industry has been showing consistent year-on-year growth. The optical disc market in India is expected to grow at a CAGR of 21% for the next 3 years.
- Digital Video Disc (DVD) is currently driving the Optical disc market and is expected to do so for the next 1-2 year. However, with Blu-Ray discs gaining importance among the consumer, the market for Blu-ray disc is expected to increase significantly in the next 1-2 years.

4.16.2 INDIAN OPTICAL DISC MARKET- CURRENT & PAST TRENDS

Overall Market size in India(FY 2009-10) = USD 298 Million

The overall market size for optical disc in India is estimated at **USD 298 million** for FY2009-10 with indigenous manufacturing accounting for 80% of the total market.

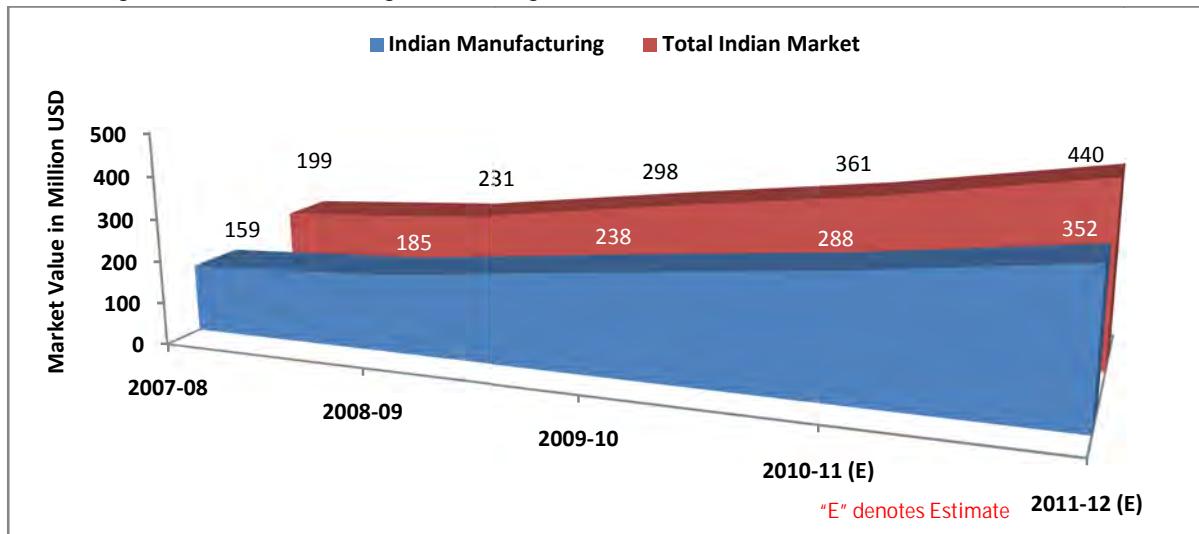


FIGURE 116: INDIAN OPTICAL DISC MARKET SIZE

The Optical disk market in India has been growing steadily and is expected to reach USD 440 Million in FY 2011-12. This growth is largely attributed to the increase in sales of CDs and DVDs in the home entertainment sector.

With Moser Baer entering the home entertainment business with diverse range of superior quality products that are competitively priced, the market is expected to multi-folds. Some of the other drivers of growth in the Optical Disk Market are as follows:

- Reduction in the hardware prices of electronic devices like Home theatre, DVD Player, Personal computers, etc
- Simultaneous reduction in the prices of Discs (CD/DVD/Blu-ray)
- Increased availability of high quality content in DVD leading to enhanced customer experience
- The growth in the Home entertainment market (which has grown by 13% from USD 84.4 Million in FY 2008-09 to USD 95.5 Million in FY 2009-10 and is expected to reach USD 164.4 Million in FY 2014-15 with a CAGR of about 12%). This soaring growth in the home entertainment market provides a tremendous opportunity for the optical discs market in India.

Moser Baer is the leading Optical Disc producer in India. It caters to both the domestic and international markets. Some of the countries of export include USA, European countries, Middle East, Africa, Australia & Russia. In addition, Moser Baer is also a contract manufacturer for many of the leading optical disc brands globally like Sony, Philips, Imation, etc. These brands provide Moser Baer access to the global markets. The total Indian export market is estimated to be around USD 834 Million in FY 2009-10.

4.16.3 TYPES OF OPTICAL DISC

Conventionally, Optical Discs are classified based on the technology used to inscribe data on to the substrate. The popular technologies include –

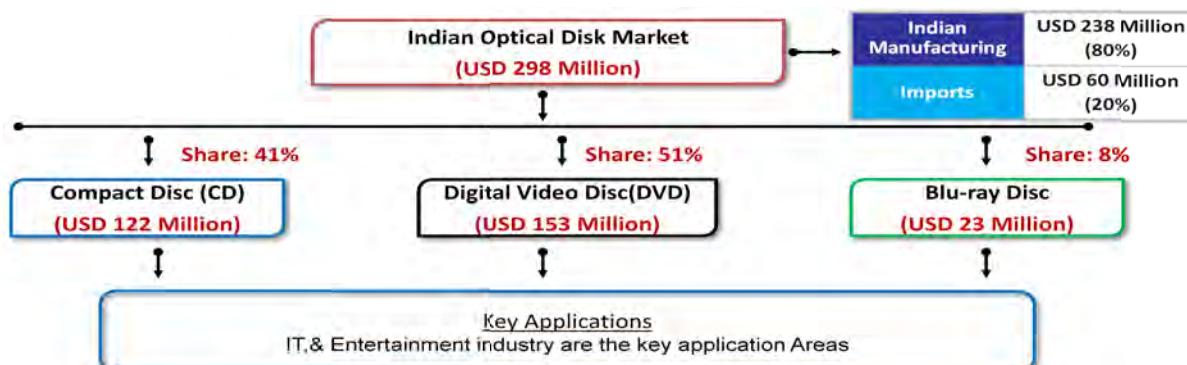


FIGURE 117: TYPES OF OPTICAL DISC

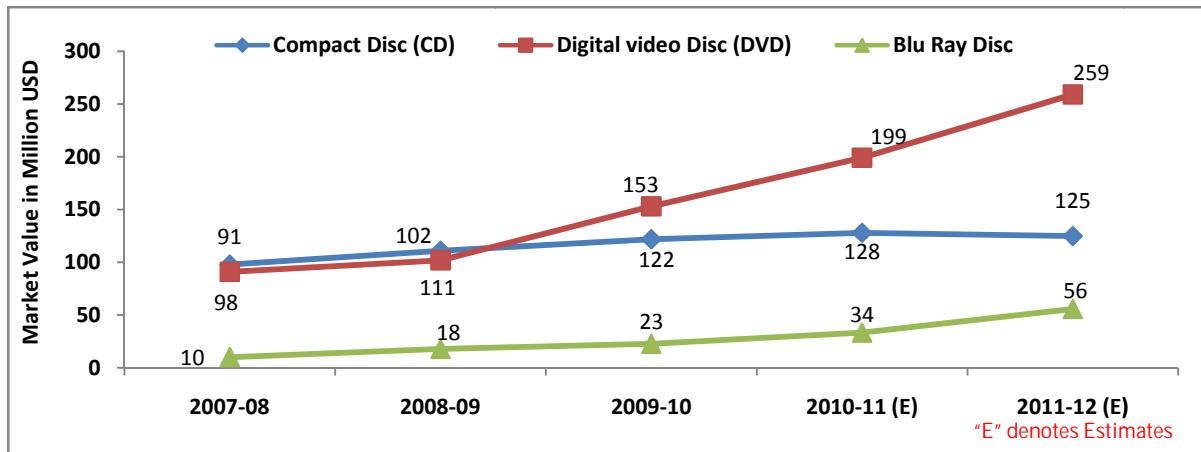


FIGURE 118: TYPES OF OPTICAL DISC

The Indian Market has been witnessing a shift from CD to DVD over the last couple of years. DVDs are the mainstay of the Indian Optical Disc market currently, though CDs continue to exist. Over the next couple of years, CD sales are expected to remain largely stagnant while the



sale of DVDs is expected to grow significantly. In addition, the adoption of Blu-Ray Discs is also expected to increase over the next couple of years. However, widespread adoption of Blu-Ray discs will depend on the manner the technology standards are defined for Blu-Ray.

Key Technology Trends in Optical Disc in FY 2010-12:-

The key technology trends that are driving the optical disc market are as follows;

- The need for distributing high-definition video and storing high volumes of data has forced manufacturers to develop Forward Versatile Disc (FVD) & Digital Multilayered disk.
- Research is underway across countries to develop optical discs that hold more than 1 Terabyte (1 TB) of data.

4.16.4 INDIAN OPTICAL DISC MARKET- MARKET SIZE BROKEN BY INDUSTRY SECTORS

The optical Disc is largely used for the purpose of Data storage in the Entertainment Industry and IT industry sectors.

4.16.5 DETAILS OF INDIAN OPTICAL DISC MANUFACTURERS

It is estimated that there are about 4-5 companies that manufacture optical disc in India with more than 80% of companies are small time manufactures. Moser Baer is the largest Manufacturer of Optical disc in India. Some of the optical disc manufacturers in India are listed in Table no. 185 in Appendix

CHAPTER #4.17:- MAGNETS



NIC Codes	369.5
HS Codes	8505.11.00



4.17.1 EXECUTIVE SUMMARY

A. Overview of the Indian Magnet Market:

The following table provides an overview of the Indian magnet market.

Sl. No.	Heads	Description
1	Overall Indian Market Size in FY 2009-10	USD 110 Million
2	Ratio of Imports: Indian Manufacturing in FY 2009-10	90:10
3	Growth in FY 2009-10	-5%
4	Export in FY 2009-10	Negligible
5	Market Size by type of Magnets	Permanent Magnets Temporary Magnets Electromagnets
6	Key Application Segments	Consumer durables, automotives, others (medical, industrial, lighting).
7	Estimated Growth in FY 2010-11	10%
8	Estimated Ratio of Imports : Indian Manufacturing in FY 2010-11	90:10

FIGURE 119: INDIAN MAGNET MARKET - AN OVERVIEW

Salient Aspects of Indian Magnetic Industry:-

- The Indian magnets market is primarily dominated by imports and there is limited manufacturing of magnets in the country.
- Key sectors driving growth in this market are Automotives (particularly automobile accessories) & Consumer Durables (particularly multimedia devices like Home theatres systems, Speakers).
- The magnet market has witnessed a steady decline for the last two years to reach a market size of USD 110 Million for 2009-10. However, manufacturers expect the market to rebound and reach USD 133 Million in FY 2011-12. This growth is expected to be driven by the increase in demand for consumer durables and automotive (accessories) sector.
- The key challenge faced by the Indian manufacturers is large-scale import of ultra cheap magnets from China.

4.17.2 INDIAN MAGNET MARKET- CURRENT & PAST TRENDS

Overall Market size in India(FY 2009-10) = USD 110 Million

The overall market for magnets in India is estimated at USD 110 million for FY 2009-10 with indigenous manufacturing contributing about 10% of the total market. The Imports of magnets are largely from China and Taiwan.

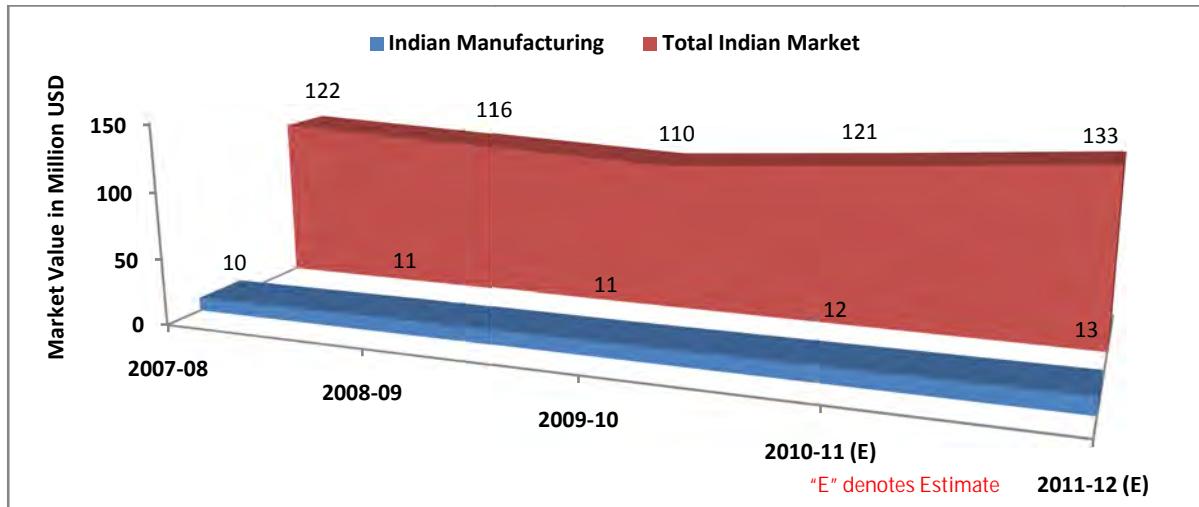


FIGURE 120: INDIAN MAGNET MARKET SIZE

The international magnet market witnessed a short term slump due to the economic recession in 2008-09, and the Indian market also felt its impact. However, unlike other components which saw a gradual revival in 2009-10, post recession, the magnet market slipped further. The reason behind this was that the market had a large number of unused stocks due to the decline in demand. The first half of 2009-10 saw the utilization of the available stocks and the companies started importing again only in the latter half of 2009-10.

The Indian manufacturers registered a growth of 10% in FY 2008-09 when the total magnet market declined by about 5%. This was largely due to the decreased production in China owing to the recession. This decrease in production resulted in many Indian companies purchasing the magnets from Indian manufacturers.

The future of the Indian market looks promising with the global demand for magnets on the rise. Increased demand from industries like automobiles, consumer electronics, multimedia devices, military and aerospace equipments, medical devices, power generation, and telecommunications is expected to further boost growth in the magnet market.

Asia-Pacific is the largest and fastest growing market for magnets globally, with China leading the production. NdFeB (Neodymium Iron Boron) type of magnets are the most common type of magnets produced and finds usage in energy, communication, medical devices, electronics goods and automotives. However, India continues to hold a very small share of the overall global production of magnets. This is due to the low availability of magnetic ores in India. Given the limited production and availability of ores, magnets are very rarely exported by Indian companies.

4.17.3 TYPES OF MAGNETS

Conventionally, Magnets are classified basis the way the magnetism is induced in the devices. The classifications of Magnets are as follows:-

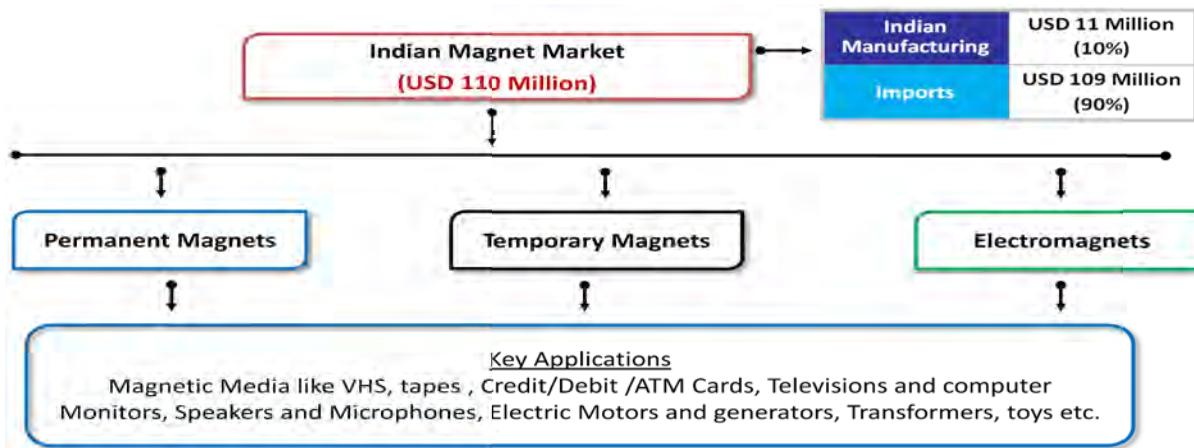


FIGURE 121: TYPES OF MAGNETS

The Permanent Magnets are further classified based on the materials used for inducing magnetism. Some of the popular materials used are Neodymium Iron Boron (NdFeB or NIB), Samarium Cobalt (SMCo), Alnico and Ceramic-Ferrite. Both Neodymium Iron Boron and Samarium are known as rare earth magnets as these are compounds directly found in the earth.

Alnico and Ceramic-Ferrite Magnets are the most commonly used permanent magnets. Loud Speakers manufactured in India is one of the key applications of Alnico and ceramic magnets apart from applications like ATM/debit/Credit Cards, toys etc. Electromagnets largely find application in device like Transformers, electric motors, Industrial equipments like junkyard cranes, Magnetic resonance imaging machines etc.

Key Technology Trends in Magnets:-

The key trends that are expected to drive the Magnet Industry in the next 2-3 years are:-



- Development of Super conducting Magnet technology that would help in increasing usage of magnets in areas of medical diagnostics like MRI Scan, Transportation (Maglev Trains), etc.
- Increasing usage of Nanomagnetic materials in devices like hard Disks, Mobile phones, etc is expected to decrease the usage of rare earth elements, which has limited production.

4.17.4 INDIAN MAGNET MARKET- MARKET SIZE BROKEN BY INDUSTRY SECTORS

The contribution of various application sectors in which Magnets are used is shown below:-

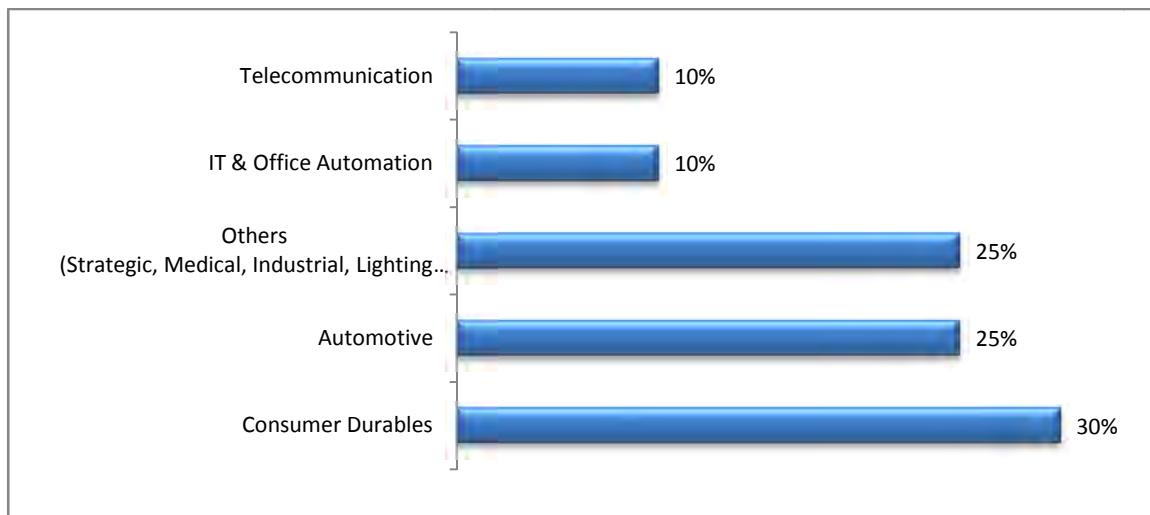


FIGURE 122: INDIAN MAGNET MARKET SIZE - BY APPLICATION SECTOR

4.17.5 FUTURE TRENDS IN APPLICATION SECTOR GROWTH

The Automotive sector, which is growing at a rate of 25% and is one of the major contributors to the demand for magnets, is expected to drive the demand for magnets in the coming years

Sl. No.	Application Sector	Growth rate
1	Telecommunication	30%
2	Automotive	25%
3	Consumer Durables	18%
4	IT & Office Automation	20%
5	Medical Electronics	17%
6	Lighting	12%
7	Industrial Electronics	7%
8	Strategic electronics	15%

FIGURE 123: KEY APPLICATION SECTORS - FUTURE GROWTH RATE



सत्यमेव जयते

4.17.6 DETAILS OF INDIAN MAGNETS MANUFACTURERS

It is estimated that there are about 5-6 magnet manufacturers in India. The more prominent manufacturers are Mahindra Hinoday Industries Ltd. (a subsidiary of Mahindra & Mahindra group), Sonal Magnetics and Permanent Magnets Ltd. Some of the large manufacturers of Magnet in India are listed in Table no. 186 in Appendix

CHAPTER #4.18:-OTHER COMPONENTS





4.18.1 INDIAN MAGNETRON MARKET

Magnetron is a high powered vacuum tube that utilizes the concept of electricity and magnetism to create microwaves. It is widely used in microwave ovens and in radar systems. There is no indigenous production of magnetron and, thus, Indian magnetron market relies completely on imports.

The total market for magnetron in India is estimated at **USD 55 Million** for the FY 2009-10. The market is estimated to grow at a CAGR of 17% in the next two years. According to industry experts, close to 80% (or about USD 44 Million) of the total magnetron imported are consumed by the consumer appliances industry for production of microwave ovens. The remaining magnetrons are used in radar systems in the aerospace sector.

NIC Codes	321.20
HS Codes	8540.71.00

FIGURE 124: NIC & HS CODES

Though tempered by the economic recession in FY2008-09, the market is expected to register a substantial increase in its revenue post recession. This is largely driven by the increase in sales of microwave ovens and significant investments made by the government in the field of strategic electronics.

4.18.2 INDIAN MICRO/STEPPER MOTOR MARKET

Micro motor is a miniature form of DC motor used mainly in low power electronic applications. These are largely used in audio-video equipments, Home appliances, Automobiles, office automation devices like printers, currency counters, etc. This product was perfected in Japan and is also largely manufactured in Japan. Apart from Japan, micro motors are also manufactured in Korea, Taiwan, Singapore & Malaysia. India largely imports its micro motors from Korea, Taiwan and, to a lesser extent, from Malaysia.

NIC Codes	321.3
HS Codes	8501.10.11

FIGURE 125: NIC & HS CODES

A Stepper motor is an electromechanical device that converts electrical pulses to discrete mechanical movements. Stepper motors find use in home appliances like OTGs, dishwashers, projectors, etc and in industrial devices like optical scanners, engine test stand, conveyors, plastic injection molding machines etc. Japan is the world leader in manufacturing stepper motor followed by North America and Western Europe. Most stepper motors are also imported in the country.

The total market for Stepper & Micro motor in India is estimated at **USD 22 Million** for the FY 2009-10. The market is estimated to grow at a CAGR of 9% in the next two years. This estimate



excludes the vibratory motors that are largely used in mobile phones. The market for vibratory motor is estimated at an additional 200 Million Units.

According to industry experts, Indian companies have not ventured into this space largely due to the following:

- Requirement of high initial investment due to the need to purchase high precision equipments
- Non availability of good quality magnet
- Strong competition from multinational companies like Canon, Matsushita, JVC , Toshiba, etc, who have attained economies of scale due to the large volume

The demand for Micro & stepper motors is only expected to increase further with the growing demand for devices like Computers, entertainment devices, mobile handsets, toys, automotives, printers and consumer electronic industries.

4.18.3 INDIAN HEAT SINK MARKET

A Heat sink is a term for a component or an assembly that transfers heat generated within a solid material to a fluid medium such as air or liquid. Typical applications of heat sinks are in Computer CPU, Graphic Processor, LED lamps etc. The manufacturing of heat sinks in India is limited and they are currently imported from countries like South Korea, Japan, Taiwan and China.

NIC Codes	321.3
HS Codes	8529.90.90

FIGURE 126: NIC & HS CODES

The heat sink market had grown at a steady pace till FY 2008-09. In FY 2008-09, the market for heat sinks witnessed a decline due to the reduction in production of information technology devices and light electrical appliances. However, post FY 2008-09, the market has seen an upward trend and currently it is estimated at **USD 67 Million** for FY 2009-10. The market is estimated to grow at a CAGR of 7% in the next two years.

There are various reasons for the low contribution of Indian production in the Heat sink market. This includes the following:

- Non availability of high grade aluminium for manufacturing heat sink. Cost of import of raw materials and the cost of import of finished heat sinks do not differ significantly making manufacturing through imported aluminium unviable
- Competing against organizations that have managed to set up economies of scale



In recent times, a few manufacturers have set up small plants for manufacturing heat sink. However, the key challenges for these players have been in terms of standardization of the product to meet consistent quality standards.

Miniaturization of electronic product, which is expected to grow significantly over the next few years, will increase the demand for heat sinks manifold. This is because the additional heat generated by the components in a small area will need to be dissipated. In addition, the growth in demand of LED lamps is expected to drive the market for heat sink further in India. Thus, the market is expected to see significant growth over the next 2-3 years. However, Indian manufacturing is expected to remain limited in this space.

4.18.4 INDIAN RF TUNERS MARKET

A Radio Frequency Tuner is an equipment that detects radio frequency signals of low amplitude and converts them for further processing. Typical applications of RF tuners are in Television, Set- top boxes, Laptops, PC peripherals, PDAs, Gaming Consoles, Portable Media Players, mobile phone etc. RF Tuners comes in various forms and its size & shape depends on the application of the device. Panasonic is one of the leading organizations globally that manufacture RF Tuners for Television and cable modems. Elonics, a UK based company, is one of leading players in this segment and is widely popular for CMOS based RF tuners.

NIC Codes	321.3
HS Codes	8522.90.00

FIGURE 127: NIC & HS CODES

Currently, India largely imports its requirement of RF tuners from countries like South Korea, Taiwan and Japan. The total Indian market for RF Tuners is estimated at **USD 100 Million** in FY 2009-10. The market is estimated to grow at a CAGR of 10% in the next two years.

In the last few years, several organizations have made attempts to design and manufacture RF Tuners indigenously. Thus, over the next 2-3 years, the country witnesses several initiatives in this space.

4.18.5 INDIAN CRYSTAL OSCILLATOR MARKKET

Crystal oscillator is widely used for nearly all electronics products. In some instances, crystal oscillators are used to provide a cost effective clock signal for use in a digital or logic circuit. In other instances, they are used to provide a RF signal source. Some of the typical applications of crystal oscillators include its use in quartz clocks, watches, radio & television transmitters, Mobile phone, etc.

NIC Codes	321.3
HS Codes	8543.89.99

FIGURE 128: NIC & HS CODES



Globally, four of the largest crystal oscillator manufacturers are based in Japan. The other key markets for oscillator manufacturers are Europe and USA. However, in recent times, Chinese and Taiwanese companies have also been successful in designing and manufacturing cost effective crystals and have started to export these oscillators to companies located in Europe, India and South America. Availability of good quality of Quartz crystals is one of the biggest setbacks for Indian companies not venturing in this product space.

The Indian market for crystal oscillator is estimated at **USD 54 Million** in FY 2009-10. The market is estimated to grow at a CAGR of 8% in the next two years. All crystal oscillators used in India are currently imported from Japan and Taiwan. With limited efforts to manufacture the component in India, import will continue to be the major source of crystal oscillators for the Indian electronic Industry.

4.18.6 INDIAN PIEZOELECTRIC CRYSTAL MARKET

Piezoelectric crystals are one of many small scale energy sources available in the market. Whenever Piezoelectric crystals are mechanically deformed or subject to vibration, they generate a small voltage. The global piezoelectric crystals market is estimated at USD 4.8 Billion in FY 2008-09 and is expected to reach USD 6.91 Billion in FY 2011-12. This is largely attributed to the emergence of wireless communications and the need for wire-line based data transmission. Apart from this, industrial & consumer applications are also steering the industry towards a steady growth.

Currently, Japan and South Korea are two major countries supplying piezoelectric crystal to the world for microprocessor based devices. China is the largest supplier of piezoelectric crystals for toys and games.

The Indian market for piezoelectric crystals is estimated at **USD 63 Million** in FY 2009-10. The market is estimated to grow at a CAGR of 13% in the next two years. There is no local manufacturing in this segment and the entire requirement is addressed through imports.

4.18.7 INDIAN MAGNETIC TAPES INDUSTRY

Magnetic tape is the oldest technology in the storage hierarchy. It has been a dominant storage and data backup technology for the last 50 years. In addition, it has also been used effectively in the audio & video markets for the last 20 years. The key application for magnetic tapes is storage and is used in the form of back up storage discs, audio & video cassettes, floppy disk, etc. However, the emergence of newer

NIC Codes	321.00
HS Codes	8541.60.00

FIGURE 129: NIC & HS CODES

NIC Codes	300.30
HS Codes	8523.11.22

FIGURE 130: NIC & HS CODES



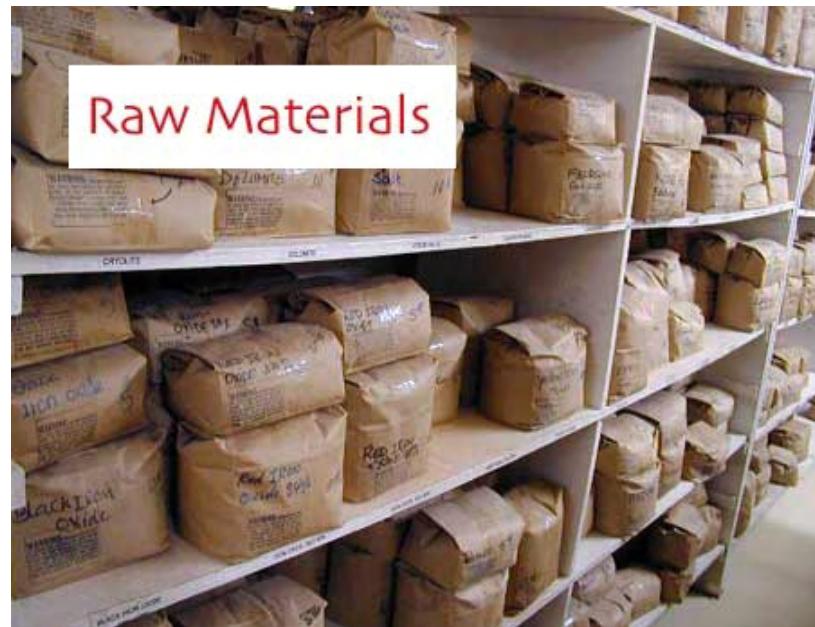
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technologies like optical media, flash drives, Solid State Devices, etc are increasingly pushing the magnetic tapes market towards obsolescence.

The total available market for Magnetic tape industry in India is estimated at **USD 10 Million** for FY 2009-10. The market is estimated to grow at a CAGR of 5% in the next two years. However, world over, the market for the magnetic tapes has seen a decline especially with the advent of Optical media and magnetic tapes are largely used as back up storage disk for large computer system.

The magnetic tapes are largely being imported into India as most Indian players like T-Series, TDK etc have significantly reduced their production due to the dwindling demand for such devices.

CHAPTER #5.0:- RAW MATERIALS USED IN ELECTRONIC COMPONENT MANUFACTURING





Raw materials are an integral part of the electronic component manufacturing industry. Raw materials and electronic components are the backbone of electronic hardware. For each component that is used in the hardware industry, there exist detailed specifications of raw materials that ensure the performance of the component as per requirement. Newer raw materials are transforming the manufacturing processes of electronic hardware products. As the specifications and the performance criteria of hardware products become more rigorous, the quality standards for raw materials also have become more stringent.

During the initial phase of component manufacturing in India, most of the raw materials were imported from Europe. The trend has not changed much over the years in spite of considerable growth in the indigenous manufacturing of components. Even now, it is estimated that 90% of the raw materials are imported from countries like China, Taiwan, South Korea and the European Union. Most industry experts believe that the present high dependence on imports is not expected to change significantly in next five years unless corrective actions are taken to address the challenges related to raw materials that are plaguing the industry.

The key raw materials required for the electronic component manufacturing in India could be broadly classified as follows:

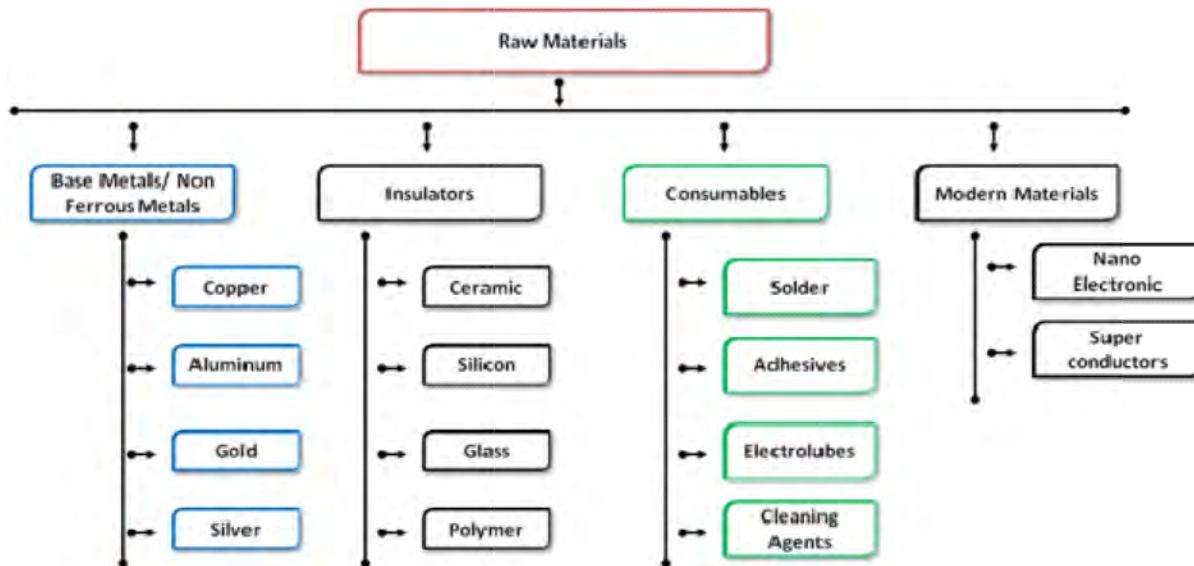


FIGURE 131: RAW MATERIALS FOR MANUFACTURING ELECTRONIC COMPONENTS

1. Base Metals/ Non-ferrous Metals

Conventionally, base metals refer to non-ferrous metals excluding precious metals like Gold and silver. However, over the years, usage of gold and silver has increased in electronics



manufacturing with the result that now these two precious metals are regarded as base metals by it. Below we discuss briefly the base metals which find high usage in electronics.

1.1. Copper

1.1.1 Introduction & Usage

Copper is one of most critical materials used in electronic components. Superior properties such as electrical and thermal conductivity make copper very difficult to substitute without sacrificing performance and energy efficiency. Pure copper is used in copper wire, copper bar, copper tubing, copper sheets etc., in the industry.

However, when a higher hardness is required, copper is used in its alloy form like bronze and brass.

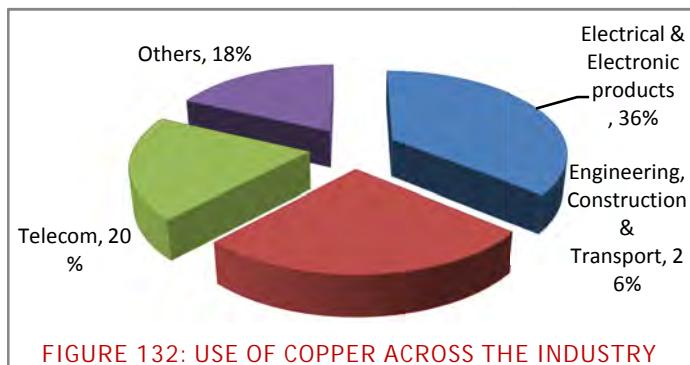


FIGURE 132: USE OF COPPER ACROSS THE INDUSTRY

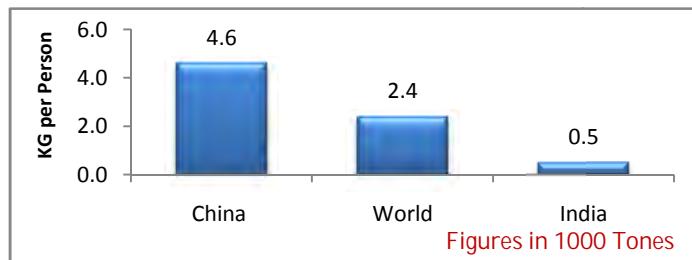
Copper finds usage in a wide range of industries. Fig 132 provides a detailed understanding of the use of copper across industries.

The electrical properties of copper are vital for devices such as electromagnets, Integrated circuits and printed circuit boards. Increasingly, it is

replacing aluminum in heat sinks and heat exchangers because of its superior heat dissipation capacity even though it is more expensive compared to aluminum. Copper in the form of copper wire is used in transformers, inductors, chokes, resistors etc. Copper in the form of touch points is used in switches, relays, resistors, diodes, rectifiers etc. Vacuum tubes, cathode ray tubes, and the magnetrons in microwave ovens also use copper, as do wave guides for microwave radiation.

1.1.2 Understanding the Market – Production & Consumption

India is not a very large producer of copper. This is due to non-availability of copper ore in India. India's total copper consumption stood at 5.6 lakh tons for the financial year 2009-10. India's per capita consumption of copper is significantly lower than that of China and is also lower than that of the world average. Figure



133 shows the comparison of per capita consumption of copper across China,



India and maps it against the global average. Figure 134 shows that the growth of consumption of copper in India has been modest.

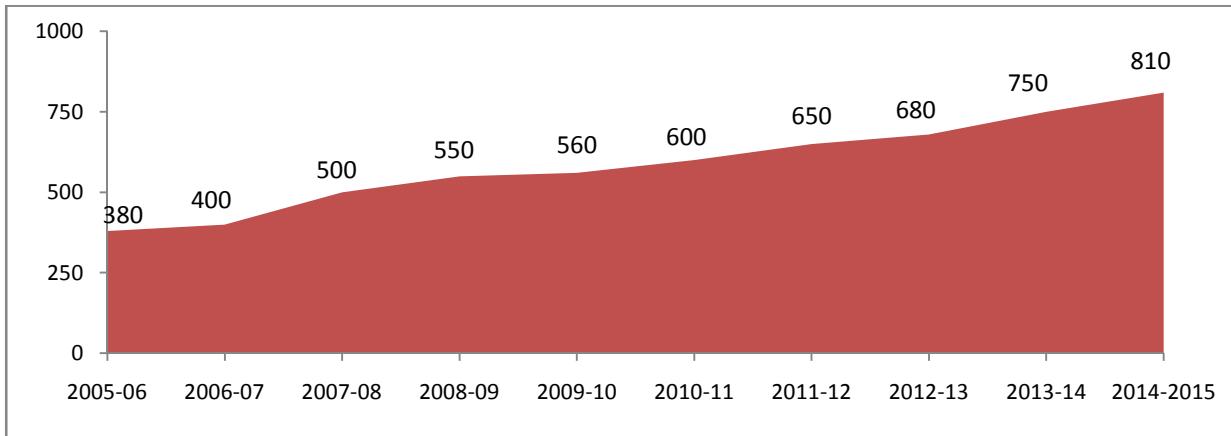


FIGURE 134: CONSUMPTION OF COPPER IN INDIA - TRENDS

1.1.3 Understanding the Market- Availability

According to the industry sources, India's production of refined copper is approximately 4% of the total world production. The copper production in India depends on the import of copper ore from countries like Canada, Indonesia, Chile and Australia.

Sl. No	Heads	Metric Tonne
1	Mining Capacity	32,000
2	Refining Capacity	9,99,500
3	Consumption	560,000

FIGURE 135: DEMAND AND SUPPLY SCENARIO (2009-10)

There are three major organizations in India which produce copper from its ore. They are Birla Copper Ltd. , Hindustan Copper Ltd., and Sterlite Industries Ltd. Of the 3 companies, Hindustan Copper Ltd. is a public sector organization while the other two are in the private sector.

Indian copper manufacturing facilities are restricted to production of refined copper. Electronics applications require high grade copper and its alloys, which require perfect raw materials engineering capabilities that are currently lacking in India. Thus, most of the copper used as raw materials in electronics components is imported into India.

1.2. Aluminum

1.2.1 Introduction & Usage

Aluminum is the most abundant metal in the earth's crust and the third most abundant element, after oxygen and silicon. Aluminum is extremely reactive and is usually found in the form of ores. Bauxite ore is one of the most commonly found aluminum ores.

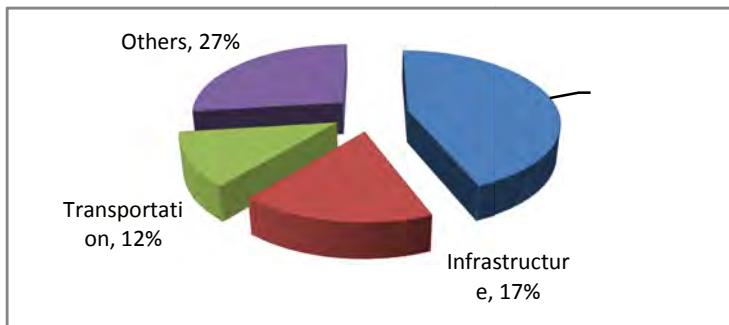


FIGURE 136: SECTORS CONSUMING ALUMINUM

substitute for copper in electrical and electronics transmission industry. A very large proportion of overhead high voltage power lines utilize aluminum rather than copper due to easier availability, lower price & lower density. However, one of the largest applications of aluminum in the electronic industry is in the manufacturing of heat sinks. This is because aluminum dissipates heat faster than most other materials. Some of the other applications of aluminum include switches, relays, amplifiers, connectors, sockets, fuses, etc. Figure 136 indicates the various sectors consuming aluminum.

Aluminum exhibits a lower density when compared to steel, thereby making it an appropriate substitute to steel in areas like transportation, power, infrastructure etc. Apart from lower density, aluminum is a good thermal and electrical conductor, having about 59% conductivity of copper, thereby making it a viable

1.2.2 Understanding the Market - Production & Consumption

India's demand for aluminum in FY 2009-10 was 1.4 million tons. India is the seventh largest producer of aluminum in the world. India produces about 1.4 million tons of aluminum, which coincidentally equals its demand. India exports about 10% of its production.

In spite of the large demand and production, India's per capita consumption of Aluminum is significantly lower than that of countries like USA, Europe, Japan and Taiwan. Figure 137 shows the comparison of per capita consumption of aluminum across some of the major consuming nations.

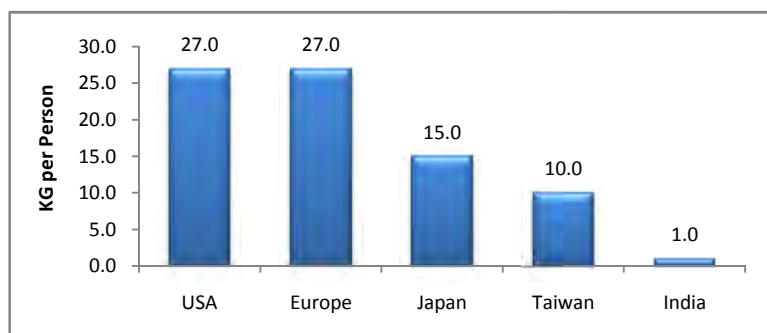


FIGURE 137: PER CAPITA CONSUMING ALUMINUM

1.2.3 Understanding the Market- Availability

The most commercially mined aluminum ore is Bauxite. India has the fifth largest reserves of bauxite with deposits of about 3 billion tons equivalent to 5% of world's Bauxite deposits. Most of the bauxite mines are in Bihar, Karnataka and Orissa. In India, the production of aluminium is highly concentrated and is largely managed by a few organizations which are as under:



- Bharat Aluminium Co. Ltd (BALCO)
- National Aluminium Co. Ltd (NALCO)
- Hindustan Aluminium Co. Ltd (HINDALCO)
- Madras Aluminium Co. Ltd (MALCO)
- Sterlite Industries Ltd.

Most of the demand for aluminum required for electronic industry use is met through local manufacturing and only a small percentage is imported as India's indigenous production of aluminium is higher than the demand for aluminum. However, the key challenge is the relatively inferior quality of pure aluminum available through the production processes in use in India. This makes it unsuitable for specialized applications in electronic components making imports necessary. One such application is aluminium foil for capacitors.

1.3. Gold

1.3.1 Introduction & Usage

While the dominant usage of gold in India is in making jewelry, it also finds significant use in the electronics industry. This is especially true in case of solid state electronics owing to its corrosion-free property.

Gold is used in connector, switch and relay contacts, soldered joints, connecting wires and connection strips as contact points for highly reliable circuits. Gold also finds application in almost every sophisticated electronic device like cell phones, calculators, personal digital assistants, global positioning systems etc.

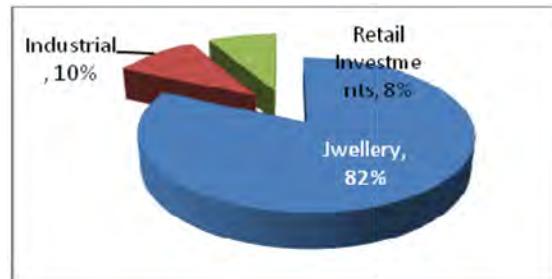


FIGURE 138: SECTORS CONSUMING GOLD

1.3.2 Understanding the Market - Production & Consumption

India consumes about 850 metric tons of gold every year which accounts for about 20% of the gold consumption globally. More than 80% of this is used for making gold jewelry. As India's domestic production of gold is significantly lower than the demand, the country imports gold for most of its domestic requirement.

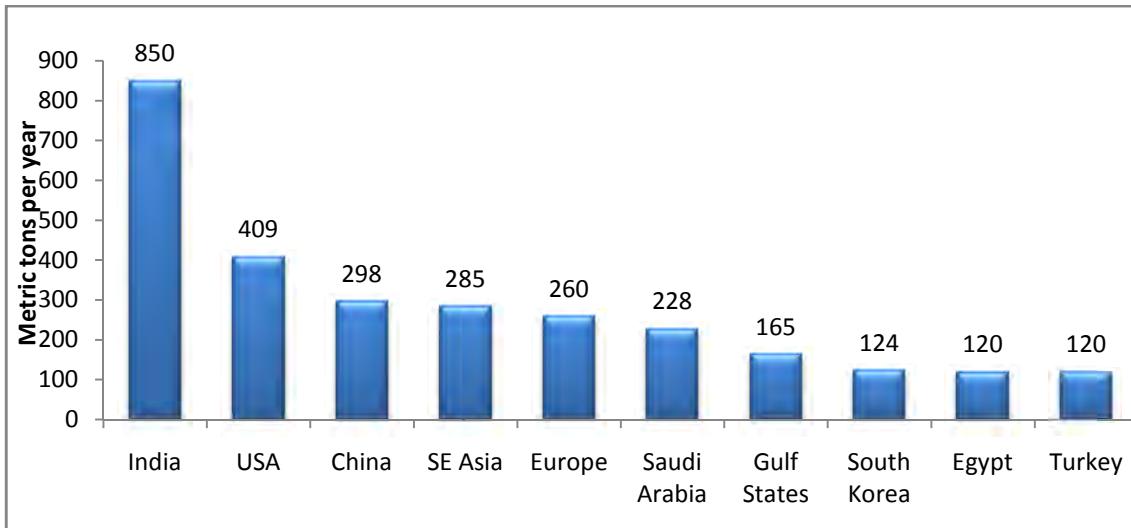


FIGURE 139: TOP 10 CONSUMERS OF GOLD

1.3.3 Understanding the Market- Manufacturers

India is one of the largest consumers of gold. Huti Gold Mines Company Ltd. (HGMCL) is the only unit processing gold from ore stage. Hindustan Copper Ltd. (HCL), a public sector undertaking, and Hindalco Industries Ltd. (HINDALCO), in private sector, produce gold as a by-product, while processing copper.

1.4. Silver

1.4.1 Introduction & Usage

Silver and gold have similar properties and usage in the field of electronics. As silver is much cheaper than gold, in many cases, gold is being replaced by silver. Silver is the best conductor of electricity and is used as a comparative measure for the conductivity of all other metals.

Electronic components account for about 5% of world's silver usage. In Electronics, silver is used in all such places where the degree of conductivity required is very high. This includes contact points, circuit breakers, switches, fuses etc.

1.4.2 Understanding the Market - Production & Consumption

India is primarily a silver importing country, as the production of India is not sufficient to satisfy the ever-growing domestic demand. The import of silver in India is about 1000 tons. India produces about 30 tons of silver annually. Most of the silver is imported from China which has a 50 % share in the import market.



India stands third after United States and Japan among the leading consumers of silver in the world.

2. Insulators

2.1. Ceramic

2.1.1 Introduction & Usage

Ceramic Industry came into existence in India about a century ago. The use of ceramic has evolved from the traditional usage in pottery to electronic applications. Currently, ceramics are used in various communication devices, semiconductor devices, GPS modules and also in passive components like resistors, and capacitors.

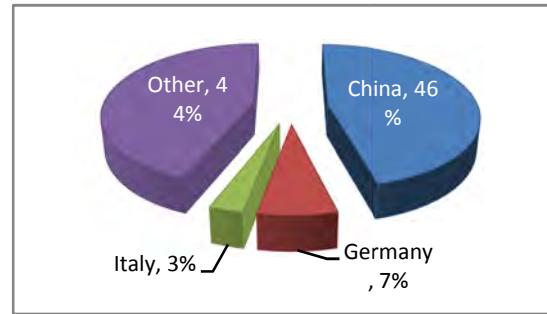


FIGURE 140: IMPORTS BY COUNTRIES

2.1.2 Understanding the Market – Production, Consumption & Availability

The Indian market for ceramics is valued at USD 1778 Million, making India, the 8th largest ceramic consuming market in the world.

The demand for ceramics in India is largely met by indigenous production. According to the government reports, the import of ceramic was estimated to be around 38% (USD 686 Million) from countries like China, Germany and Italy. Fig 140 shows the breakup of imports by country of origin.

2.2. Polymers

2.1.1 Introduction & Usage

Polymers form an important constituent of the Indian petrochemical industry. Polymers are largely used in the manufacture of various plastic products. Major polymers that have applications in electrical and electronics industry are polyvinylchloride (PVC), polypropylene (PP), polyethylene (PE).

Polyvinylchloride (PVC) is a thermoplastic polymer and is the third most widely produced plastic. It has wide applications in the electronics industry. It is used in cables as an insulating medium and also for providing stability and protection. It also finds application in capacitors, resistors, relays, switches, transformers, etc.

Polypropylene is a very light weight thermoplastic polymer and is mainly used in the manufacture of plastic parts manufactured through injection molding process, BOPP, ropes,



twines, etc. Polyethylene is mainly used in the packaging industry and in the manufacture of blow molded components, injection molding components in the paper industry.

2.2.2 Understanding the Market – Production, Consumption & Availability

India has an installed polymer production capacity of around 4.5 million metric tons per year. Polyethylene and polypropylene production accounts for around 70% of the total polymer production in India. The combined production of polypropylene and polyethylene stood at 3.1 million tons per annum with the consumption of polypropylene at 0.8 Million Tons per Annum.

India stood at 8th place in the consumption of polymers with per capita consumption of 4 kg per year.

The PVC industry in India is estimated at 1.4 million tons per annum and is growing at a 13-15% per annum. The market is driven by the high growth in packaging, building & construction, consumer goods, and automotive industry. The major producers of polypropylene in India are Reliance Industries, Haldia Petrochemicals and Gas Authority of India. The total demand for PVC in India is a little over 1.6 million tons and the shortfall of about 2 lakh tonne and is being met through imports. The major company producing PVC is Reliance Industries Ltd.

3. Consumables

Consumables play an indispensable role in the electronic industry. Quality, availability and price of consumables have a direct impact on the competitiveness of the industry. India had been a large importer of consumables since the 1990s. However, with technological advancement and increase in demand, India has also started producing some of these consumables including solder paste, adhesives, solder fluxes and cleaning materials.

With the increase in processing power and the trend toward smaller and more compact electronic modules, which in turn would need higher quality& quantity of consumables, the demand for consumables is increasing at a rapid pace. Apart from the electronic components segment, demand is also fuelled by the end product industries like aerospace, automobiles, Solar Energy, etc.

Currently, a significant proportion of the demand for consumables like solder paste, adhesives, solder fluxes, etc is met by local manufacturing. However, most of the ingredients required for the production of these consumables are imported from China, Europe and Africa.

Most of the demand for cleaning solutions and chemicals are being met through imports. Several multinational companies like Henkel Corporation, Zestron, Kuraray, and Ciba Specialty Chemicals have either set up sales offices or are planning to set up their sales offices in India to cater to the growing market for such cleaning solutions and chemicals.



3.1. Solder Flux

The role of a flux is typically dual - dissolving the oxides on the metal surface and acting as an oxygen barrier by coating the hot surface, preventing its oxidation. However, soldering flux serves a third purpose too - that of facilitating the amalgamation by improving the wetting characteristic of the liquid solder.

Soldering fluxes are typically organic in nature as it does not react easily with oxygen. Some of the major types of fluxes used in the electronics industry are as follows:-

- Rosin Fluxes – Rosin fluxes largely find use in boards used in Chip Mounting process.
- Water Soluble Fluxes- used largely in high density electronics boards.
- No-clean fluxes- used in general electronic boards.
- Tinning fluxes. – used largely when tinning of lead wires is done.

The market for soldering flux was estimated at 36,000 liters in FY 2009-10 and is expected to have reached 48,000 liters in FY 2010-11, a growth of 35%. With the industry moving towards miniaturization and Surface Mount Technology, the market for soldering flux is expected to witness a significant growth.

3.2. Adhesives

The basic building block of the modern electronics industry is the PCB which makes use of adhesive materials in bonding surface-mount components, wire tacking, potting and encapsulating electronics components and conformal coating of circuit boards.

The type of adhesives used for the bonding process depends on the method by which it is applied on the PCB. Some of the popular types of adhesives used in the industry are as follows:-

- Electrically conductive adhesives: - These are used when the circuitry requires the adhesive to be conductive. Normally, two types of electrically conductive adhesives are used :-
 - Anisotropic adhesives: - It allows only bi-directional current and is largely used in most electronics products.
 - Isotropic adhesives: - Used in special applications where uni-directional flow of current is required.
- Thermally conductive adhesives: - Miniaturization of electronic circuitry creates a problem of heat build-up. In such cases, thermally conductive adhesives are used to dissipate the excess heat generated.



- Ultraviolet-curing Adhesives:-These adhesives are gaining in importance as they do not use any environmentally harmful solvents and additives. These adhesives are normally acrylic-based formulations and contain photo-initiators which, when activated by ultraviolet radiation, form free radicals to initiate the curing process.

The market for adhesive industry was estimated at USD 300 Million in FY 2009-10 and is expected to have reached USD 400 Million in FY 2010-11, a growth of 33%. This is expected to increase further with the fast growing industry.

4. Modern materials

Apart from the traditional raw materials, the industry is also adopting newer technology (like nanotechnology) based materials. Materials like Nanowire, Nanocube, Graphene, Nanorod, etc are currently being developed for use in the electronic component industry. These are in various stages of testing and are largely used by R&D labs of major companies. In India, these are being imported from Western Europe and North America.

With medical electronics gaining importance in the modern world, the need for superconducting magnets has increased as they find application in MRI and NMR machines. Superconducting magnets are made from superconducting wires, popularly known as superconductors. They exhibit superconductivity where at a certain temperature, the electrical resistance is zero. The biggest drawback of superconductivity is the constant need for maintaining the critical temperature. This limits its usage to niche products. Currently these are manufactured in Western Europe and most countries import it from Western Europe.

Apart from the nano materials and superconductors, a few other materials like variants of Indium and Gallium are being used in some of the products like LCD's and LED's. Industry experts believe that Indium and gallium are the next generation materials and using them in right proportion with Silicon would enable creation of newer and effective semiconductor components.

4.1 LCD Panels & Displays

LCD Panels and displays are going to witness a significant growth over the next few years. It is estimated that there will be a demand of not less than 30 million such displays by 2015 (TVs, computer monitors, smartphones, etc.) with LCDs being on the forefront. According to Industry experts, the Indian LCD TV market is at the beginning of an inflection point, with an expected growth of about 100% year-on-year for the next five years. This growth is largely driven by the enhanced purchasing power, transition to digital broadcast (DTH, IPTV, STB cable) and increase in consumer awareness. Meanwhile, major international brands like Samsung, LG, Sony and



Philips and Indian brands like Videocon and Onida are focusing promotional efforts around LCD TV which is also responsible for triggering the growth in the demand.

Currently, the components of LCD TV are largely imported into India. As per government sources, approximately 25% of the LCD panel is imported as CBU (Complete Built Unit) and rest 75% were imported as SKD (Semi-Knock Down) or CKD (Complete Knock Down). The high import is largely attributed to FTAs (Free Trade Agreement) with countries like Thailand and Malaysia. This has discouraged companies like Sony, Panasonic, LG, etc from manufacturing LCD TV from India and instead importing them from their plants in South East Asia. However, with growing demand for such products within the country, the electronic manufacturers feel that there should be high amount of emphasis placed by the government to promote manufacturing of LCD panels in the country right from the raw materials stage.

Some of the raw materials required for manufacturing LCD panels are as follows:-

- Power Supply Units- consists of Power cord, AC Adapter, PCB, Connector, Cable, Voltage regulator IC and Plastic components.
- LCD Panel – Silicon dioxide, Indium tin oxide and Glass.
- Plastic & metal encasing.

While components like Power supply units and plastic & metallic encasing are manufactured in India, the panel components like Indium tin oxide and silicon dioxide are not available in India. Both Silicon dioxide (an oxide of silicon) and Indium tin oxide (a solid solution of indium oxide and tin oxide) are imported from China as they are found in abundance in China. China is the largest exporter of both these components.

4.2 LED Lighting and Displays

With the world moving towards environment friendly lighting, the demand for LED Lighting and Displays is expected to increase in the coming decade. Over the last 2-3 years, companies like OSRAM and Philips Lumileds have set-up LED wafer fabrication plant in Penang, Malaysia. Both these fabrication plants produced LED Chips using Indium-gallium-nitride technology on 4-inch wafers , best used for Blue, Red and white LEDs. Based on the success of these setups, other companies like Nichia Corporation, a Japanese company and a few local Chinese companies indigenously developed LED wafer fabrication technique and set up their facility in Asia-pacific region.

However, it is widely believed that component pricing, IP (Intellectual Property) and cross licensing are the reason for limited production of LED chips and the only way to increase the production would be through technology joint ventures. India would need to focus on attracting



large manufacturers of LED to set up fabrication plants in India through joint ventures with Indian companies.

5. Printed Circuit Boards.

India has almost no manufacturing of Copper Clad Laminates, the basic raw material for manufacturing PCB's. This is largely due to adverse commercial conditions making it unviable. The current technologies required for high end products are HDI boards with up to 20 to 24 layers in some cases up to 60 layers. On material front, high performance materials (PTFE & Ceramic coated) are used in RF & Microwave, as well as defense and space applications. Most of these materials are manufactured in USA and controlled by US federal govt.

6. Solar Panel.

Solar panels, generally comprising of array of Photovoltaic cells, use the solar energy directly from the sun and generate electricity. This concept is already established in countries like Australia, United Kingdom and United States of America etc. Over the last few years, solar panels have grown in acceptance in Indian market too. A large number of factories in the Indian market are now using solar panels for their daily electricity usage.

The government, as a part of its 2020 vision, unveiled a USD 19 Billion plan to produce 20GW of solar power by 2010. The plan also indicated that all government building, hospitals and hotels would compulsory use solar-based equipments and applications by 2020. This also led to launch of National Solar Mission under the National Action Plan on Climate change, with plans to generate 1,000 MW of power by 2013.

Theoretically, India can generate about 5 Petawatt-hours per year (PWh/yr) that is 5 trillion KWH per year as it experiences approximately 300 clear sunny parts in a year. However, the amount of solar energy produced is less than 1% of the total energy demand. This has largely attributed to the following:-

- Scarcity of Land: - Per capita land availability is a scarce resource in India. Dedication of land area for exclusive installation of solar arrays might have to compete with other necessities that require land.
- Slow Progress in production of Photo-voltaic Cells: - While the world has progressed substantially in production of basic silicon mono-crystalline photovoltaic cells, India has fallen short of achieving the worldwide momentum. India is now in 7th place worldwide in PV cell production and 9th place in solar thermal systems, with nations such as Japan, China, Germany and the US currently ranked far ahead.



However, with Government of India promoting the use of solar energy through various strategies, the demand and production for such panels is slated to grow over the next few years. The growth is already visible with major manufacturers like Tata BP Solar, Kotak Urja Pvt. Ltd., Moser Baer Pvt. Ltd, Titan Energy Systems Ltd. Indo Solar, Lanco Solar and WEBEL SL Energy Systems Ltd. expanding their facilities to meet the growing demand.

Conclusion

Thus, we see that in most cases, the raw materials required for the production of electronic components are imported. This is largely due to their unavailability in India which is adversely affecting growth of the electronic component and equipment manufacturing industry in India.

Also, with the imports cost rising, the need for self reliance by indigenously developing these raw materials or through bilateral agreements with countries rich in these raw materials has become extremely important. These is a need to devise a comprehensive R&D plan to develop and productionize technologies for raw materials.

CHAPTER #6.0:- APPLICATION SEGMENTS





The Indian electronics industry has been growing at a rapid pace over the last few years. The overall electronics industry is estimated at USD 30 Billion and has witnessed a growth of about 10% over the last year. This increase has led to a growth in the component industry also which is estimated at USD 9.2 Billion in FY 2009-10. This is a growth of about 11% CAGR over the last 3 years. The electronic component industry is largely driven by about 8 major application sectors and hence, it is important to understand these application sectors in detail.

The following are the key application sectors that contribute to the electronics and component industries:

- Telecommunication Sector
- Automotive Sector
- Consumer Durable Sector
- Information Technology & Office Automation Sector
- Medical & Healthcare Sector
- Lighting Sector
- Industrial Electronics Sector
- Strategic Electronics Sector.

In order to determine the opportunities in each of the application sectors, it is important to understand the current demand and the future growth of the sectors. The electronic component industry is expected to change considerably owing to some major technological advances that are finding their way into the application sectors. These technological advances have already led to creation of several newer products in the application sectors. Understanding of these technological advances will help in providing a more realistic roadmap for the component industry, in general and specific components, in particular.

CHAPTER #6.1:- TELECOMMUNICATION SECTOR

**Anecdote:**

Glancing through the history of Indian telecom industry, one will find it interesting to note that it had its beginning with the commissioning of a 50-line manual telephone exchange in the year 1882, in Kolkata. Interestingly, this commissioning happened within four years of Graham Bell inventing the telephone.

The telecom services have been recognized world-over as an important industry for socio-economic development of a nation. It is considered to be one of the prime support services required for the rapid growth of any economy. Indian telecom network, with 621 Million connections as on March 2010, is the third largest in the world.

The telecom service sector has been registering a growth of 26% year-on-year in the last 5 years and it is expected to grow at a faster pace in future. This rapid growth is attributed to the proactive and positive policies of the government coupled with the intrinsic need of the Indian people to communicate. The growth in the telecom services sector has also influenced the telecom equipment manufacturing sector.

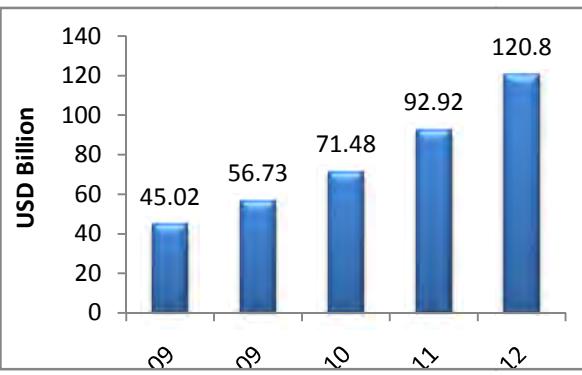


FIGURE 141: GROWTH OF TELECOMMUNICATION SECTOR

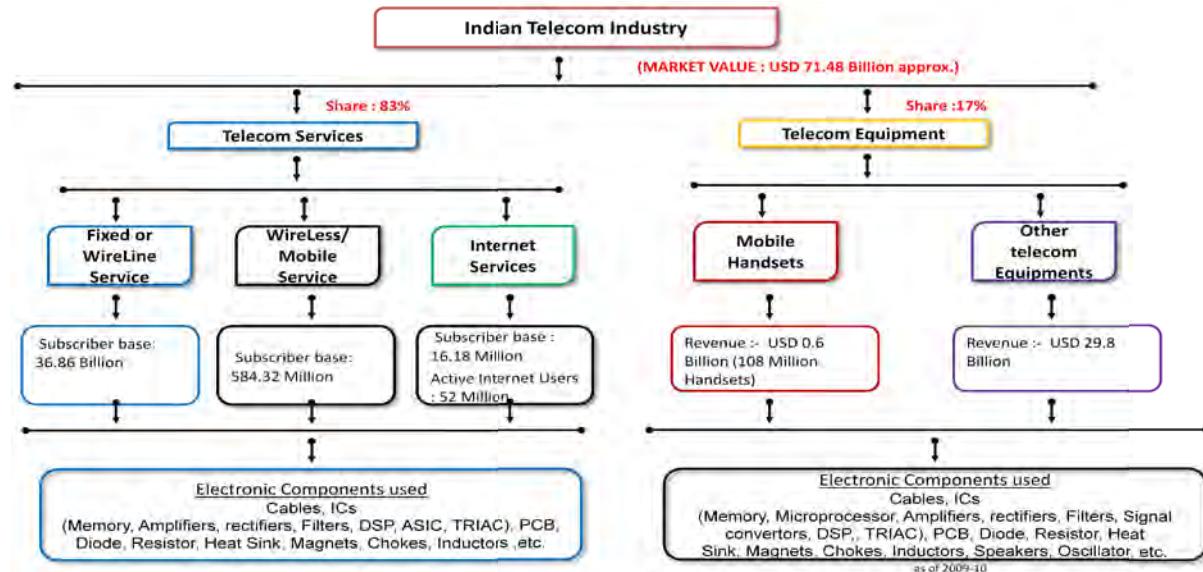


FIGURE 142: INDIAN TELECOMMUNICATION INDUSTRY

Source: TRAI, IBEF Report & IMRB-ITOPS Estimates



While the telecom industry has been growing at a rapid pace, the mobile telecom industry has been witnessing spectacular growth. Driven by various policy initiatives, the Indian mobile telecom sector has witnessed a complete transformation in the last decade. The mobile sector is expected to grow further with the successful auction of 3G and Broadband wireless services. The introduction of 3G is expected to revolutionize the Indian telecom industry. It is also expected to help the government to roll out some of its e-initiatives like e-education, telemedicine, e-health, e-governance, etc. These developments in 3G and broadband services are expected to drive demand for telecom equipment and mobile phones in a big way.

Anecdote:

The Indian telecom industry witnessed more than USD 16 Billion worth of Mergers and Acquisition; biggest among them was the acquisition of Zain's African mobile services by the Bharti Airtel group and the deal was valued at USD 10.7 Billion.

Sunrise sectors/products in the Telecom segment:

The factors that will drive the next level of growth in the telecom industry will include the following:

- The vast rural market is recognized as one of the most lucrative markets by the telecom service providers. It is estimated that rural India holds a huge potential to drive the future growth of the telecom companies. Further, the government initiatives for increasing the telecom connectivity in rural areas, is likely to aid the telecom service providers to extend their services to the unconnected rural areas.
- With the advent of 3G, there is expected to be a significant increase in demand for Internet access and usage. This will be driven by the need for faster and more robust internet connectivity and access to data services like e-commerce, social networking, audio-video conferencing, video streaming, etc.
- The next couple of years are expected to witness an increased demand for Value Added Services (VAS). This is likely to result in an increased demand for higher end handsets including the new generation smart phones.
- The new Internet revolution is also expected to result in the creation and availability of quality

Excerpts from Planning Commission report 2007-11

- To reach a telecom subscriber base of 600 million and rural tele-density of 25%.
- To create a dynamically configurable national multi-gigabit backbone core network.
- To connect 5000 institutions of education, science and technology to this core to enable collaborative research and development nationally and internationally.
- To augment the existing educational system by introducing special IT courses and establishing finishing schools to impart soft and other important skills.

Policies Relaxed by the Government

- No Industrial license required for setting up manufacturing units of telecom equipment.
- 100% FDI is allowed through automatic route for manufacturing of telecom equipment
- Payment for royalty, lump sum fee for transfer of technology and payment for use of trademark/brand name on the automatic route
- Full repatriability of dividend income and capital invested in the telecom sector.



content on the web which is currently limited to the Indian users. With this change, the demand for technologies like Wi-Fi and Wi-Max are also expected to witness a growth. The growth in volume could reduce the cost of Internet broadband, thereby, enabling service providers and government to provide affordable wireless broadband to Indian users, especially those in suburban and rural parts of India.

The changes in the telecom industry are expected to drive the demand for telecom equipment industry. Currently, most of the demand is met through imports. According to Government estimates, equipments worth USD 10 Billion have been imported by operators over the last couple of years. This will grow further in the next 2-3 years due to the following reasons:

- Government allowing 100% FDI through automatic route in the telecom sector
- The need for new equipments in the fast evolving 3G market
- The need for equipments for covering rural India

These factors are expected to encourage manufacturing of telecom equipment in India and positively influence investment by manufacturers. Experts believe that India will emerge as a key manufacturing hub for telecom equipments in the next 5 year horizon.

Sales of few key products

Sl. No.	Segments	Units Sold in Millions				
		2007-08	2008-09	2009-10	2010-11	2011-12
1	Land lines Units	39.42	37.96	36.96	35.78	34.65
2	Mobile Phones units	96	103	108	138.6	177.82
3	Telecom Towers	0.1	0.2	0.24	0.33	0.45

FIGURE 143: FEW KEY GROWING PRODUCT

CHAPTER #6.2:- AUTOMOBILE SECTOR



Indian automobile industry has witnessed phenomenal growth in the last decade. Today, India is one of the fastest growing markets in the world for automobiles. The Indian automobile industry boasts of several leading international brands like Honda, Toyota, General Motor, Ford,

Anecdote:

India ranks very high in the automotive industry.

Rank	Category
1	Two Wheeler
2	Tractors
4	Commercial vehicles
10	Passenger Car

Hyundai, Suzuki, etc. from leading automobile companies. These new vehicles will require not only larger quantities of electronic components but also require advance technologies.

Since the launch of Maruti Suzuki, the Indian auto industry has developed consistently and today is a self sustaining industry. This is largely due to the following:-

- Liberalization policy of the government of India.

- Relaxation in foreign exchange & equity regulation
- Reduction of tariffs on imports
- Supportive tax policy with high duties on finished goods and low duties on inputs.

The automobile industry today offers a huge opportunity for the auto electronic component industries.

The Automobile industry was valued at USD 53.28 billion in FY 2009-10, a growth of 22.17% over the last year. According to the Industry experts, the industry is expected to reach USD 92.12 Billion in FY 2011-12

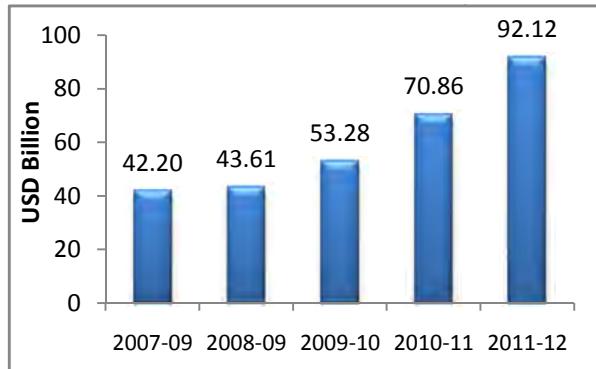


FIGURE 144: GROWTH OF AUTOMOBILE SECTOR

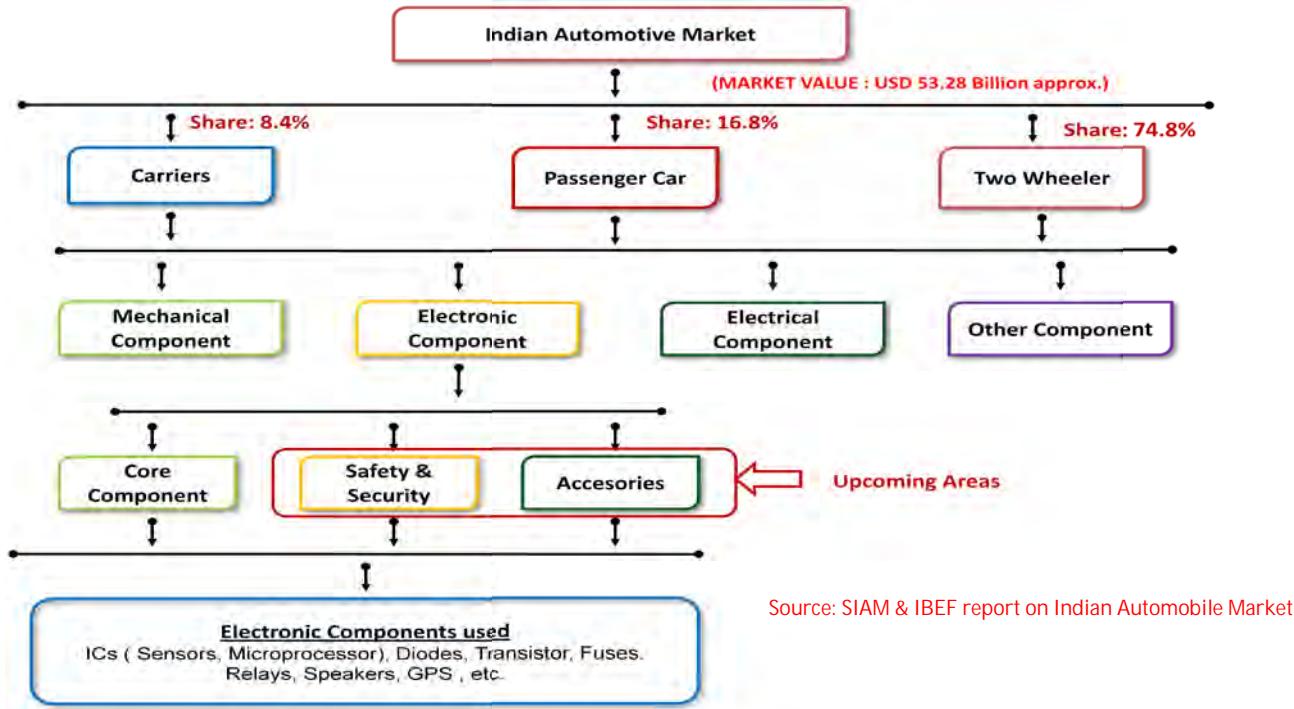


FIGURE 145: INDIAN AUTOMOBILE INDUSTRY

The electronic components used in the automotive industry are estimated at 10% of the total Bill of Materials. This is expected to increase to about 15-20% over the next 5-10 years which could result in a significant increase in the demand for automotive electronics and thus, electronic components. The size of automotive electronics sector is estimated to grow to around USD 12- USD 13 Billion by FY 2020-21.

It is broadly estimated that the average share of electronics in an Indian car today is in the range of US\$ 1000 to US\$ 1500 per car. The share is growing rapidly.

A decade ago, a motorcycle hardly had a microcontroller based hardware unit. However, today, every motorbike has at least one or two microcontrollers and other associated electronics.

Sunrise sectors/products in the automotive segment:

The following factors are expected to contribute to the next level of growth in the automobile industry.

- The launch of the Tata's mini-car, the Nano in FY 2010-11, has created a completely new segment within the auto industry. This car, priced at approximately USD 3000 created a revolution and made cars affordable to the Indian middle class. This launch has led many other manufacturers plan the launch of their brand of mini-cars over the next 1-2 years.



- At the other end of the passenger car spectrum, the multi-utility and sports utility vehicles (MUV's/SUV's) are increasingly being adopted by the Indian consumer. Many companies are planning to set up their manufacturing base for such cars in India.
- A related development in the automotive industry is the emergence of the In-Vehicle communication and entertainment systems. These are driven by the ownership of high-end cars coupled with the amount of time individuals and families spend in their car. This is a completely untapped opportunity in the Indian market and could potentially lead to significant growth in the electronic component sector.
- Manufacturers are increasingly exploring the option of launching smarter cars in the Indian market. These cars are expected to have advanced electronics management and monitoring systems including systems like Engine Management Systems (EMS) Capacitive discharge ignition (CDI), Flashers, regulators, Alternators, Wipers, remote key, taxi meters, Power Monitors, Glow plug timers, Air bag control units, and many more such devices expected to take car driving experience to a completely new level.
- Electric cars and bikes are also growing in prominence with several manufacturers planning to launch such vehicles. These vehicles are expected to be widely accepted in India. With higher contribution of electronics on board such cars, they are expected to trigger a higher demand for automobile electronics components.

Sales of key Automotive Vehicles

Sl. No.	Segments	Units Sold in Million				
		2007-08	2008-09	2009-10	2010-11	2011-12
1	Passenger Cars	1.52	1.52	1.93	2.45	3.26
2	Multi Utility Vehicles	0.25	0.29	0.27	0.32	0.42
3	Buses & Trucks	0.29	0.19	0.25	0.34	0.46
4	Motorcycles	6.50	6.80	8.44	10.53	14.00
5	3-Wheeler	0.50	0.50	0.62	0.80	1.06

FIGURE 146: FEW KEY GROWING PRODUCT CATEGORIES

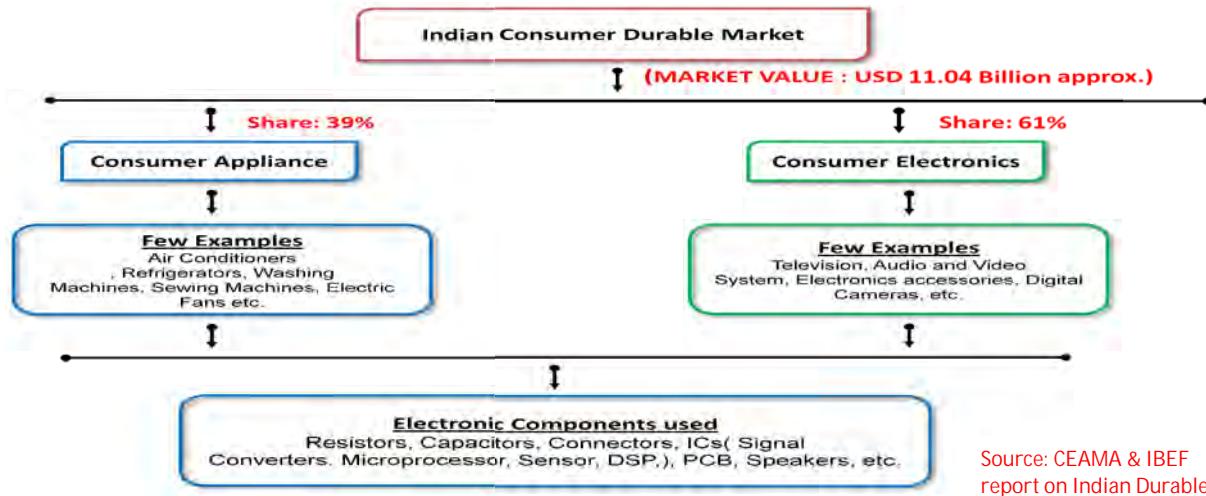
CHAPTER #6.3:- CONSUMER ELECTRONICS SECTOR



India's Consumer Durables Market is riding the crest of the country's economic boom. The growth of the industry is largely being driven by the young population with high disposable income and access to easy finance options. The Indian Consumer Durable market is estimated at USD 11.04 Billion in FY 2010-11 with a growth of 7% over the previous year.

Most industry experts believe that India has become a preferred manufacturing destination for Consumer Durables and is creating significant export opportunities. The market is expected to continue on its growth trajectory largely due to the following:

- A sizeable domestic market.
- A highly competitive industry resulting in falling prices, leading to greater consumer purchase.
- Adequate investments in R&D.
- Growth of organized retail in the country.
- Access to easy finance options.
- Rationalization of tax structure and Expected Introduction of GST which will attract international companies.



Source: CEAMA & IBEF report on Indian Durable Market

FIGURE 147: INDIAN CONSUMER DURABLE INDUSTRY



According to the Consumer Electronics and Appliances Manufacturers Association (CEAMA) the consumer durable market is expected to grow at 15% in the next 1-2 years. This growth is expected to be driven by premium products like refrigerators, air conditioners and washing machines. Moreover, with the market dynamics changing over the last few years, the growth in the consumer durable market is driven by both fresh entrants in the market and the replacement/ up gradation led demand.

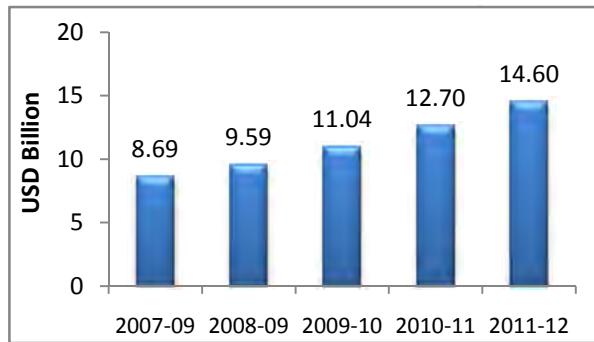


FIGURE 148: VALUE GROWTH OF CONSUMER DURABLE

The electronic components used in the Consumer durables industry is estimated to range between 30-40% of the total Bill of Materials, amounting to US\$ 3.5 Billion.

Sunrise sectors in Consumer Durable segment:

The consumer durable industry is currently moving to the next level of level of sophistication with the launch of new technology products. These new technologies are expected to drive the demand in the next few years:

- The year 2010 saw the launch of 3D Television by leading manufacturers like LG and Samsung.
- The other key introduction was the launch of High Definition television (HDTV). This is expected to gather momentum over the next couple of years as it is expected to significantly improve the TV viewing experience.
- The year also saw the launch and adoption of LED TVs. With LCD and Plasma TVs already available in the market, the launch of LED TVs have provided the customers with a complete range of technologies to select from based on the viewing experience they desire.
- Newer features based on technologies like Fuzzy Logic, Artificial Intelligence etc are being introduced in many of the durables like Air conditioners, Refrigerators, Iron boxes, Microwaves etc. These are expected to further increase the demand for such products in the market.
- The vast rural market has been acknowledged as one of the focus market by many of the manufacturers. Products catering to the specific needs of the rural consumers are being



launched. Products powered by alternative sources of energy, like solar, are being developed to cater to the rural demand

The above technology changes coupled with the market drivers for electronics and consumer durable products are expected to drive this industry segment to a higher growth trajectory. With most players focusing on manufacturing the products in India for the Indian market, the demand for electronic components is expected to witness a significant increase in the next couple of years.

Sales of few key products

Sl. No.	Segments	Units Sold in Million				
		2007-08	2008-09	2009-10	2010-11	2011-12
2	Cable & Satellite Industry	70	82	68	96	115
3	CRT Television	15	13.97	15.15	15.7	16.27
4	Digital Camera	0.5	0.53	0.62	0.71	0.82
5	DVD Players	7.25	7	6.2	10	16
6	Home Theatres	0.1	0.13	0.151	0.2	0.26
8	LCD Television	NA	2.7	3.3	6.6	9.7
9	Microwaves Ovens	1.15	1.21	1.32	1.48	1.69
10	Mobile Phones	96	103	108	138.6	177.82
11	MP3 Players	0.63	0.73	0.9	1	1.11
15	Refrigerators	4.75	5.5	6	6.6	9.7
16	Set Top Boxes	3	5	7.5	10	13.3
18	Washing Machines	2.29	2.62	3.35	4.21	5.27

FIGURE 149: FEW KEY GROWING PRODUCT CATEGORIES

CHAPTER #6.4:- INFORMATION TECHNOLOGY & OFFICE AUTOMATION SECTOR



The Indian information technology (IT) industry has played a key role in putting India on the global map and is now envisioned to become a USD 225 billion industry by 2020. Over the past decade, India has grown to be a power house in providing Information technology (IT) services to myriad clients all over the world. Annual revenues from outsourcing operations in India are almost twice that of China. Figure 150 depicts the annual outsourcing revenue across economies

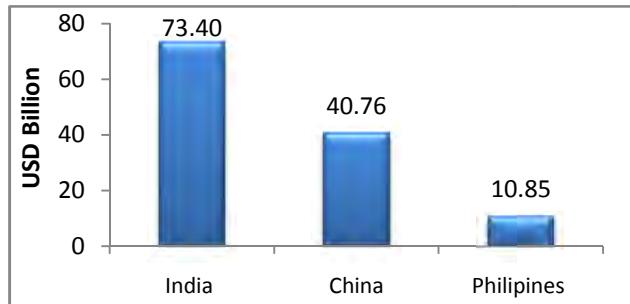


FIGURE 150: ANNUAL IT AND ITES REVENUES ACROSS ECONOMIES

However, the Indian IT hardware market is not as large as the IT outsourcing business. The following figure 151 provides details of the domestic IT market. The Indian IT market is estimated at USD 5.58 Billion of which the IT hardware market is estimated at USD 5.04 billion and the rest is accounted for by the software service segments.

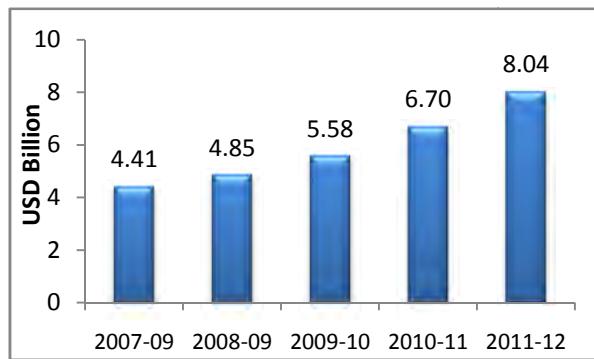


FIGURE 151: GROWTH OF IT & OA SECTOR

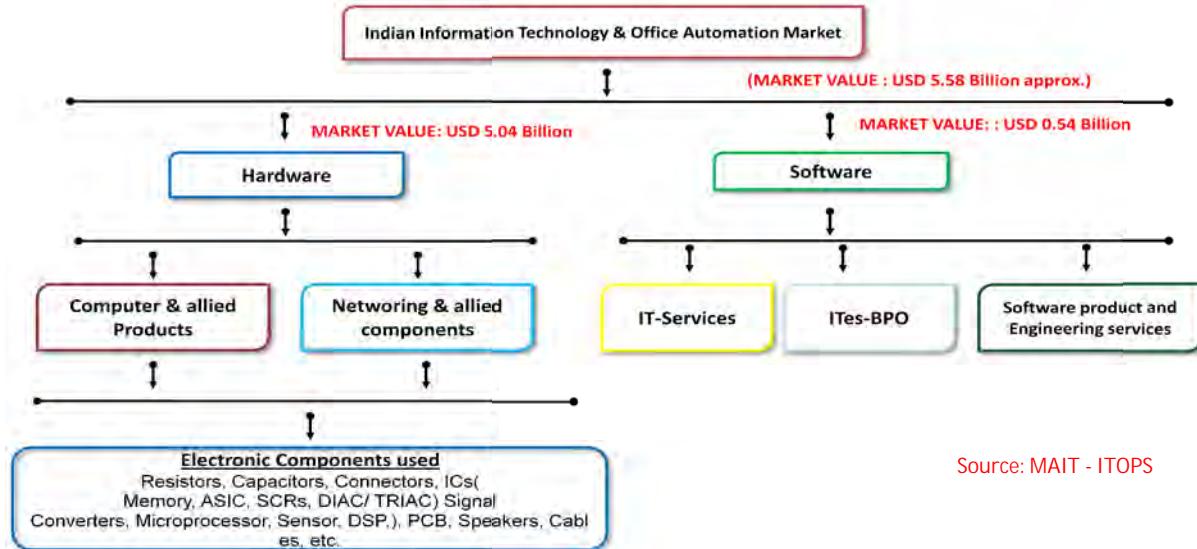


FIGURE 152: INDIAN IT & OFFICE AUTOMATION INDUSTRY

The Indian IT Hardware segment is a reasonably sized segment in the country. Driven largely by the computing products, this segment has been witnessing a modest growth over the last



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couple of years. However, the changes in the market over the last few years have been radical with the segment becoming more household driven rather than B2B driven. This has resulted in a changed outlook for the sector. The sector is currently estimated to growth at around 20% per year in the next 3-5 years.

The surging demand for PCs and peripherals has resulted in several vendors to set up their manufacturing plants in India. Currently, all the desktops and notebooks sold in India are assembled locally. However for most of the notebooks, the printed circuit boards and other key components are imported as semi- knocked down kits (SKD).

Over the last few years, most leading manufacturers like HP, Dell, HCL, Sony etc., are opting for Hardware contract Manufacturing (HCM). This is to save on costs, streamline operations and also as a strategy to gradually move away from low value -added manufacturing processes.

Sunrise sectors/products in the IT Industry:

The information technology industry is at an inflection point that will redefine the types of products and services that are offered to the customers. New product innovation has transformed the market dynamics of the industry from being an office and business product category to being a vibrant and exciting industry. The following are some of the activities that are expected to redefine the industry.

- Mobile Applications and Media tablets: The future of Indian computing is expected to migrate from Desktops and notebooks to the new generation products like NetBooks and Tablets. The tablet segment in particular, has created a lot of excitement among the consumers. With further innovation in the category, tablets could emerge as one of the important computing device for Indian consumers.
- Apart from the computing products, storage devices are also growing in prominence. The need to store digital content including images, music and movies, are on an increase in the Indian market. The consumers are increasingly storing these information in external hard drives, memory cards and flash drives, thereby, leading to their adoption.
- Wireless Networking devices (including Wireless Internet devices), the third category of IT products are also expected to witness significant growth. The initial concerns around the usage of wireless technology have reduced considerably thus, paving the way for its increased

The government is one of the biggest consumers of the IT Hardware. Its welfare schemes have given a boost to the hardware manufacturing market. The national e-governance plan, with an estimated budget of more than USD9 billion for automating processes in its departments, alone would generate enough opportunity for the industry to grow.



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adoption. With the higher adoption of Wi-Max technology and the implementation of the National Broadband Plan, these devices are only expected to increase in their adoption in the near future.

- Apart from the above, Cloud Computing, Social networking, communication & collaborations, PC based gaming, next generation analytics, etc., are some of the other significant developments that will revolutionize the IT Industry.

Over the next 3-5 years, the Indian IT Hardware industry is expected to undergo a radical shift. The new technology devices coupled with the changes in the ecosystem to enable services that support such technology, will result in a significant growth of the industry. Electronic components form the core of these products and thus, the growth of the industry will result in a direct increase in demand for electronic components.

Sales of few key products

Sl. No.	Segments	Units Sold in				
		2007-08	2008-09	2009-10	2010-11	2011-12
1	Personal Computers	7.34	6.8	8.03	9.35	10.42
2	Printers	1.60	1.62	1.72	1.83	1.93
3	Networking Products	4.31	4.27	3.86	3.97	4.07

FIGURE 153: FEW KEY GROWING PRODUCT CATEGORIES

CHAPTER #6.5:- MEDICAL & HEALTHCARE SECTOR

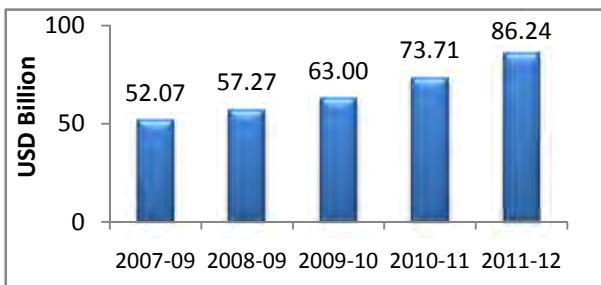


FIGURE 154: GROWTH OF MEDICAL & HEALTH CARE SEGMENT

The Indian Healthcare Sector has emerged as one of the most progressive and amongst the largest service sectors in India. The sector is expected to contribute about 8% of the GDP by FY 2011-12, up from 5.5% that it contributed in FY 2009-10. It is estimated to grow to a USD 220 Billion Industry by FY 2019-20.

The Indian Healthcare markets comprise the following areas:

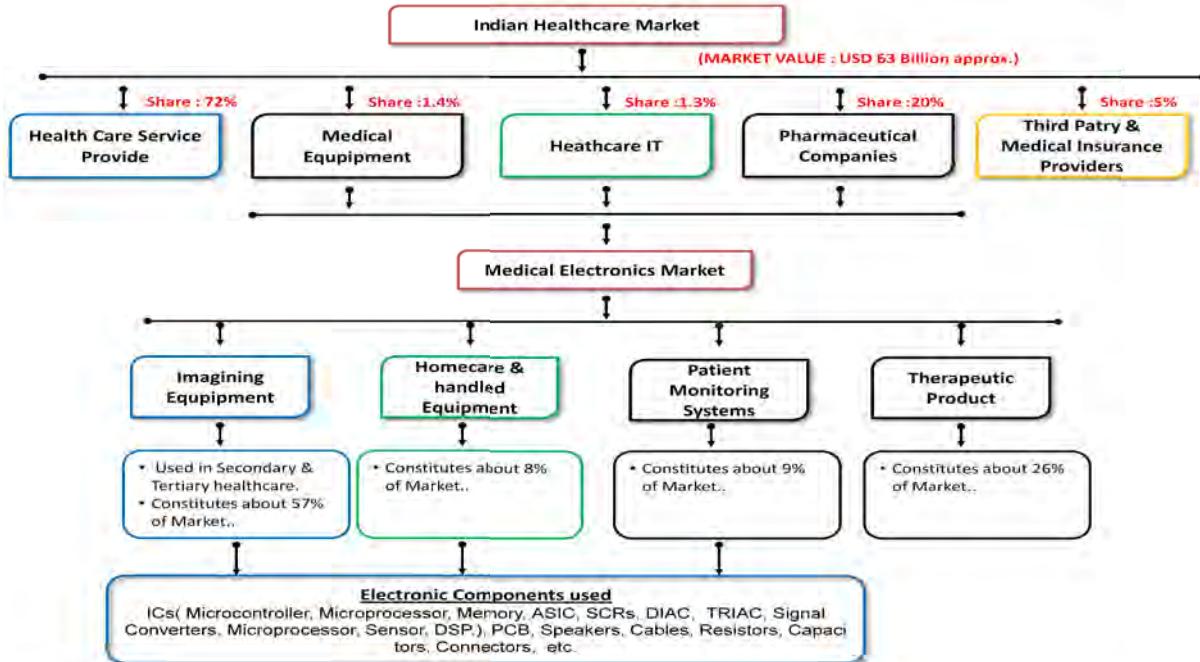


FIGURE 155: INDIAN MEDICAL & HEALTHCARE INDUSTRY



FIGURE 156: GROWTH OF MEDICAL EQUIPMENT MARKET

The Indian medical electronics market is estimated at USD 0.8 Billion in FY 2009-10. The Indian medical electronics equipment market is estimated to grow at around 17% CAGR over the next five years and reach about USD 2.16 Billion in FY 2015-16.

The electronics used in the medical



equipment industry is estimated at 10% of the total Bill of Materials.

The imaging equipment market is by far the largest segment in the medical electronics equipment market contributing to about 57% of the total industry. About 65% of the medical electronic equipments are imported into India while the rest are assembled in India with the Semi-Knock Down kits (SKDs) being imported from countries like China, Taiwan, etc.

India's healthcare spending (estimated to be around USD 63 Billion) accounts for only about 1-1.5% of the total global healthcare expenditure. With India contributing around 17% of total population, the opportunity for growth of Indian healthcare segment is significantly large.

Sunrise sectors/products in the Medical Electronics segment:

According to a report released by a well known industry body, India would be requiring another 1.75 million beds by end of 2025 to cater to the demand

Sl. No.	Diseases	Number of Patients (in Millions)
1	Cancer	3
2	Diabetes	34
3	HIV	10
4	Epilepsy	8
5	Alzheimer's	1.5
6	Cardiac-Related Diseases	2

FIGURE 157: INDIA'S VITAL CLINICAL
STATISTICS SOURCE: NEWSPAPER ARTICLE

Indian Customers are increasingly becoming aware of the need for quality and accessible health services. With increase in lifestyle ailments and the improvement in healthcare technology, there is an increased requirement of such services to be offered to the customers. Increased consumerism has led to a significant improvement in the quality of services offered in the healthcare segment in the country.

While there is an increased demand for high quality healthcare service, there is also a huge deficit in its availability. For example, as per a WHO study, India currently has a deficit of approximately 30 lakh beds based on their recommendation of four beds per 1000 population. To meet the norms of WHO, Indian will need for an additional 12,000 hospitals to bridge this gap. This has led to the emergence of a new segment of Home Care and handheld medical devise market which was largely non-existent till recently.

The demand for medical imaging equipments, cardiac care equipments and medical laboratory equipments are expected to increase significantly over the next few years. With increase in lifestyle diseases, the need for technically advancement imaging and patient monitoring systems will grow.

The adoption of newer technologies like Nanotechnology is also being seen in medical electronics in India. This has led experts to believe that some medical equipments requiring advanced precision manufacturing will be manufactured in India over the next few years.



The above changes are expected to increase the current contribution of electronic components from the segment. However, the share of Indian manufacturing is expected to be low because of the lower current base in manufacturing of such products in India currently. This is not expected to change significantly over the next few years.



CHAPTER #6.6:- LIGHTING SECTOR



Lighting is an important application segment for the electronics products. As per industry estimates, the Indian lighting industry is estimated at USD 1.59 Billion in FY 2009-10 with a growth rate of 12 %. Almost one-fifth of the total power consumed in India goes towards lighting purposes. Thus, there is an increased focus by both consumers and the manufacturers to reduce the power consumption for lighting.

Rural electrification Program and the increasing purchasing power of the middle class are attributed for the growth of lighting equipments and solutions.

Though India started off by importing lightings, currently, India boasts the state-of-art manufacturing facilities in GCS lamps, Incandescent lamps, fluorescent tubes, high intensity discharge lamps, CFLs and halogen lamps. The liberalization of the economy has facilitated both the entry of international players into the Indian markets and the opportunity for Indian manufacturers to look at the export markets.

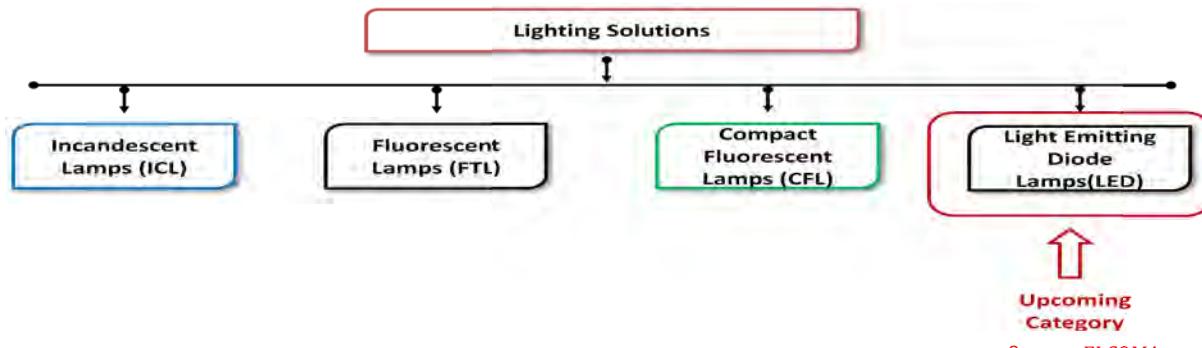


FIGURE 158: INDIAN LIGHTING INDUSTRY

Source: ELCOMA

The concept of lighting has undergone a significant change in the country with increased exposure to sophisticated designs of interior lighting in offices, home, restaurants and hotels. However, with insufficient power capacity, the focus has shifted from incandescent bulbs to Compact Fluorescent lamps (CFLs.). Currently, the CFL market is growing rapidly as these are energy efficient. This is driven by the rising

Anecdote:

A small village in the state of Haryana has shown the way to the rest of India by turning itself into a CFL village.

household demand, government initiatives and the growing real estate industry. However, LED lighting has gained importance in the global context, which has started percolating to the Indian market as well. The current demand for LEDs is largely being met through imports though this is expected to change in the near future.



Sunrise sectors/products in the Lighting segment:

The future of lighting solutions in India is CFLs and LED lamps. The major driving factor for their adoption is the energy efficient technologies used in these solutions. In addition to the above, the following are some of the other emerging trends that are expected to be seen over the next couple of years:

- Harnessing and usage of solar energy for lighting applications
- Using Fiber optic for lighting

With significant opportunities in rural electrification and Government-led lighting projects, the segment is expected to witness a rapid growth in the next few years.

CHAPTER #6.7:- INDUSTRIAL ELECTRONICS



6.7 Industrial Electronics

Industrial electronics has made rapid strides from the days of LSI circuits and power semiconductor devices in the 1960s to the PCs and information network of today. According to industry estimates, the Indian industrial electronics industry is valued at USD 3.29 Billion in FY 2009-10 with an expected growth of over 9% in future

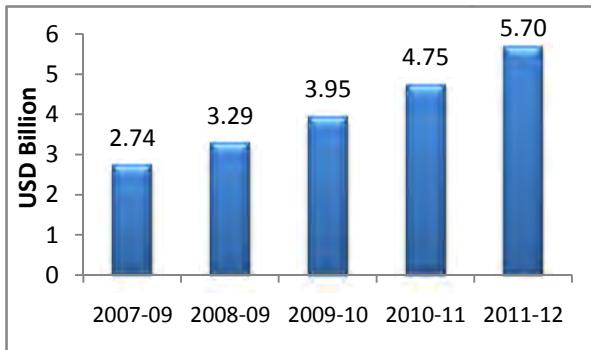


FIGURE 159: GROWTH OF INDUSTRIAL ELECTRONICS SEGMENT

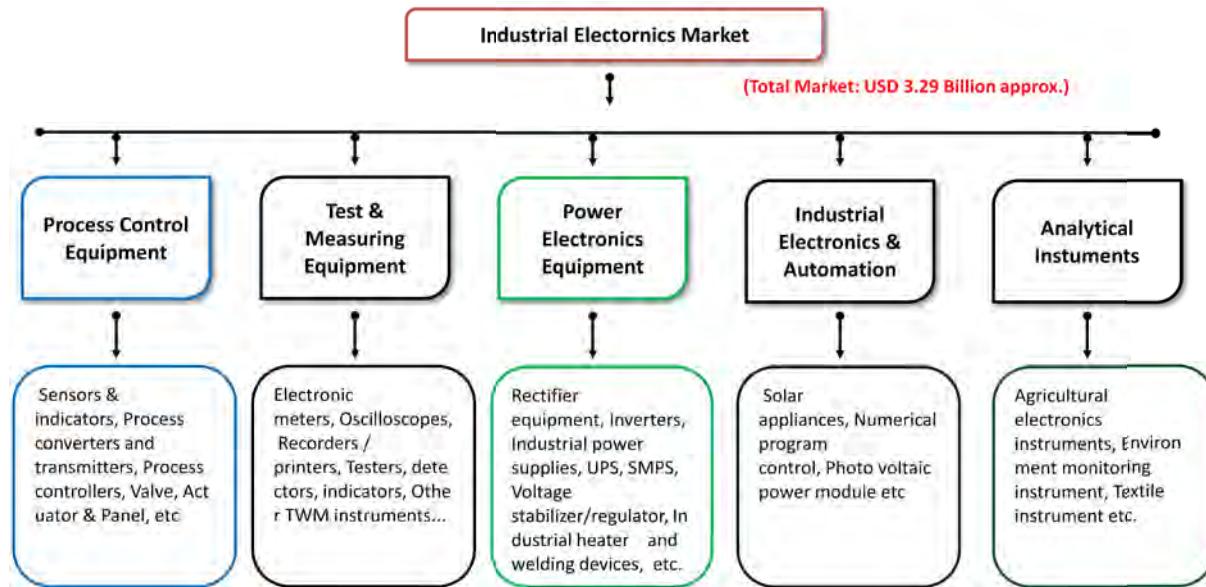


FIGURE 160: INDIAN INDUSTRIAL ELECTRONIC INDUSTRY

Source: *Government report*

Power electronics, Process control equipments and Industrial electronics & automation accounts for nearly 81% of the total industrial electronics production. Most of the domestic demand is catered to by the local manufacturing and only about 10% of the products are imported. These imports constitute sophisticated and high-tech process control equipments, online monitoring systems and analytical equipment and systems. 90% of these imports are from USA, Japan, UK and Germany.

The Industrial electronics segment in India has a large number of small time players especially in Process control equipments and Test & measuring equipments. The Power electronics space is dominated by unorganized regional players. Some of the larger players in this area include



ABB, BHEL, Bluestar, Keltron, Allen-Bradley, Numeric, Honeywell, Usha etc. Some of these players have set up global tie-ups over the last few years and have brought in newer technologies into the Indian markets.

Close to 8-10% of the Indian production is exported to the neighboring SAARC countries, the Middle East and the African Countries.

Sunrise sectors/products in the Industrial Electronics segment:

The importance of automation and process control in the process industries has increased dramatically in the recent years. In the highly industrialized countries like US, and Germany, process automation and process control are used to serve enhanced quality product, improve safety process, increase plant efficiencies, utilize resources efficiently and lower pollution and radiation. In the developing countries, mass production is the main motivation for applying process automation and process control equipments. The demand for process automation is from chemical, pharmaceutical, power generation, and petrochemical industries.

Some of the recent trends in the Industrial electronics segment which could potentially change the landscape of the sector are as under:-

- Availability of products with Artificial intelligence. This would help the industry to be more efficient, improve quality control and reduce manual supervision costs.
- Integration of production and business operations: - Newer softwares are being launched to help the companies integrate their production and business operations so as to maximize production, manage labor and reduce overheads.
- Introduce robotics to manage process and equipments for sensitive industries like Chemical industry, Nuclear power generation, etc.
- Some of the other notable trends are Decision Analysis, 3-D co-ordinate systems, Smart Image processing, Nanotechnology, Nanoscale assemblies, Distributed control systems, etc., which are also being increasingly made available.

The industrial electronics segment is a small segment in India as the automation of plants and industries are currently at a basic level for most organizations. Therefore, the opportunity, over the next couple of years, will largely be driven by automation opportunities in case the businesses plan to make the necessary investments. The use of emerging technologies and their impact will largely be limited to a few large manufacturing units.

CHAPTER #6.8:- STRATEGIC ELECTRONICS SEGMENT



The Indian strategic electronics mainly includes satellite-based communications, navigation and surveillance, underwater electronics and infrared-based detection, disaster management and GPS-based vehicle tracking systems designed largely for transportation and defense applications.

Indian military has been focused on constantly upgrading its technology in the areas of combat and surveillance. The investment in such up gradation is expected to increase over the next few years. This is driven by the advancement in technology, especially in strategic electronics, and the changes in the national military policies. As per the annual report released by Department of Electronics, the strategic electronics industry in India is estimated at USD 1.55 Billion for the FY 2009-10 and is expected to reach USD 2.6 Billion by FY 2010-11.

The strategic electronics industry has been facing challenges in the availability of skilled manpower. However, this has been addressed to an extent by the involvement of private players in Strategic electronics industry. Coupled with the redefined defense offset policy, this has set a stage for the Indian companies to become part of a global supply chain for strategic defense and aerospace industry.

Sunrise sectors/products in the Strategic Electronics segment:

The defense and aerospace are strategic sectors for the country and thus, the sector fosters a lot of the innovation in electronics in the country. In addition, the sector is also experimenting with technologies that are largely used for civilian purposes. Thus, technologies around Intelligent

The major players in the strategic electronics division in India are:

- Bharat Electronics Limited (BEL)
- Electronics Corporation of India Limited (ECIL)
- Hindustan Aeronautics Limited (HAL)

sensors, Intelligent secure data communication, RFID, Micro-robotics, Intelligent material, Micro-electronics systems, nanotechnology, etc are being developed. In addition, Electro-magnetic wave applications, deep space communications systems, etc., are also being experimented with by the engineers.

The country is also making significant investments into driving in-house manufacturing for the sector. This is also to comply with the Defense Offset policy (implemented by the Defense Offset Facilitation Agency) which states that any defense purchase valued over USD 600 Million must have a local component of 30%. This could potentially drive significant opportunities for the Indian players focused in this segment.

There exist two models for the growth of strategic electronics in the country:

- Develop & make Model: This relates to the creation of a climate for the indigenous development of technology in the country



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- Buy, learn and make Model: This relates to the transfer and adaptation of advanced foreign technologies with an intention of achieving technological & economic development in the Indian Defense sector.

Both these models have been in operation in India and is expected to result in a significant growth in the strategic electronics segment in the near future.

CHAPTER #6.9:- ELECTRONIC MANUFACTURING SERVICES (EMS)



Electronics Hardware Manufacturing Services (EMS) is a relatively recent phenomenon in the Indian market. However, this segment has been witnessing a rapid growth since its inception in India. Over the next few years, the market is set to witness exponential growth with many companies having planned their investments in EMS.

Electronic Manufacturing Services (EMS) is a specialized service which includes designing, testing, manufacturing, distribution and maintenance of electronic components and assemblies for Original Equipment Manufacturers (OEMs). Driven by large economies of scale in manufacturing, raw material procurement and pooling of resources, the EMS industry is well placed to address most of the concerns that the other smaller electronics industry face. In addition, they allow significant cost savings which, in turn, allow the OEMs to increase profitability and/ or reduce product pricing. According to industry estimates, the EMS industry was estimated at USD 3.3 Billion in FY 2009-10 and is expected to grow at a CAGR of 25-30% to reach USD 16.7 billion in FY 2015-16.

Key Application/segments for EMS:-

- *Consumer Electronics*
- *Telecommunication Infrastructure*
- *Defense &*
- *Medical Electronics.*

The EMS market is expected to continue on its growth trajectory largely due to the following reasons:

- Increase in outsourcing by OEMs both from India and elsewhere.
- Strong and growing demand for electronic products both locally and internationally.
- Presence of specialized workforce for design and engineering related services
- Presence of large number of EMS players and their plans for increasing investments in India.

Most experts believe that in next few years, India's EMS industry is all set to gain from the opportunities lost by China due to the increasing labor and raw materials cost. However, the industry faces a bottleneck owing to lack of adequate infrastructure, logistics and R&D facilities. When these are addressed, EMS could help India migrate to the next phase of electronics revolution and could emerge as a serious competition to China. Thus EMS is expected to help India achieve its goal of being a global manufacturing powerhouse.

CHAPTER #7.0:- CHALLENGES FACED BY ELECTRONIC COMPONENT MANUFACTURING COMPANIES





The demand for electronic hardware in India is increasing at a rapid pace. The market is estimated to grow at 15% year-on-year for the next five years. However, only 40% of the total demand is catered to by the Indian manufacturers with the rest being imported largely from countries like China, Taiwan, Malaysia etc. popularly known as the Asian Tigers. Most industry experts believe that the current ratio of local production to imports is not expected to change in the next five years unless corrective actions are taken to address the challenges facing the industry.

"The electronic manufacturing industry is facing some serious issues and it is imperative for the government and its related bodies to pay attention and address them at the earliest, otherwise the focus of Indian manufacturer will shift from manufacturing to trading/retailing." Large component manufacturer

According to the Central Electricity Authority, Indian energy requirement in FY 2009-10 was estimated at 830,000 million units (MU) while the availability was around 746,493 MU only.

The major challenges faced by the electronic component manufacturers in India could be broadly classified into the following:

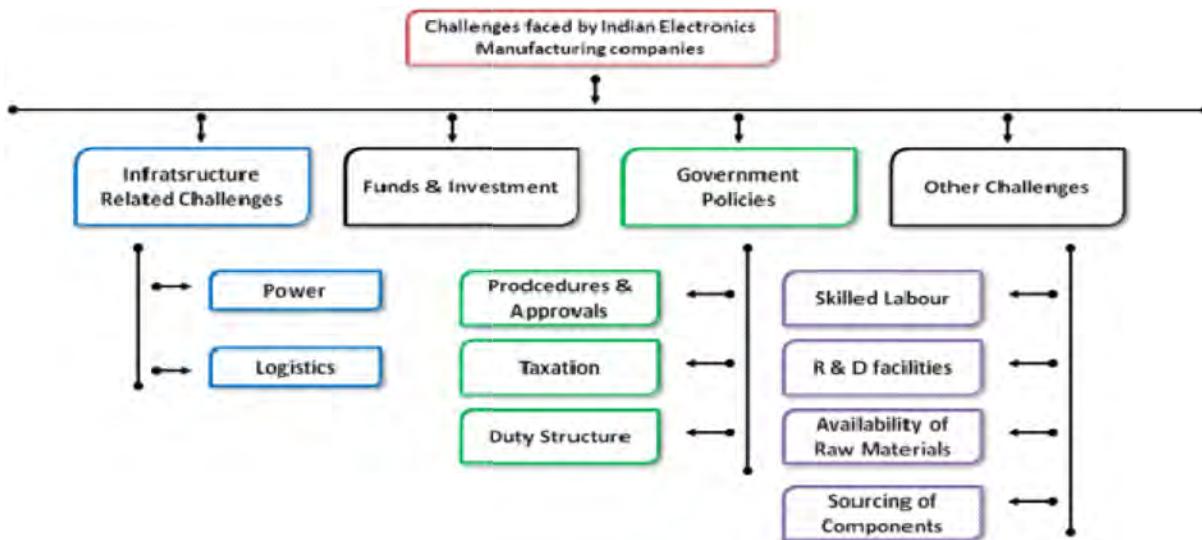


FIGURE 161: CHALLENGES FACED BY THE INDUSTRY

1. INFRASTRUCTURE RELATED CHALLENGE

Infrastructure is the basic building block for the success of any manufacturing industry. Sub-standard infrastructure severely affects the component manufacturing as it leads to higher cost, longer lead time and lower quality of products.

It is observed that even prominent industrial estates like those in Ghaziabad, Pune, Vapi, etc., lack the basic infrastructure facilities that are considered to be the norm in most other countries. Thus, it is imperative to focus and address these challenges.



The infrastructure challenges are primarily the result of non-availability and/or poor quality of power and logistics.

a) Power Supply

Power is the mainstay for all modern manufacturing and even more so for electronic components and equipment which is high tech and energy intensive in nature. With the industry moving from manual processes to automation, the demand for uninterrupted power supply is rising. Many processes specially for manufacture of semiconductors and speciality materials require continuous and stable power supply, absence of which causes severe losses. According to the Central Electricity Authority, the demand-supply gap for power is around 10% in FY 2009-10

It is estimated that around 17 significant power outages per month (lasting 6-8 Hours) occur in India as against 1 and 5 similar outages in a month in Malaysia and China, respectively.

This significant power outage has forced manufacturers to explore alternate sources of power to ensure on-time delivery and productivity. Captive back-up power generation has become the norm for most manufacturing units in India. This has lead to increase in the total manufacturing costs by nearly 10%, leading to significant increase in product cost. This is a key reason for Indian components to be uncompetitive in Indian and global markets. Apart from direct costs, the frequent outages also result in higher cost of maintenance and service of equipment.

"...last summer, the local government decided that no power would be supplied to industrial units from 10 pm to 6 am, forcing us to use gensets during this time period for our units. This had a direct effect on the production cost...."- Indian Manufacturer.

The other significant challenges with respect to power are the quality and cost of power.

- As per feedback from industry quality of power in the industrial areas has deteriorated over the past few years due to demand growth outpacing supply creating pressure on the electricity supply system.
- The cost of procuring power for Industrial units in India is nearly double of that in China or Malaysia (Refer figure 162). This results in additional cost of the production, thereby, leading to lower price competitiveness.

Sl. No.	Country	Tariff (USD/100KW)
1	India	8-10
2	China	4-5
3	Malaysia	3-4

FIGURE 162: POWER TARIFF SOURCE:
GOVERNMENT REPORTS



b) Logistics

Logistics is a critical factor for efficient manufacturing. With high dependence on imports and movement of goods to different manufacturing locations, the Indian electronic component industry requires efficient logistics support. Therefore, the need for connectivity between the industrial hubs, ports and markets is a critical requirement for success.

Unfortunately, the logistics sector is extremely weak in India and is largely unorganized. More importantly, there is limited mechanization in the sector for handling goods and cargo. Even the ports, are not adequately mechanized and depend on human labor for handling material, slowing down the entire process of material movement. On the other hand, competing Asian countries like China employ very high degree of mechanization in handling cargo.

"it takes 2-3 days for the materials to get the required clearance from the port and from there on it is another 2-3 days for it to reach Pune from Mumbai, which is located 180 kms"

According to the Logistics Performance Index (LPI) - an attribute developed by the World Bank to indicate the logistic infrastructure of a country, India is ranked at 47th Position. The index takes in account 6 different dimensions related to Logistics on which various countries are rated. As one can see from the figure 163, India is rated poorly especially on 'timeliness', 'tracking' and 'tracing' which can be improved through mechanization.

Sl. No.	Countr y	Overall LPI		Customs		Infrastructure		International Shipments		Logistic Competence		Tracking & Tracing		Timeliness	
		S	R	S	R	S	R	S	R	S	R	S	R	S	R
1	India	3.12	47	2.7	52	2.91	47	3.13	46	3.16	40	3.14	52	3.61	56
2	China	3.49	27	3.16	32	3.54	27	3.31	27	3.49	29	3.55	30	3.91	36
3	Malaysia	3.44	29	3.11	36	3.5	28	3.5	13	3.34	31	3.32	41	3.86	37

FIGURE 163: LOGISTICS PERFORMANCE INDEX (LPI)

S= Mean Score on a scale of 5 and R= Rank

The low LPI for India not only affects domestic manufacturers but also deters foreign investments in India.

In addition to the poor logistics across the country, the connectivity of the industrial hubs with ports and markets is also a major concern for most manufacturers. Most industrial hubs have poor road connectivity and few of them rail connectivity. This leads to:

- i. Delay in shipments/products reaching the target destination.
- ii. Deters the local talent to work in the industrial hubs.



Thus, overall, infrastructure challenges severely impact competitiveness and it is estimated that the manufacturing cost escalation due to infrastructure led challenges could be as high as 20%. This in turn, leads to higher cost of production of components and electronic equipment manufactured in India vis-à-vis imported components which are preferred by electronic product manufacturers in India due to their lower prices.

2. FUNDS & INVESTMENTS

The component industry in India is at a stage where the businesses need infusion of cheaper and more accessible capital to move to the next level of automation and expansion. However, according to most manufacturers, availability of cheaper and accessible capital is a major challenge for them. Since most of the Indian component manufacturers are mid-sized companies, the challenge is even more acute as most banks and financial institutions do not offer them loans at competitive interest rates. In most cases, they also insist on collaterals which make it even more difficult for such companies to get loans.

The interest rate in India is significantly higher at 12-13% when compared to China and Malaysia where it ranges from 4-8%. The high interest rate acts as a barrier for investment.

Sl. No.	Country	Getting Credit (Ranking)
1	India	32
2	Taiwan, China	72
2	China	65
3	Malaysia	1

FIGURE 164: RANKING ON "GETTING CREDIT".
SOURCE: EASE OF DOING BUSINESS- WORLD BANK

Owing to the above factors, many Indian manufacturers are unable to modernize their manufacturing units losing the much needed technology parity, if not advantage with respect to the other countries.

3. GOVERNMENT POLICIES

In an evolving industry like the component industry, the role of the Government is extremely important. Favorable and stable Government policies with a long term outlook are expected to provide the industry with the much needed impetus to trigger the next level of growth.

Most electronic manufacturers believe that the existing policies of the Government are not conducive for local manufacturing. Procedures & approvals, complex tax structure and Inverted duty structure are some of the key challenges that are detrimental to the growth of the industry.

Procedures & Approvals



Sl. No	Country	India	China	Malaysia
1	Overall			
1.1	Ease of Doing Business (Rank)	135	79	21
1.2	Starting a Business (Rank)	165	151	113
1.3	Trading across Borders (Rank)	100	113	37
2	Starting a Business			
2.1	Procedures (Numbers)	12	14	9
2.2	Time (Days)	29	38	17
2.3	Cost (% of Income per capita)	56.5	4.5	17.5
3	Trading across Borders- Exporting			
3.1	Procedures (Numbers)	8	7	7
3.2	Time (Days)	17	21	21
3.3	Cost (USD per container)	1055	50	500

FIGURE 165: RANKING ON "EASE OF DOING BUSINESS" SOURCE: EASE OF DOING BUSINESS-WORLD BANK

The procedures and approval processes for setting up a manufacturing unit are extremely complex in India. In addition to this, the procedural delays and approval cost in the Government machinery add to the woes of the manufacturers

As per International Finance corporation report 'Ease of Doing Business', India ranks much worse than Malaysia and China on several parameters including the number of procedures and number of days required to comply with the procedures etc. (Refer to figure 165). Moreover, the cost involved in getting the required approval is significantly higher in India compared to China, Malaysia, etc. (Refer to figure 165)

According to the report, India ranks significantly lower than China and Malaysia in process & procedure related to exports as well. Each shipment requires compliance to cumbersome procedures leading to avoidable delays in dispatches. In addition to these delays, the cost of export is also higher in India when compared to China and Malaysia. The cost includes the costs towards documentation, custom clearance, inland transport, port & terminal handling and other official costs incurred for exporting. The figure 165 compares the costs to export products in a 20 feet container from India vis-à-vis that from China and Malaysia to export products in a 20 foot container.

Complex Tax Structure

India's commercial taxation system follows a three tier taxation policy. This is unlike most other competing economies like China or Malaysia which follow a single tier taxation system. In India, taxes are levied not just by the center, but also by the states and even the local municipality. The three tier taxation adds to the complexity of taxation and also to the sheer

"...we have employed around 2-3 people in addition to the tax consultants, to ensure that we meet the requirements of the government. This cost also adds to our overheads..." - Indian Manufacturer



quantum of tax levied.

In addition, due to the different taxation rates and policies prevailing in different states, the cost of production from two plants located in two different states of India could be different. This is not the case in China where the taxation system is consistent across the different provinces.

Multiple taxes such as CST (Central Sales Tax), VAT, Central Excise, Service Tax, Surcharge, Education Cess etc, could be applicable depending on the transaction and offerings and add to administrative work and cost.

On the positive side, tax reform and rationalization is being expedited by the government and Central and State VAT have been implemented. Considerable progress has been made on changing over the national Indirect Tax system to Goods and Service Tax (GST) and in spite of resistance from different States, it is hoped that GST would be implemented nationally within next one year, say by June 2012.

Inverted Duty Structure

Inverted duty structure refers to a situation where the duty on the finished products is lower than that on raw materials and intermediate products.

This acts as a disincentive for the domestic electronic component manufacturers who have to pay a higher price for the raw materials while the finished products can be imported at lower duty. This leads to preference for trading and low value addition activity (such as assembling and packing) rather than manufacturing. The inverted duty structure has been corrected in most cases but even today manufacturers have to import inputs under a specific Customs notification no. 25/99 for which they have to follow a very cumbersome procedure.

"....the import duty on raw materials into the country is almost twice that of finished product. This has put an additional burden and has made us cost ineffective when compared to imports...", Indian Manufacturer

In addition to the Inverted duty structure, bilateral trade agreements signed by India with countries like Thailand, Singapore, and Sri Lanka have also acted as a deterrent by reducing cost of imported components and even finished products. A classic case is that of Color Televisions which were included in the FTA (Free Trade Agreement) with Thailand about 3 years ago. Once this FTA was implemented, Sony closed its manufacturing plant in India and started importing TV's from their manufacturing facility in Thailand. FTA's have also resulted in increasing imports of components as buyers find them cheaper under FTA's. While most components are already included under the ITA-1 Agreement and are importable at zero customs duty, the few remaining components such as those exclusively for Consumer and Industrial Electronics which attract duty get imported under specific FTA's at zero duty.



In order to encourage Indian manufacturing, it is imperative that the Government helps in creating a level playing field for the Indian manufacturer's vis-à-vis their global counterparts.

4. Other Challenges

Among other challenges that are faced by the Indian electronics component industry skilled labor, R & D facilities in India, availability & sourcing of raw materials are important as these affect the growth of the industry significantly.

Skilled Labor

India's is considered to be a global hub for low-cost skilled labor. This has been one of the reasons for the rapid industrialization of India. This rapid growth has led to scarcity of specialized labor in the country, especially, in places other than metro cities where the industries are located.

Over the years, the Indian government has framed policies to improve the quality of education provided in the country and has set up vocational training schools across India to develop skilled manpower. However, most of these vocational training schools do not meet the required standards leading to a dearth of domain specific skilled labor. The ITI set up is an example of this gap where the skills attained by the students pursing these courses do not aid them in getting productively employed.

With increasing adoption of newer technologies in component production, it is imperative that the government sets up domain specific training schools to train the existing talent pool to meet the needs of the industry.

As per a NSDC report, some of the areas of focus from an electronic component perspective will include the following

- Understanding of process charts
- Understanding material variation and machine operations
- PLC programming
- Robotic machinery maintenance
- Computer proficiency and data management

In addition to the above, training on soft skills is increasingly gaining importance as it is an important skill set for several jobs today.



The above could be attained by revamping the training setups to incorporate the above skill sets. This is best delivered through the existing ITI program in case the ITI's could be revamped. As per one of the plans of Govt. of India, it plans to convert about 1396 of the 1896 Government ITI's into center of excellence that could impart technical training in specific trades and skills.

R&D Facilities

Innovation is extremely important for businesses to survive and grow. In case of the electronic component industry, Indian manufacturers are giving very little attention to this aspect. Most of the innovation in this space is driven by countries like China, Russia and Brazil. India has not been a front runner on electronics component R&D so far. In many cases, Indian manufacturers have not been able to migrate to more advanced variants of the components due to lack of technological expertise and know-how.

For India to emerge as a strong manufacturing base, it is extremely important for India to set up a strong R&D base. This will require organizations to invest in R&D facilities and for the Government and other bodies to support such initiatives. The industry believes that R&D is possible when it makes profits to re-invest in growth. In its present situation an external impetus is required so that entrepreneurs are encouraged and supported financially to do more R&D which is a basic requirement for sustaining growth in an industry with very high obsolescence.

Currently, the R&D in electronics is largely limited to a few organizations like

- Electronic Research Development & Facilities Centre,
- C-DAC etc.
- Vis-à-vis 9 state of art R&D centers are being set up under the National Automotive testing & R&D Infrastructure development project (NATRIP).

So to promote R&D in India, the DIT has constituted a group – 'R&D in Electronics Group' on the same lines of CAR (Core group on Automotive R&D) to conduct sponsored R&D activities across India at various academic institutions of higher learning and R&D laboratories.

Availability of Raw materials

The raw materials required for the manufacturing of electronics components are of high purity which is currently unavailable in India. Due to this, the component industry has been sourcing these materials from countries like China, Malaysia etc., making the end products more expensive.



It is estimated that close to about 80% of the raw materials required for producing high to medium end electronics components are imported into India. This has a direct impact on the cost of manufacturing, rendering the local product more expensive vis-à-vis imported product.

Conclusion

In many cases, components manufactured in India are priced 30-40% higher than those imported. This is largely due to the challenges indicated above which significantly affect the electronic component industry. These are the disability costs which are beyond the control of individual enterprises and need to be addressed by the government. It is common knowledge that in some cases, the price of components imported from China is even lower than the material cost of the same component when manufactured in India.

For the electronic component industry to grow in India, it is extremely important to address the concerns and challenges highlighted above. These challenges will help the industry increase local production and compete with the global players.

It is also important for the Indian businesses to explore niche opportunities existing in the market for growth. Since most of the Indian businesses in this industry are mid-sized and family-owned, they are largely satisfied with a modest revenue and growth. Hence, the government should find ways by which it can attract multinational companies and large Indian corporate houses to invest in the electronic component and equipment manufacturing industry in India in a big way.

CHAPTER #8.0:- FUTURE DIRECTION





The telecom and consumer electronics market are the two largest consumers of electronics industry in India. With a market size of USD 71.48 billion and 11.04 billion in FY 2009-10, a robust growth rate, a largely un-penetrated rural market and a large overall potential with a very high population of about 1.2 billion, the electronic market in India is poised for a strong growth in the years to come.

This strong demand in consumer electronics and telecom market has forced manufacturers to continuously innovate making these the most dynamic economic sectors today. With consumer's also getting technically inclined using Internet, the manufacturers have been forced to adapt quickly to rapid changes in modern technology so that they could meet the needs of the new generation of customers. In other words, manufacturers were forced to adopt the latest technologies in order to develop the most functional products and to keep in touch with consumer in real time. Moreover, continuous innovation became a norm among the manufacturers to prevail in the market. Some of the popular technology trends that are emerging and have been highlighted in the earlier sections are that of miniaturization, intelligent electronics and technology convergence.

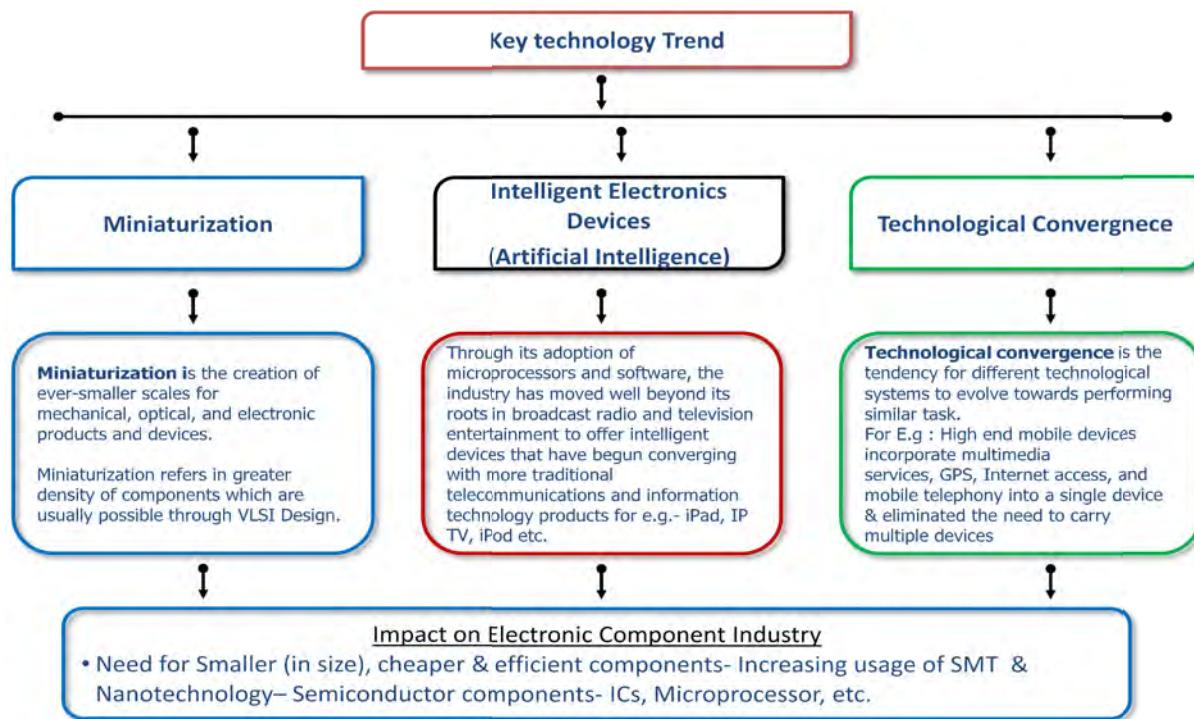


FIGURE 166: KEY TECHNOLOGY TRENDS

These trends indicate that electronics markets are in a rapid evolution phase and the manufacturers are under tremendous pressure to be the first-to-market with unique and differentiated products. However, successful products in the consumer market quickly attract



"me-too" products from the competition, leading to rapid price erosion. Thus, in order to stay ahead of competition, consumer manufacturers were forced to constantly enhance their products or support emerging technologies. Traditional design methodologies of using ASSPs (Application specific standard product) and ASIC (Application specific integrated circuit) failed to meet the above technological changes forcing manufacturers to move to Surface Mount Technology (SMT), Very Large Scale Integration(VLSI), System-on-chip (SoC), Nanotechnology, etc. This shift in the technology has brought about a change in the kind of electronic components required for making these devices. For example, surface mount technology has forced the industry to move from leaded devices to surface mount components.

The increase in adoption of these new technologies would have severe impact on the kind of components required for production. This would mean the electronic components manufacturers would have to upgrade from existing production techniques which are largely human labor driven to automated techniques. This shift would require the manufacturers to majorly overhaul the existing production line which also means a significant investment would have to be made by the manufacturer.

However, it is observed that the most manufacturers are not upbeat about the investment that needs to be pumped in to overhaul the existing production line as they fear that with decreasing revenue realization due to price differences of Indian manufactured products and imports would not help them sustain for long time. The reasons that are attributed to the increasing difference in prices are as follows:-

- Inverted Duties making imports more attractive than manufacturing
- High Finance and energy cost compared to competing countries
- Inadequate infrastructure resulting in delays and higher costs
- Procedural issues and transactional costs
- Lack of economies of scale, due to inability to use our domestic market to get access and volumes.
- Lack of R&D funding/grants and long-term finances
- Lack of Fiscal incentives for Indian products vs. imported (which are at Zero duty due to ITA-1)
- Lack of export promotion of Indian ICTE products- no branding of Indian products & no quality standards.

So what should Indian Government do to enhance Indigenous production?

While the electronic components sector in India is currently small, there are several advantages that India could offer to the sector in order to leverage the quantum of growth it could offer. Following are some of the measures that the policy makers and industry need to focus on in order to create a level playing field for the indigenous players:-

1. Identify & promote electronic components that show high growth potential
2. Develop & Promote Electronic Hardware Technology Park (EHTP) and Electronic Clusters
3. Develop & Promote R&D centers across the country
4. Rationalize tax policies
5. Improve overall infrastructure in and around major Industrial Hubs and connectivity with major markets & ports.

1. Identify & Promote electronic components that show high growth potential

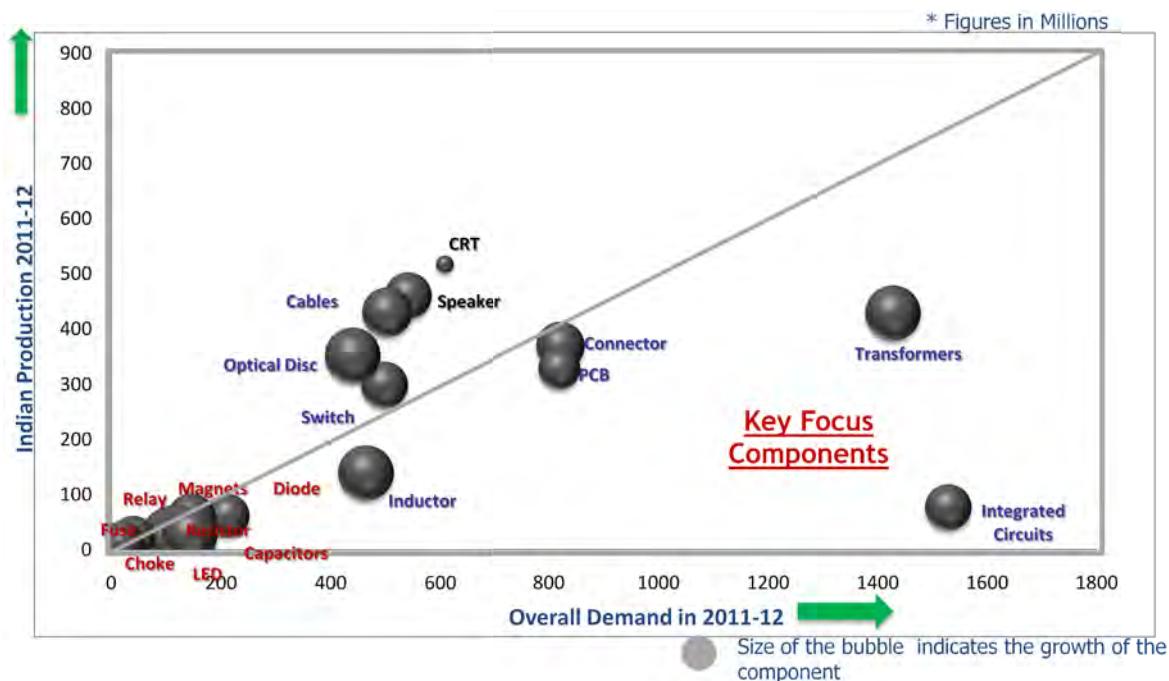


FIGURE 167: DEMAND VS. PRODUCTION OF ELECTRONIC COMPONENTS IN FY 2012

Figure 167 shows the overall demand and Indigenous production in 2012. While the imports are higher for most electronic components, there are a few components like Integrated Circuits (ICs) and Transformers, PCBs and Connectors which are expected to have a significantly higher



demand in the Indian market by FY 2011-12 when compared to their production in India. Therefore, it is important for the policy makers to promote indigenous production of these components immediately.

2. Develop & Promote Electronic Hardware Technology Park (EHTP) and Electronic Clusters.

Electronic component industries and end user industries like Television, Automobiles, and IT products should ideally be concentrated in a cluster in order to gain in terms of lower inventory, lower transportation cost, etc. Countries which lead in manufacturing of electronic component have successfully adopted this practice. In our view, India should have a number of such clusters in each of the major application industry. We recommend that the policy makers and industry notify the following clusters and EHTPs:-

- **Consumer Electronics Industry**:- We recommend that a cluster be created to produce components like ICs & Power ICs, Wounded components, Resistors, capacitors, Cables, Connectors, SMT Assembly, etc., to the cater to the Consumer Electronics Industry. Some of the possible locations these clusters could come up are Greater Noida in the North India and Mumbai/Pune in West India.
- **Automotive electronics Industry**: - We recommend a cluster be created to produce components like Power Chips, Relays, and Fuses that could be used in the automotive electronics industry. These clusters could either come up in of Mumbai-Pune region or Gurgaon or Chennai due to the high concentration of automobile manufacturing in these locations
- **Information Technology & Office Automation Industry**: - We recommend that a cluster be created in places where large IT manufacturers have set up their manufacturing and assembling plants. The electronic component cluster could focus on producing components like PCBs, Semiconductor chips, etc which are used in the IT & Office Automation industry.

3. Develop & Promote R&D centers in the country

India is lagging behind significantly in manufacture of high technology components. There are also components where the share of imports is much higher. One of the reasons for lower share of indigenous production is the lack of technology. In order to address this issue, we suggest that we focus on developing R&D centers on Private-Public Partnership. We also recommend that such R&D centers focus on SMT, LEDs & Nanotechnology on an urgent basis. In addition, Government could allocate corpus funds each year to focus on development of components involving these technologies.



4. Rationalization of Taxation policies.

The policy makers could amend or relax a few monetary policies in order to boost indigenous production. These policies include:-

- o Ensure uniform taxation system across the country
- o Abolish inverted duty structure
- o Lower slabs of taxes for purchase of raw materials and components that are sourced locally
- o Imports of all inputs including raw materials for zero duty items (ITA-1) at zero customs duty

Indian Government has recently taken a right step towards implementation of the GST. It would be extremely useful if such taxations be brought to use at the earliest.

5. Improve overall infrastructure in and around major Industrial Hubs and connectivity with major markets & ports.

The government could adopt a Public Private Partnership (PPP) or Build-Operate-Transfer (BOT) model along with Infrastructure management companies to develop and maintain the infrastructure at the various industrial hubs and ports. This could follow a similar model as the one used to develop many of the National Highways and International Airports in India.

In addition to the above, we also recommend the following additional changes:-

- **Promote Indigenous production :-** Encourage local companies to either set up new manufacturing facilities or expand their existing facilities by :-
 - o Single window application process mechanism with guaranteed process time for each activity.
 - o Provide freedom to source funds globally.
 - o Promote Technology collaborations.
 - o Lower rate of interest for funds sourced from financial institutions.
 - o Promote investment companies to invest in electronic component manufacturing.
 - o Compensate for disabilities in proportion to value addition –higher value addition can get benefit of deferred tax payment or rebates on Income Tax
- **Develop a Comprehensive plan by setting up a 'Electronic components mission plan' :-** Set up an Electronic component Mission plan to identify the needs and requirements to



develop India as a design and manufacturing hub like the way it was executed for 'Automotive Mission Plan 2006-2016'

- **Develop & Establish a Technical Standard:**- Develop a technical standard in the same lines of CE mark & CCC mark set up by Europe and China respectively. Alternatively, India could adopt technical standard developed by other countries and enforce regulation to follow the same for both Imports as well as local products. The technical standard would need to cover warranty, energy consumption, safety, product technical standards etc.
- **Preferential Access to Indigenous products in Government, PSUs and Government executed projects:** - Enforce a minimum of 40-50% usage of indigenously produced products in Government, PSUs, etc.
- **Engage in joint technology transfer/partnerships:** - Engage in joint exercises to facilitate technology transfer/partnership for developing new age electronic components in India.

CHAPTER #9.0:-ANNEXURE



A Comparison of the various Taxation laws between India and China

The table below provides a comparison of the various taxation laws present in India and China.

Sl. No.	Heads	Taxation In India	Taxation In China
1	Overview of the Tax Systems	<ul style="list-style-type: none"> - Has a well developed taxation Structure - Follows a three tier system based between Central, State and Local Bodies 	<ul style="list-style-type: none"> - Has fine tuned its taxation structure in 1994 - Follows a single tier taxation system levied by the Federal government
2	Value Added tax	<ul style="list-style-type: none"> - The standard rate of VAT is 12.5% and reduced rates are at 4% and 1 % depending on the states - Minimum Annual turnover for VAT registration ins INR 500,000 - Additional sales tax of 2% is imposed on transfer of goods between Indian State 	<ul style="list-style-type: none"> - The standard rate of VAT is 17% and reduced rates are of 13% that applies to products such as books and types of oils. - Exporters are entitled to VAT for refund for materials bought in China. - No tax is imposed on transfer of goods between different provinces of China.
3	Service/Consumption Tax	<ul style="list-style-type: none"> - The tax imposed on a defined group of services provided in India as follows- Advertising services, consultancy services, banking, insurance and more. - The tax imposed is10.3% including CESS - Service Tax is paid monthly/quarterly. 	<ul style="list-style-type: none"> - The tax is imposed inter-alia on sale of alcohol, petrol, jewellery and cars. - The relevant rates are 3%-45% - Consumption tax returns are filed monthly
4	Business Tax	No Business tax in Present in India	<ul style="list-style-type: none"> - The non recoverable turnover tax is imposed in China instead of VAT on businesses other than Manufacturing businesses, including most services and transfer of intangible and Immovable property. - The Businesses tax is imposed when either the service supplier or the customer are located in China - The tax rate is generally 5%

FIGURE 168: INDIAN AND CHINA TAXATION SYSTEM- AN OVERVIEW



List of Electronics SEZ's in India.

Sl. No.	Name of Company	City	State	Type of SEZ	Status
1	S2tech.com India Private Limited	Gudur, Ranga Reddy	Andhra Pradesh	Electronic Hardware including IT and ITES	Approved
2	Andhra Pradesh Industrial Infrastructure Corporation	Chittoor	Andhra Pradesh	Electronics Hardware	Operational
3	GIDC	Gandhinagar Electronic Estate	Gujarat	Electronics	Notified
4	ELECTRONIC SEZ Gujarat Industrial Dev. Corp'n	Ghandidham	Gujarat	Electronics	Operational
5	Wellgrow Buildcon Private Limited	Gurgaon	Haryana	Electronics/ IT & ITES	Approved
6	Mikado realtors Private Limited	Gurgaon	Haryana	Electronic Hardware, IT/ITES	Approved
7	Progressive Build estate Pvt. Ltd.	Gurgaon	Haryana	Electronic Hardware & Software including IT/ITES	Approved
8	Ireo Investment Holding Ltd.	Gurgaon	Haryana	Electronic Hardware, IT/ITES	Approved
9	Opto Infrastructure Limited	Hassan	Karnataka	Electronic Hardware & IT/ITES	Approved
10	Hebe Infracon Private Ltd	Anekal	Karnataka	Electronic Hardware, Software & IT/ITES	Approved
11	Ittina Properties Pvt. Ltd.	Hoskote	Karnataka	Electronic Hardware and software including IT/ITES	Notified
12	Opto Circuits (India) Limited	Mysore	Karnataka	Electronic Hardware Park	Operational
13	Kerala Industrial Infrastructure Dev. Corp (KINFRA)	Trivandrum	Kerala	Electronics Industries	Approved
14	KSIDC	Cochin	Kerala	Electronic Hub	Approved
15	Modern India Property Developers Limited	Raighar	Maharashtra	Electronic Hardware Software Incl. IT/ITES	Approved
16	Benchmark Realty Private Limited	Pune	Maharashtra	Electronic Hardware and Software including IT/ITES	Approved
17	SEEPZ Special Economic Zone	Mumbai	Maharashtra	Electronics and Gems and Jewellery	Operational



18	Magarpatta Township Development and Construction Company Ltd	Pune	Maharashtra	Electronics Hardware and Software	Operational
19	Kumar Builders Township Ventures Pvt. Ltd	Pune	Maharashtra	Electronics Hardware and Software	Operational
20	Lark Projects private Limited	Mohali	Punjab	Electronic hardware and software including ITES	Approved
21	Somani Worsted Limited	Bhiwadi	Rajasthan	Electronics Hardware and Software/ ITES	Approved
22	Tamil Nadu Industrial Development Corporation	Egmore	Tamil Nadu	Electronics & Electrical	Approved
23	Sriperumbudur Ventures Private Limited	Kancheepuram	Tamil Nadu	Electronics and Electrical Products	Approved
24	Best and Crompton Engineering Limited	Kancheepuram	Tamil Nadu	Electronic hardware	Approved
25	True Developers Pvt. Ltd.	Coimbatore	Tamil Nadu	Electronics Hardware and IT/ITES	Notified
26	Velankani Technology Parks Pvt. Ltd.	Kancheepuram	Tamil Nadu	Electronics hardware and software and ITES	Notified
27	State Industries Promotion Corporation of Tamil Nadu	Oragadam	Tamil Nadu	Electronic Hardware	Operational
28	Flextronics Technologies (India) Private limited	Kancheepuram	Tamil Nadu	Electronics Hardware and related services	Operational
29	State Industries Promotion Corporation of Tamil Nadu	Sriperumbadur	Tamil Nadu	Electronics of Telecom hardware	Operational
30	Uppals IT Projects Pvt. Limited	Noida	Uttar Pradesh	Electronic Hardware and Software including IT/ITES	Approved
31	Sarv-Mangal Realtech Pvt. Ltd.	Noida	Uttar Pradesh	Electronic Hardware and Software including IT/ITES	Approved
32	Videocon Realty & Infrastructures Limited	24 Parganas	West Bengal	Electronics	Approved
33	Oval Developers Private Ltd	24 Parganas	West Bengal	Electronic Hardware and Software	Approved

FIGURE 169: LIST OF SEZS AND EHTPS APPROVED IN INDIA



Details of Indian Integrated Circuit Manufacturers

Sl. No.	Name of Company	Corporate office in India	Products Manufactured	Salient Aspects
1	BEL	Bangalore, Karnataka	IC, Small Signal transistors, Hybrid micro circuits, Oscillators Amplifiers	<ul style="list-style-type: none"> - An Indian public sector (Navaratna) company started in 1954 - It is a company of strategic importance for the ministry of Defense. - Caters to the specialized electronic needs of the Indian Defense services. - ISO 9001 and ISO 14001. It also has certified Aerospace standards AS 9100 - Caters to a wide range of clients- public limited companies to private companies in both India and countries like USA, Sri Lanka, Germany & Indonesia.
2	CDIL	New Delhi, India	Transistors, Diodes, Zener Diodes, Rectifiers, Bridges, Schottky, Thyristors – DIAC, Triacs, SCRs, Voltage Regulators	<ul style="list-style-type: none"> - The only Indian company to have pioneered the manufacturers of Silicon Semiconductors Devices in India way back in 1964 - EXACT, JSS, CACT, LCSO and C-DOT are some of the certifications received by CDIL. - ISO/TS 16949 & ISO 9001 QMS are some of the quality certifications. - Owns a well established state-of-art manufacturing facility with automated production equipment set-up in over 30,000 sq. m. of area, spread over two plants at New Delhi and Mohali (Chandigarh). - Caters to most countries in Asia, North America, Europe and a few countries in South America & Africa.

FIGURE 170: KEY INTEGRATED CIRCUITS MANUFACTURERS



Details of Indian Cathode Ray Tube Manufacturers

Sl. No.	Name of Company	Corporate office in India	Products Manufactured	Salient Aspects
1	Samtel Color Limited	New Delhi, India	Color picture tubes and Deflection yokes	<ul style="list-style-type: none"> - A flagship company of the Samtel group; the largest manufacturer of color picture tubes in India. - Incorporated in 1986 with a technical collaboration with Mitsubishi Electric, Japan to manufacture 14" and 21" Color Picture Tubes (CPTs) - Has two plants- one in Ghaziabad and one in Kota in Gujarat - One of the first to introduce Digital Color Monitor in India. - One of the Public-Private Partnerships in the area of defense avionics.
2	JCT Electronics Limited	New Delhi, India	Color Picture Tubes	<ul style="list-style-type: none"> - A flagship company of Thapar Group. - Was the first Color Picture Tube manufacturer in India. - Have two plants- one in Mohali & another in Vadodara. - Has a manufacturing capacity of 5 million Color Picture tubes per annum.

FIGURE 171: KEY CATHODE RAY TUBE MANUFACTURERS

Details of Indian Diode Manufacturers

Sl. No.	Name of Company	Corporate office in India	Products Manufactured	Salient Aspects
1	CDIL	New Delhi, India	Transistors, Diodes, Zener Diodes, Rectifiers, Bridges, Schottky, Thyristors – DIAC, Triacs, SCRs, Voltage Regulators	<ul style="list-style-type: none"> - The only Indian company to have pioneered the manufacturers of Silicon Semiconductors Devices in India way back in 1964 - EXACT, JSS, CACT, LCSO and C-DOT are some of the certifications received by CDIL. - ISO/TS 16949 & ISO 9001 QMS are some of the quality certifications. - Owns a well established state-of-art manufacturing facility with automated production equipment set-up in over 30,000



				<ul style="list-style-type: none"> - sq. m. of area, spread over two plants at New Delhi and Mohali (Chandigarh). - Caters to most countries in Asia, North America, Europe and a few countries in South America & Africa.
2	Naina Semiconductor Ltd.	Noida, India	Axial Leaded Diodes, Power Diodes, Auto Diodes, Zener Diodes, Schottky Diodes, Bridges, etc.	<ul style="list-style-type: none"> - Manufactures Semiconductor devices ranging from 1 amp to 1000 amp which include Axial Lead diodes, Medium & high power bridges, diodes etc. - ISO 9001-2000 certified - Most of the devices manufactured conforms to the European Union Directive 2002/95/EC - Caters to Automobile companies, battery charges, alternator, instrumentations, industrial applications etc.
3	Vishay Components India Pvt. Ltd.	Pune, Maharashtra	Film resistors, Diodes & capacitors	<ul style="list-style-type: none"> - Apart from resistors, Vishay manufactures Capacitors and Discrete semiconductors like Power rectifiers, Power MOSFET's etc. - Has many patented products in its product portfolio. - Apart from India, Vishay has its manufacturing facilities in China, Israel, Europe & the Americas. - Caters to telecom, instrumentation, computer & automobile industry. Process industry, Industrial application and various R&D establishments in the country. - Has received UL and LCSO Accreditations.
4	Semikron Electronics Pvt. Ltd.	Mumbai, Maharashtra	Thyristor, Diodes & IGBT Drivers	<ul style="list-style-type: none"> - Has production sites in 10 countries and operates in most countries. - Market leader in the field of diode/ Thyristor modules, enjoying a 37% share of the worldwide market.
5	Stanesh Semiconductor Pvt. Ltd.	Mumbai, Maharashtra	Electronic Vertical Pins	<ul style="list-style-type: none"> - Established in the year 1995 - Major markets are Indian Subcontinent, East Asia, Middle East and South East Asia.

FIGURE 172: KEY DIODE MAUFACTURERS



Details of Indian Transistor Manufacturers

Sl. No.	Name of Company	Corporate office in India	Products Manufactured	Salient Aspects
1	BEL	Bangalore, Karnataka	IC, Small Signal transistors, Hybrid micro circuits, Oscillators Amplifiers	<ul style="list-style-type: none"> - An Indian public sector (Navaratna) company started in 1954 - It is a company of strategic importance for the ministry of Defense. - Caters to the specialized electronic needs of the Indian Defense services. - ISO 9001 and ISO 14001. It also has certified Aerospace standards AS 9100 - Caters to a wide range of clients- public limited companies to private companies in both India and countries like USA, Sri Lanka, Germany & Indonesia.
2	CDIL	New Delhi, India	Transistors, Diodes, Zener Diodes, Rectifiers, Bridges, Schottky, Thyristors – DIAC, Triacs, SCRs, Voltage Regulators	<ul style="list-style-type: none"> - The only Indian company to have pioneered the manufacturers of Silicon Semiconductors Devices in India way back in 1964 - EXACT, JSS, CACT, LCSO and C-DOT are some of the certifications received by CDIL. - ISO/TS 16949 & ISO 9001 QMS are some of the quality certifications. - Owns a well established state-of-art manufacturing facility with automated production equipment set-up in over 30,000 sq. m. of area, spread over two plants at New Delhi and Mohali (Chandigarh). - Caters to most countries in Asia, North America, Europe and a few countries in South America & Africa.
3	Arihant Electricals	Delhi, India	IGBT Drivers, [Power Modules and Discs, Fuses Boxes, Fans Blowers, Capacitor, Connectors and Relays.]	<ul style="list-style-type: none"> - Leading Solution Provider in Electrical/Automation components. - Caters to diverse industries like Energy, Transportation, Print/Packaging/Plastic, Infrastructure, Heavy industry, Telecommunication, Oil & Gas, Consumers Electronics, OEM, Heavy equipment manufacturers.
4	Semikron Electronics Pvt. Ltd.	Mumbai, Maharashtra	Thyristor, Diodes & IGBT Drivers	<ul style="list-style-type: none"> - Has production sites in 10 countries and operates in most countries. - Market leader in the field of diode/ Thyristor



				modules, enjoying a 37% share of the worldwide market.
5	Hind Rectifiers Limited	Mumbai, Maharashtra	Diodes, Thyristor, Power Modules, Rectifiers, Transformers, Converters & Inverters	<ul style="list-style-type: none"> - Established in 1958 - ISO 9001: 2000 certified - Major markets are Australia/NZ, East Europe, East Asia, Middle East, South East Asia and North America.

FIGURE 173: KEY TRANSISTOR MANUFACTURERS

Details of LED Manufacturers

Sl. No.	Name of Company	Corporate office in India	Products Manufactured	Salient Aspects
1	Kwality Photonics Pvt. Ltd.	Hyderabad, India	LED, LED Display & Optoelectronic products	<ul style="list-style-type: none"> - An ISO 9001:2000 certified company. - Company is in the process of increasing its capacity to 50 Million LEDs per annum - Using COB technology to make modules for automobile lamps. - Reckoned as a Price Leader- offering most Competitive Prices and Best Value for money.
2	MIC Electronics Limited	Hyderabad, India	LED Display & LED lighting	<ul style="list-style-type: none"> - Incepted in 1988 at Vijayawada - ISO 9001:2000 & ISO 9001:2008 certified company. - Nationwide presence in the form of a vast network of marketing, sales and services support centre's in all metros of India. - Has direct presence in foreign markets with subsidiaries in US and Australia. - Caters to the indoor, outdoor lighting needs like the retail store, restaurants and industrial. Streetlights, floodlights etc. - The company is a leader in providing railway and solar lighting
3	Goldwyn Limited	Noida, Delhi NCR	LED lighting	<ul style="list-style-type: none"> - An ISO 9001:2000 quality certified company engaged in the design and manufacture of LED lighting fixtures - Manufacturing facility and R&D centre of over 9000sq. m. in Noida Special Economic Zone. - The company has got expertise and experience in developing, designing, manufacturing and exporting innovative LEDs



				<ul style="list-style-type: none"> - lighting assemblies. - Caters to the indoor and outdoor lighting needs.
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FIGURE 174: KEY LED MANUFACTURERS

Details of Indian Wound Components Manufacturers

Sl. No.	Name of Company	Corporate office in India	Products Manufactured	Salient Aspects
1	Sree Vishnu Magnetics Pvt. Ltd	Chennai, Tamil Nadu	Transformers, Coils & Inductors	<ul style="list-style-type: none"> - Has been in production since 1979 - Caters to consumer electronics, computer peripherals, telecom, medical electronics, lighting and automobile sectors - Have three operating units in India, with manufacturing space of over 15,000 sq. ft and employs over 300 dedicated and highly qualified personnel.
2	Elcompo Electronic Industries Pvt. Ltd	Chennai, Tamil Nadu	Transformer & inductors, Filters, Correctors, Deflection coils	<ul style="list-style-type: none"> - One of the leaders in manufacturing of fly back transformers & deflection coils - Caters to TV, Monitors (Computer & medical equipment), Power coating, Water purifiers, lighting, printer, etc. - Sales per annum is estimated around USD 2Million
3	Powercaps Systems (Madras) Pvt. Ltd	Chennai, Tamil Nadu	Transformers & inductors	<ul style="list-style-type: none"> - Caters to power supply, power conditioning, telecom, medical & automobile industry - Has been certified ISO/TS 16949:2002 and ISO 14001:2004 EMS, Registered with SSI unit
4	Pulse Magnetic & Power Electronics	Gurgaon, India	Transformers, Inductors & Chokes	<ul style="list-style-type: none"> - Indian company established in 1997 - Caters to industrial, Automation control/Motor Drives, Power Control/Power Management, Military, Telecom and Aerospace. - Exclusively produces customized wound components for Industrial, Medical, Railway, Aerospace and Telecom sectors of on shore and off shore customers. - Has been certified with ISO 9001:2008 (QMS), ISO 14001 (EMS), OHSAS 18001 (BS), SA 8000
5	Traffo Electronics	Pune, Maharashtra	Transformers, Chokes, Reactors & Coils	<ul style="list-style-type: none"> - Started in 1989 with manufacturing transformers and coil & later ventured out in to UPS - Caters to Consumer electronics and Indian



				<ul style="list-style-type: none"> - railways - Got accredited with ISO 9002 - Caters to Industries like Voltage stabilizers, Aviation equipment, Automation & control, Control Panels, Power Suppliers
6	Sinanics Components Pvt. Ltd	Chennai, Tamil Nadu	Communication transformers and Filters, Hook Switch, Power Transformers, RF Coils, EMI Suppression products	<ul style="list-style-type: none"> - Established in the year 1980. - Company produced AM/FM IF coils for radio and TV industry. In the subsequent years, the company diversified into manufacturing of several wound components. - Certified for ISO 9001/2000 by UL India Limited.
7	GSP Electronics Pvt. Ltd	Noida, UP	Choke Coils & Inductors, Degaussing Coil & Wire Harness, EMI & Line Filter Transformers, Power Magnets	<ul style="list-style-type: none"> - Established in 1993 - Diverse manufacturer with core competence in magnetic, components & Assemblies. - Quality certifications like SQTC certification for safety components in 2005, Certification of registration awarded by Quality certification Bureau Inc., in 2003
8	Victor Components Systems Pvt. Ltd	New Delhi, India	Transformers, filters, coils, chokes, degaussing coils, toroids, AC/DC adapters	<ul style="list-style-type: none"> - Got accredited with ISO 9001:2000, ISO 14001 - Exports to UK, South East Asia.

FIGURE 175: KEY WOUND COMPONENTS MANUFACTURERS

Details of Indian Capacitor Manufacturers

Sl. No.	Name of Company	Corporate office in India	Products Manufactured	Salient Aspects
1	Epcos India Pvt. Ltd	Nashik, Maharashtra	Capacitors, Inductors, Ceramic components and SAW Components	<ul style="list-style-type: none"> - Caters to information and communication technology, automotive electronics, Industrial electronics and consumer electronics - Caters to countries in Europe, North America, South America and South East Asia.
2	Deki Electronics Ltd	Noida, UP	Plain Polyester, Metalized Polyester, Metalized polypropylene, Palin & Metalized	<ul style="list-style-type: none"> - Established in 1984 in technical collaboration with Okaya Electric Industries, Japan - Has production capacity 460 Million capacitor per annum - Caters to Consumer Appliances, Lighting, Medical electronics, Industrial electronics,



			Polypropylene, Mixed Dielectric	- Auto electronics, IT Hardware, etc - Exports to Europe, Hong Kong, China, Thailand, Philippines, Malaysia, South Korea, Middle East.
3	Vishay Components India Pvt. Ltd	Pune, Maharashtra	Ceramic, Electrolytic, Aluminum and tantalum capacitor, apart from resistor, inductors opto-coupler & Semiconductor	- Established its operations in India in 1985 - Company has been growing by making strategic acquisitions across locations. - Caters to Automotive, Industrial equipment, Computer Medical equipments, consumer electronics and telecommunications industry.
4	Gujarat Poly-AVX Electronics Ltd	Mumbai, Maharashtra	Ceramic Capacitors	- Established in 1989 - GPAEL is a joint venture company promoted by Polychem Ltd, AVX Corporation of U. S. A. and Gujarat Industrial Investment Corporation Limited (GIIC).
5	Incap Limited	Vijayawada, Andhra Pradesh	Radical Capacitor, Lug Terminal Capacitor, Motor Star Capacitor, Screw Terminal Capacitor	- Established in the year 1992 - ISO 9001:2000 accredited
6	Keltron Electro Ceramics Ltd	Malappuram, Kerala	Ceramic Capacitor, NTC Thermistors, Metal Oxide Varistors, Piezo Ceramic Buzzers	- Company Started functioning in the year 1974 - Production of Disc Ceramic Capacitors was started during 1978 - ISO 9001:2008 Certified - Major Market are Indian Subcontinent, East Asia, Middle East and South East Asia.
7	Globe Capacitors Limited	Faridabad, Haryana	AC Motor Run Capacitors, Electrolytic Start Capacitors, MPP Films	- Established in the year 1978. - ISO 9001:2000 and ISO 14001:2004 certified. - Company exports 30% capacity to USA, South Africa, Middle East, West and South East Asia.

FIGURE 176: KEY CAPACITOR MANUFACTURERS

Details of Indian Resistor Manufacturers

Sl. No.	Name of Company	Corporate office in India	Products Manufactured	Salient Aspects
1	Vishay Components	Pune, Maharashtra	Film resistors, Diodes &	- Apart from resistors, Vishay manufactures Capacitors and Discrete semiconductors like



	India Pvt. Ltd.	(Global HQ: Malvern, USA)	capacitors	<ul style="list-style-type: none"> - Power rectifiers, Power MOSFET's etc. - Has many patented products in its product portfolio such as Metal Strip, WSL and WRR Metal Strip resistor. - Apart from India, Vishay has its manufacturing facilities in China, Israel, Europe & the Americas.
2	Stead Electronic Industries	New Delhi. India	Wire Wound Resistor, Wire Wound rheostats, Wire wound potentiometers	<ul style="list-style-type: none"> - Has been in the industry since 1953. - Factory is located in Wazirpur Industrial Area, New Delhi - Only company in India making special customer specific resistor
3	Hi-tech Resistors Pvt. Ltd	Nagpur, Maharashtra	Wire wound & low ohm resistors	<ul style="list-style-type: none"> - Was formed by acquiring Samsung Co. Ltd - Have their plant in MIDC Industrial Area, Nagpur, Maharashtra
4	Cermet Resistronics Pvt. Ltd	Pune, Maharashtra	Fusible Film resistors, Fusible wire wound resistors, etc.	<ul style="list-style-type: none"> - Has been certified ISO 9001:2000 - Growing at a rate of 40% every year with annual turnover of USD 3 Million and share of exports at 20% - Caters to Auto electronics, Industrial electronics, telecom industry, entertainment electronics, instrumentation etc. - Exports resistors to Germany, UK, China, Hong Kong, Russia, Middle East and Brazil
5	Watts Electronics Pvt. Ltd	Kochi, Kerala	Carbon Film, Metal Film & wire wound resistors	<ul style="list-style-type: none"> - Has been certified with LSCO Qualification- an approval by the Ministry of Defense - Have their plant in Kochi, Kerala - Exports products to East Asian Markets, Middle East and few South East Asian countries
6	Precision Electronics Component Mfg. Co (PEC)	Hyderabad, Andhra Pradesh	Power resistor, Precision resistor, Low ohmic resistor, Potentiometer	<ul style="list-style-type: none"> - Leader in precision wire wound resistor in India - Established with the aim of making defense grade resistor - Meets standards of IS-8909, GOST 6513.62 and MIL-R-26 - Clients include BEL, HAL, ITI, CDOT, BRL Systems - Caters to both Indian as well as International Market.
7	Pankaj Potentiometers	Mumbai, Maharashtra	wire wound potentiometers	<ul style="list-style-type: none"> - Established in 1959 - ISO 9001:2000 certified company



	Pvt. Ltd			<ul style="list-style-type: none"> - Starting from single wire wound potentiometers the company have a variety of different wattage single turn wire potentiometers, servo potentiometers and added Hall Effect Rotary absolute encoders having various outputs.
8	Variturn Electro Products Pvt. Ltd	Hyderabad, Andhra Pradesh	Wire Wound Resistors & Rheostats, Braking Resistor, Linear Rheostat, Space heater	<ul style="list-style-type: none"> - Established in 1990 - An ISO 9001:2008 certified company.

FIGURE 177: KEY RESISTOR MANUFACTURERS

Details of Indian Printed Circuit Board Manufacturers

Sl. No.	Name of Company	Corporate office in India	Products Manufactured	Salient Aspects
1	AT&S	Nanjangud, Karnataka	Single Sided, Double Sided & Multi layered PCBs	<ul style="list-style-type: none"> - Formed in 1987, the company went to become a leading PCB manufacturer in Europe & India. - Caters to automotive, industrial and medical sectors - Three production locations in Austria (Leoben, Fehring, Klagenfurt) and factories in India (Nanjangud), China (Shanghai) and Korea (Ansan near Seoul) - The Group employs more than 5,500 people worldwide. In the last fiscal year 2009/10, AT&S achieved turnovers of EUR 372.2m.
2	Ascent Circuits	Hosur, Tamil Nadu	Single Sided, Double Sided & Multi layered PCBs	<ul style="list-style-type: none"> - Ascent Circuits is one of the largest and fastest growing PCB manufacturers in India with annual capacity in excess of 5,00,000 square meters of single side PCBs and 108,000 square meters of Double side / Multiplayer PCBs - Has ISO 9001 : 2000 & TS 16949 certified by UL laboratories Inc - Exporting more than 55% of production to most demanding markets / MNC's in USA &Europe.
3	Circuit systems India Limited	Gandhi Nagar,	Single Sided & Multi Layered (up	<ul style="list-style-type: none"> - Has a manufacturing plant located in Gandhi Nagar, Gujarat



		Gujarat	to 24 layers) PCBs	<ul style="list-style-type: none"> - Has opened office in Belgium to handle the Europe sales. - Key Supplier to telecom Industry, Process industry, Industrial application and various R & D Establishments in the country. - Has received UL and LCSO Accreditations.
4	CIPSA-RIC India Pvt. Ltd.	Tumkur, Bangalore	Single Sided & Double Sided PCBs	<ul style="list-style-type: none"> - Company was formed with many like minded Indian and Spanish entrepreneurs. - Caters to automotive, energy, industrial automation, EMS provider, telecommunication & peripheral sectors - The Current annual capacity of 85,000 square meters is being expanded to 150,000 square meters over the next 1 year
5	Shogini Technoarts Pvt. Ltd	Pune, Maharashtra	Single Sided & Double Sided PCBs	<ul style="list-style-type: none"> - Established in 1979, the company has grown to become one of the top five manufacturers. - The company produces 100,000 sq. meters of PCBs per annum - Exports to USA, UK, Germany & Sri Lanka. - Caters to consumer durables, telecommunication, power electronics, process control, office automation, automobiles and energy meters
6	BCC Fuba India Limited	Solan, Himachal Pradesh	Single Sided, Double Sided PCBs & Multilayered PCBs	<ul style="list-style-type: none"> - Entered the Indian market in 1990 in collaboration with Fuba Hans Kolbe of Germany. - The present installed capacity of the plant is 42,000 square meters with 7,000 square meters for the multilayered PCBs - Has obtained ISO 9001 (2000) certification

FIGURE 178: KEY PRINTED CIRCUIT BOARD MANUFACTURERS

Details of Indian Connector Manufacturers

Sl. No.	Name of Company	Corporate office in India	Products Manufactured	Salient Aspects
1	Tyco Electronics Corporation India Pvt. Ltd.	Bangalore, Karnataka	PCB Connectors, AV Connectors, Signal Connectors, RF Connectors	<ul style="list-style-type: none"> - Apart from Connectors, the company manufacturers relays, switches, touch screens, sensors and filters. - Caters to wide range of industries-Aerospace, Defense, Consumer appliance, Automotive, Medical, Lighting & railway
2	Molex India Pvt.	Bangalore,	Signal & Power	<ul style="list-style-type: none"> - Apart from Connectors, the company



	Limited	Karnataka	Connectors	<ul style="list-style-type: none"> - manufacturers Sockets, cables assemblies, fiber optics, PCBs & Lighting products. - Has close to 59 manufacturing plants located across Asia, Europe & North America - In India, Molex has three plants- Gandhinagar, Pune & Noida. - Molex's plants have been ISO certified - Caters to Computer Peripherals, Automotive, Industrial Electronics, Medical & military Markets.
3	Amphenol Interconnect India Pvt. Ltd	Pune, Maharashtra	MIL , AV & RF connectors	<ul style="list-style-type: none"> - Subsidiary of Amphenol Inc. USA - Has three factories in India- 2 in Pune & 1 in Bangalore - Has ISO 9000 from BVQI. - Apart from connectors, the company also manufactures back Shells, Antennas, Cable harness etc.
4	FCI OEN Connectors Ltd	Kochi, Kerala	PCB & Signal Connectors	<ul style="list-style-type: none"> - A joint venture with FCI France - Has four manufacturing units in India namely – 3 plants in Cochin and 1 in Bangalore. - Company has received QPL approval from the defense electronics supply center, USA, - Caters to Communication, Industrial & instrumentation, Automotive, Electrical & Power interconnector sectors.
5	TEI Technologies Private Limited	Noida, UP	Power connectors	<ul style="list-style-type: none"> - A joint venture between Tyco electronics, US and Elentec Korea. - Established in India in 2000 - Caters largely to Consumer Durables sector
6	Essen Deinki	Chandigarh, India	Electrical & Electronic Connectors & Micro switches	<ul style="list-style-type: none"> - Established in the year 1964 - ISO 9001:2008 certified manufacturer - Their market covers Europe, Far east and Middle East
7	Phoenix Contact (Ind) Pvt. Ltd	New Delhi, India	Circuit breakers devices, conductors, connectors, switches, Ethernet controller	<ul style="list-style-type: none"> - Phoenix Contact India (Pvt.) Ltd. established as a joint venture with Phoenix Contact GmbH and Co., Germany - Quality (ISO 9001:2008), environmental protection (ISO 14001:2004) and work safety (BS OHSAS 18001:2007) management have been certified by DQS. - Major markets are Australia/NZ, Indian Subcontinent, East Europe, East Asia, Central



				America, North Europe, Middle East, South America, South/West Europe, South East Asia and North America
8	Bright Star Component Pvt. Ltd	Mumbai, Maharashtra	T.V, audio / video components, Pin jack connector, Speaker terminal assembly, BNC connector, AV terminals audio, Video, Visual products & Equipments	- Established in the year 1964

FIGURE 179: KEY CONNECTOR MANUFACTURERS

Details of Indian Speaker Manufacturers

Sl. No.	Name of Company	Corporate office in India	Products Manufactured	Salient Aspects
1	Dakshin Speaker Manufacturing private Ltd.	Chennai, Tamil Nadu	AV Speakers, Multimedia Speakers & Public address system.	<ul style="list-style-type: none"> - Caters to automobiles, AV equipments, Multimedia and Public address system - Formally known as Onkyo India private limited - The company also exports to Japan, Taiwan & Malaysia - Has an installed capacity of 500,000 speakers a month. - Annual turnover is estimated to around INR 55 Million in FY 2010-11
2	Sunvoice Electronics Pvt. Ltd.	New Delhi, India	Audio Speakers	<ul style="list-style-type: none"> - Largely cater to Television companies - Has three manufacturing plants in Delhi and Noida with a total manufacturing capacity of 20 million units per annum. - The manufacturing units are certified by ISO 9001:2000, - The company has set up testing facility to test their products - LG, Samsung, Videocon, Onida, BPL, Haier are a few companies
3	Capital Radio	Okhla, New Delhi	Audio Speakers	<ul style="list-style-type: none"> - Established in 1948 as a trader in radios and other related components. Subsequently, developed into a manufacturing company of speakers for radio & public address systems



				<ul style="list-style-type: none"> - Caters to European and American markets too
4	Ahuja Radios	Okhla, New Delhi	Audio Speakers	<ul style="list-style-type: none"> - Have 8 factories in Delhi, Noida & Mumbai. - Over 700 engineers, technicians and skilled workers are employed in these 8 factories - Their products are sold across 50 countries with largest export being done to Europe - Apart from regular speakers, the company also manufactures Amplifiers, mixers, microphones, etc.
5	Salora International Ltd	Okhla, New Delhi	Audio Speakers	<ul style="list-style-type: none"> - Part of the INR 15,000 Million Jiwarajika group. - A Joint venture with leading international corporations like Matsushita Electric Inc, Japan (since 1972); LM Ericsson, Sweden (since 1975); and HP Financial Services (subsidiary of Hewlett-Packard Co.), USA (since 2001). - Largely caters to the Consumer Electronics and a few retailers - Factories are located in Noida and Delhi

FIGURE 180: KEY SPEAKER MANUFACTURERS

Details of Indian Switch Manufacturers

Sl. No.	Name of Company	Corporate office in India	Products Manufactured	Salient Aspects
1	Teknic Electromechanics Pvt. Ltd.	Bangalore, Karnataka	Push Button Switches, Micro, Rocker & Toggle Switches	<ul style="list-style-type: none"> - Started as a small plastic processing unit for Philips and grew in-house expertise in plastic processing in over 5 years - Many of the products have acquired UL, CSA, STQC, ENEC and VDE approvals
2	Pran Electronics Pvt. Ltd.	Vadodara, Gujarat	Push Button, Toggle Switches, Slide Switch	<ul style="list-style-type: none"> - Part of the Mehta Engineering Enterprise - Apart from switches, the company also manufactures jacks & connectors.
3	Salzer Electronics Limited	Coimbatore, Tamil Nadu	Rotary Switches, toggle break switches	<ul style="list-style-type: none"> - Has been in the industry since 1985 - Has 5 factories across India - Has product approvals CSA, UL and carries CE mark, with RoHS compliance. - Has been accredited with ISO 9001:2008, ISO 14001:2004 and OHSAS ISO 18001:2007 approvals. - Apart from switches, the company also



				manufactures ducts, transformers, lighting solutions like CFL.
4	Elmeco India	Thane, Mumbai, Maharashtra	Micro, Toggle, Trigger, Slider & Door Switches, Pilot Lamp, Push Button, Terminal Block	<ul style="list-style-type: none"> - Started as manufacturing Electrical switches and ventured in the electronic switches. - Largely caters to industrial electronic sector.
5	ELICO Limited	Hyderabad, Andhra Pradesh	Miniature Toggle, Push Button Switches	<ul style="list-style-type: none"> - Started as pH Meters manufacturing company but ventured in to professional grade switches in 1976. - Largely caters to consumer electronics & telecommunication industries. - Has been accredited with CACT, LCSO, EXACT, C-DOT, etc, making them eligible for catering to the defense sector.
6	PLA Components	Mumbai, Maharashtra	Relays, reed relays, sockets, switches	<ul style="list-style-type: none"> - Established in the year 1970

FIGURE 181: KEY SWITCH MANUFACTURERS

Details of Indian Cable Manufacturers

Sl. No.	Name of Company	Corporate office in India	Products Manufactured	Salient Aspects
1	Sterlite Technologies	Pune, Maharashtra	Optical fibers, fiber optic cables, copper telecom cables, structured data cables, power transmission Conductors, aluminum & alloy Rods	<ul style="list-style-type: none"> - Has around 4 manufacturing locations in India- 1 in Delhi, 3 in Maharashtra - Employs over 1000 employees across the 4 manufacturing plants in the country. - Caters to countries like China, Denmark, Netherlands, Russia, Saudi Arabia, UAE, UK, Americas etc.
2	Finolex Cables	Pune, Maharashtra	Co-axial Cables, Telecom Cables & power cables	<ul style="list-style-type: none"> - Started in 1956, it has transformed in a company generating USD 750 Million. - One of the leading & popular manufacturers of co-axial cables, Power & control cables. - Over the last few years they have started manufacturing Optical cables. - Cater to Power, communication & Petrochemical industry



3	Birla Ericsson	Rewa, Madhya Pradesh	Optical Cables & Power cables	<ul style="list-style-type: none"> - Part of the M.P. Birla Group of companies - Apart from cables the company manufacturers Power capacitor - Most of its plants are ISO 9001:2000 certified.
4	Vindhya Telelinks	Rewa, Madhya Pradesh	Optical Cables & Copper cables	<ul style="list-style-type: none"> - Exports are largely limited to Asia and Europe countries; However, recently they have started supplying to a few countries in South America - Cater to Medical, IT & Computer networks - Also undertakes a lot of CSR activities in education & healthcare sectors.
5	Optic Fibre Goa (A Unit of Universal Cables Ltd)	Goa, India	Optical Fibres	<ul style="list-style-type: none"> - Started in 1984 as a private company, the company became a public limited company in 1994 - Has a plant in Bhiwadi, Jaitpura in Rajasthan - Has a facility to manufacture 1.45 million Fkm per annum.
6	Aksh Optifiber	New Delhi, India	Optical Cables	<ul style="list-style-type: none"> - Has been in the manufacturing industry since the pre-independence era. - Has been awarded ISO 9002 Certification for the quality system. - Has received the following approvals – DOT, BIS, LCSO, NHPC, CAS etc.
7	Bhansali Cables	New Delhi, India	Coaxial Cables, LAN Cables, Telephone Cables	<ul style="list-style-type: none"> - Offers over 3500 high quality electronic components. - Have been credited with ISO 9001:2008 and ISO 14001:2008. - Exports to Nepal, Bhutan, Bangladesh, Dubai, South Africa
8	MDR Electronics	Mumbai, Maharashtra	Networking Cables, Coaxial Cables, Fiber Optic cables	<ul style="list-style-type: none"> - Established in 1986 for manufacturing wound components; - Currently manufacturers Degaussing coils in addition to cables & wound components - Has an R&D to develop newer ways to manufacture components
9	Vabros (I) Pvt. Ltd	New Delhi, India	Coaxial Cables, Telecom Cables	<ul style="list-style-type: none"> - Established in the year 1983 - Manufacturers of specialized, high
10	Servel India Pvt. Ltd	New Delhi, India	Cables, Power cables, Telecommunication	<ul style="list-style-type: none"> - Established in the year 1983 - Manufacturers of specialized, high



			Cables	<p>quality wires and Cables for the Electronics, Telecom, Defense, Aerospace, Communication and Instrumentation industries.</p> <ul style="list-style-type: none"> - Several products are certified for quality by national certifying agencies such as LCSO, Ministry of Defense, BEL etc.
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FIGURE 182: KEY CABLE MANUFACTURERS

Details of Indian Relay Manufacturers

Sl. No.	Name of Company	Corporate office in India	Products Manufactured	Salient Aspects
1	ERI	Bangalore, Karnataka	Solid state relays and input output modules	<ul style="list-style-type: none"> - The company started in 1979 & was largely exporting to US. - Currently, it caters to both domestic and export demand - ERI is an ISO 9001:2000 company and has a capacity of 500,000 Relays. - Leading Indian manufacturers utilize the relays for developing oil warning and Ignition Systems.
2	O/E/N India Limited	Cochin, Kerala	Relays, Switches, Potentiometers	<ul style="list-style-type: none"> - Established in 1968, O/E/N is the market leader for Electromechanical Components - Has two plants namely in Cochin & Bangalore - Has been certified with ISO 9001: 2000 - Caters to Communications, Automotive, and Strategic Industrial Controls segments.
3	Satronix (India) Pvt. Ltd	Pune, Maharashtra	Solid state relays	<ul style="list-style-type: none"> - Established in 1985, is one of the leading manufacturer of power electronics Automation products. - Has over 200 OEMs as Clients. - State of art facility located at MIDC Pune - Largely caters to Indian defense organizations and scientific research projects.
4	CII Guardian International Ltd.	Cochin, Kerala	Hermetic Sealed Relays, Grid relays	<ul style="list-style-type: none"> - Established in 1995 - It is a joint venture of M/s. Guardian Controls Limited, Cochin and M/s. Communications Instruments Incorporated, USA.



				<ul style="list-style-type: none"> - ISO 9001:2008 certified by Intertek Systems Certification - Products serve a diverse market including communications, aerospace, medical, industrial, commercial and general purpose applications
5	BG LI-IN Electricals Pvt. Ltd	Aurangabad, Maharashtra	Automotive relays, cng relay, electromechanical relay, power relays and flashers	<ul style="list-style-type: none"> - Established in 2000 - BG LI-IN is a joint venture between Bagla Group and LI-IN Electricals of Taiwan for manufacturing various types of Flasher and Relays. - The company is TS 16949 certified and is now aspiring for OHSAS and ISO 14001
6	C&S Electric Limited	New Delhi, India	Busducts divisions, Final power distribution components, lighting & wiring accessories division, Low Voltage panels	<ul style="list-style-type: none"> - Established in 1966 - Enters Medium Voltage business through a JV with Efatec of Portugal. - The business operations of C&S Electric are divided in the following 3 strategic business units.

FIGURE 183: KEY RELAY MANUFACTURERS

Details of Indian Fuse Manufacturers

Sl. No.	Name of Company	Corporate office in India	Products Manufactured	Salient Aspects
1	Protectron Electromech Pvt. Ltd.	Bangalore, India	Fuses and Connectors	<ul style="list-style-type: none"> - Indian Company established in 1991 - The company has UL, RoHS, LCSO Approvals and ISO 9001-2000 Certified - Caters to sectors like telecom, consumer electronics and automotive - Exports to Singapore, South America and Sri Lanka.

FIGURE 184: KEY FUSE MANUFACTURERS

Details of Indian Optical Disc Manufacturers

Sl. No.	Name of Company	Corporate office in India	Products Manufactured	Salient Aspects
1	Moser Baer	New Delhi, India	Storage media, IT peripherals, Entertainment, solar	<ul style="list-style-type: none"> - Established in 1983. The company presently operates in 82 countries. - World's second largest manufacturer of Optical storage media



				<ul style="list-style-type: none"> - Two manufacturing locations in Noida and Chennai. - ISO 9001:2000, ISO 14001:2004 and OHSAS 18001:1999 certified
2	Verbatim Marketing India Private Limited	New Delhi, India	Blank CD with AZO dye, DVD -R 16X 50 Pk Spindle, DVD R Double Layer 8.5 GB, Verbatim Rapier V1 Gaming Mouse	<ul style="list-style-type: none"> - Established in 1969, subsidiary of Verbatim Australia. - Verbatim was the first media company to receive ISO certification.

FIGURE 185: KEY OPTICAL DISC MANUFACTURERS

Details of Indian Magnets Manufacturers

Sl. No.	Name of Company	Corporate office in India	Products Manufactured	Salient Aspects
1	Mahindra Hinoday	Pune, Maharashtra	Permanent magnets, soft ferrite cores, Customized Magnetic Products	<ul style="list-style-type: none"> - Indian Company founded in 1963. - Caters largely to the automotive industry - The company also makes magnets for Industrial Applications and Customized applications. - ISO-TS16949 quality system.
2	Sonal Magnetics	Ahmadabad, Gujarat	Permanent magnets, soft ferrite cores, Customized Magnetic Products	<ul style="list-style-type: none"> - Has been servicing the Indian electronics industry for more than 10 years. - Caters to a wide variety of industries like cement, fertilizers, food processing, mining, pharmaceutical etc. - Close to 60% of products manufactured are exported worldwide. - Established a sales office in New Jersey, USA to handle the sales In North & South America
3	Permanent Magnets Limited	Silvassa, Dadra and Nagar Haveli	Alnico, NdFeb and ferrite magnets	<ul style="list-style-type: none"> - Started operation in 1963 in collaboration with Centro Magneti Permanentni of Italy - ISO: 9001:2000 certified company. - Most of the customers are OEMs in key industry sectors such as automobile industries,



				telecommunication, defense, space research, aeronautics
4	Cosmo Ferrites Limited	New Delhi, India	Manganese Zinc Ferrite Components (EE, EC, ETD, EER, EI, EFC, UU, TOROIDS, EP, RM, PQ, Pot, Planar, PTS, I Bar, EFF, EVD and EED), Pre-Calcined Ferrite Powder	<ul style="list-style-type: none">- Company was established in the year 1986- ISO 9001:2000 Certified- More than 70% of production is exported to U.S.A., Western Europe and Far East
5	S V K Electronics Pvt. Ltd	Bahadurgarh, Haryana	Soft Ferrite, Hard Ferrite, Impeder Ferrite, Power Ferrite, Iron Dust Cores, Rare Earth Magnets	<ul style="list-style-type: none">- ISO: 9001-2000 ANAB 14000-2004 certified company.- Products manufacturing and exporting of electronic components, EMI/ EMC ferrite, istorpic magnets, chokes, rubber magnets, rare earth magnets.

FIGURE 186: KEY MAGNET MANUFACTURERS