



*Let noble thoughts come to us from every side*  
*Rig Veda*

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## About the Issue


The electronics industry which emerged in the 20th century has become a global industry worth billions of dollars with products ranging from simple consumer products to highly complicated devices. The field of electronics is now a meta resource that can be converged with a wide spectrum of applications. Electronics items are no more than just a product for direct consumption but are 'enabler' for improving the productivity and efficiency of other manufacturing sectors. The industry has the potential of creating enormous employment opportunities and helps in the spread of education and health care through ICT to both rural and urban areas as well as implementing e-Governance. Its growth has direct impact on the socio-economic development of the country and determining its competitiveness.



India is one of the largest consumers of electronic products globally. What is needed is for both Government and industry to focus on meeting the increasing domestic demand. The huge demand from the Government sector is a key to propelling the potential of the sector. Steps like preferential access to domestic manufacturers, which will span domestic innovation, creation of Brand India electronics, and create an environment fostering domestic manufacturing will position India as a design and innovation leader in the global stage.

India's domestic demand is met through imports, and therefore with the present demand projected to go up to 400 billion USD in 2020, it provides a huge opportunity for India to become an Electronics System Design Manufacture (ESDM) hub to meet both domestic and global demands. India produces just 45 percent of the demands, thus creating an import gap of USD 45 billion. The domestic production growth rate stands at 16 per cent and this rate would give India a total production of USD 104 billion creating a trade imbalance of USD 296 billion in 2020. Hence the need arises to bridge this gap. This sector is also one of the few sectors that can provide high employment and currently the target is to make USD 400 billion by employing 28 million people. This is being done by strengthening skill and manpower development. Steps have been taken to establish India as a leading global electronics system design and manufacturing, and the draft National Policy on Electronics has been formulated.

Similarly, the IT industry in India has also grown by leaps and bounds and has emerged as one of the dynamic sectors in India's economic boom. Over the last decade, the IT services industry has undergone many changes. The export revenue has grown from USD 4 billion in 1999-2000 to USD 69 billion in 2011-12. The domestic revenue has increased from USD 1.9 billion in 1999-2000 to USD 19 billion in 2011-12. The direct employment of IT-ITeS industry increased from 0.52 million in 2000-01 to 2.8 million in 2011-12. Thus this sector has great potential in meeting the human resource requirement of the industry. The National Policy on Information Technology seeks to create a pool of 10 million additional skilled manpower, provide mandatory and affordable e-government services to the common man and have a regulatory framework for secured cyberspace.

Inside, policy makers, stakeholders and experts give their insight and analyses in detail the growth, development, challenges and emerging opportunities in the ESDM and IT sector in India. 



# Strategic Importance of ESDM Sector

*J Satyanarayana*



*A Communications and Brand Building Campaign for promotion of ESDM sector in India has been launched with the objective to build “Made in India” as leading global brand in ESDM and increasing awareness regarding initiatives taken by Government to promote investments*

**T**HE ELECTRONICS industry emerged in the 20<sup>th</sup> century and has quickly become a global industry worth of billions of dollars with products ranging from simple consumer products to highly complicated aerospace ones. Over the years electronics has become a meta-resource, the building blocks of modern technology and is redefining how the world operates every day. India also has been a part of this great transformation, where electronics today has become a way of life.

The demand for electronics hardware in the country is projected to increase from USD 45 billion in 2009 to USD 400 billion by 2020 (Source: Task Force Report). This provides a huge opportunity for India to become an Electronics System Design and Manufacturing (ESDM) hub to meet the domestic as well as the global requirements. Most of India's domestic demand is presently being met through imports. This has serious economic and strategic implications for the country. Every country is unique. India's uniqueness is about diversity but at the same time, masses have

similar kind of expectations from consumer products, more so from consumer durables, particularly electronic products. Under such a dynamic environment ESDM is set to be the area of interest for India in the years to come.

## **Importance of the ESDM Sector in the Indian Context**

### **Trade Imbalance**

During the last few years India has been the centre of a strong economic growth. With trade barriers lightened and rapid improvements in infrastructure and technology the Indian consumer had global products at his finger tips. While India strived ahead in the Hi-Tech service sector, there was a gap in the Hi-Tech manufacturing, specifically in the electronics area. As a result of which India had to rely on heavy imports to meet the consumer demands. If we look at the current figures, India produces just about 45 percent of the demands (Source: Task Force Report) creating an export import gap of around USD 45 billion. Estimates show that the demand for electronic goods will grow at a CAGR of around 22 percent and reach a figure of USD 400

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billion in year 2020. As of now, the domestic production growth rate stands at 16 percent and holding on to this growth rate would give India a total production of USD 104 billion creating a trade imbalance of USD 296 billion in the year 2020 (Source: Task Force Report). Looking at these figures we do need to start taking proactive steps to bridge this huge gap and make sure that ESDM sector contributes to India's FOREX reserves rather than depend on it to meet the import obligations.

### ***Employment Generation***

The electronics manufacturing sector is one of the very few sectors that can provide high employments across all education levels. This gives a positive thrust to the overall socio economic condition in India. According to the Skill Gap Analysis Report, the electronics industry has the potential to employ around 3.2 million people by the year 2022 if we are able to hold on to the current electronics production growth rate of around 16 percent (Source: Skill Gap Analysis Report). This can reach a figure as high as 28 million if we are able to provide sufficient impetus to this sector.

### ***Intellectual Property***

Over the last decade or so, India has become the intellectual powerhouse in the hi-tech service industry. However India could never lay a right to this intellectual excellence since most of the organizations where innovations took place were based out of a foreign soil having operations in India. This has caused a significant loss in terms of the total value creation to an extent of 90 percent (Source: Task Force Report). In

such a scenario, re-usability of the Intellectual Property created does not always benefit the Indian Industry. Indian software industry is a fitting example of the loss of Intellectual Property. While Indian software companies have done wonders in Information Technology field but it could rarely hold on to the Intellectual Property generated because most of the deliverables were fully owned by their clients. ESDM sector provides India to take a corrective and holistic view to address this problem. With a well defined roadmap and policy level interventions to encourage companies to have the Intellectual Property to reside in India, we should be able to stake claim on the entire value created, rather than the approximate 10 percent that we do now.

### ***Sectors of national importance***

As we move forward in this decade, major investments are expected in 3 major areas of strategic importance to India; Defense, Avionics and Nuclear sector. Estimates state that India is going to be the 3<sup>rd</sup> largest market for defense equipment by the year 2015 (the total market size would be around 325 billion, Source: Task Force Report). With technology becoming the heart of modern warfare and overall security apparatus, ESDM becomes the indispensable area of focus. We are seeing a visible thrust on indigenous defense equipment development to reduce our reliance on imports as well as remove the bottlenecks of foreign technology transfers.

In the recent years we have seen a surge of demand for aircrafts in India, China and Russia. It is expected the combined demand of

these three countries would account for 15 percent of the total demand of this industry. (Source: Task Force Report). Visibly avionics, a highly electronics dependent sector, would be the next vital area where ESDM sector of India can play a defining role. Creating a strong base of OEM's or of parts and subsystem manufacturers to supply Tier I OEMS's would help in creating a niche for India in the avionics field. The effects of this could be far reaching, starting from creating a strong Intellectual Property base to driving healthy exports.

Over the last decade there has been a worldwide consensus to look for greener alternatives to generate energy and India as a country cannot ignore such a mandate. This has given a great boost to the Nuclear power (considered one of the cleanest source of energy) in India. With a formal worldwide recognition and endorsement, India's nuclear power is expected to contribute 25 percent to 50 percent of power generated by 2050, a massive leap from the current 3 percent (Source: Task Force Report). This opens new fronts for the ESDM here, where they can contribute a sizeable portion of the power plant equipment costs. On one side this will significantly lower the costs of the nuclear plant setup, reduce dependency on imports and on the other side will create an invaluable knowledge repository and expertise for exports in the future.

### ***Government's initiatives in meeting the challenges***

The Government attaches high priority to electronics hardware manufacturing and has taken a number of steps for promotion

of this industry. The vision is to establish India as a leading global destination for electronics system design and manufacturing (ESDM). The Government is aiming to meet all the domestic demands of electronic sector and gather surplus for exports by the year 2020. Following are some of the initiative highlights.

### ***NPE (National Policy on Electronics)***

The draft National Policy on Electronics was released by Hon'ble Minister of Communications and Information Technology in October 2011. The Policy has been finalized after widespread consultations and it is expected to be approved shortly. Parts of the policies such EMC (Electronics Manufacturing Clusters) and M-SIPS (Modified Special Incentive Package) has already been approved in principle. The Policy will provide a clear road map for the development of electronics sector in the country for the coming decade.

### ***Creating opportunities...***

As part of the vision to make India a leading destination for the ESDM sector, the draft National Policy on Electronics (NPE) proposes to achieve a domestic production of about USD 400 Billion by 2020 in the ESDM sector by creating an industry friendly policy framework and ecosystem which provides a level playing field for the domestic industry. This will involve investment of about USD 100 Billion and provide employment to around 28 million by 2020. This inter-alia includes achieving a turnover of USD 55 Billion of chip design and embedded software industry and

USD 80 Billion of exports in the sector. Moreover, the policy also proposes setting up of over 200 Electronic Manufacturing clusters. The draft NPE also proposes to set up two semiconductor wafer manufacturing facilities and to create and sustain a vibrant research and development and innovation eco-system in the ESDM sector. Another important objective of the policy is to significantly upscale high-end human resource creation to 2500 PhDs annually by 2020 in the sector. The renaming of the Department, and bringing back of electronics with IT, is reaffirmation of the thrust that this sector deserves.

### ***Setting up Semiconductor Wafer Fabs***

An Empowered Committee (EC) has been set up for identifying technology and investors for setting up two Semiconductor Wafer Fabrication (Fab) Manufacturing facilities after obtaining approval of Cabinet in its meeting held on 20<sup>th</sup> April 2011. The EC after interacting with the potential investors will crystallize the nature and quantum of Government support in physical/ financial terms and recommend to the Government the course of action to attract investments in the sector. The Expression of Interest (EOI) was sought through advertisement in leading global and national dailies and websites during June-July, 2011.

### ***Preference to Domestically Manufactured Electronic Goods***

Vide Gazette Notification dated 10<sup>th</sup> February, 2012, the Government has laid down the policy for providing preference to domestically manufactured electronic products, in procurement

of those electronic products which have security implications for the country and in Government procurement not with a view to commercial resale or with a view to use in the production of goods for commercial sale. The policy is expected to strengthen the cyber security ecosystem in the country as well as provide a boost to the domestic manufacturing.

### ***Electronics Manufacturing Clusters***

The importance of clusters in ESDM is a well accepted phenomenon worldwide. A well developed cluster can give a unit located in it a cost advantage of 5 to 8 percent because of various reasons such as increased supply chain responsiveness, consolidation of suppliers, decreased time-to-market, superior access to talent and lower logistics costs. Setting up of EMCs is an integral part of this strategy to make India a leading destination for the ESDM sector.

The Union Cabinet in its meeting held on July 4, 2012 approved the proposal to offer financial support for the development of Electronics Manufacturing Clusters (EMCs) as these EMCs would aid the growth of the ESDM sector. In this regard a notification was issued on July 21, 2012 in all leading newspapers of India and the ESDM department has already started getting enquiries from the domestic and international players.

The proposed EMCs scheme would support setting up of both Greenfield and Brownfield EMCs.

The policy covers all States and districts and provides them an opportunity to attract investments in electronics manufacturing.

## **Modified Special Incentive Package Scheme**

The Union Cabinet on 12th July, 2012 approved the proposal to provide a special incentive package to promote large-scale manufacturing in the ESDM sector. The scheme is called the Modified Special Incentive Package Scheme (M-SIPS). The main features of M-SIPS are as follows:

The scheme provides subsidy for investments in capital expenditure - 20 percent for investments in SEZs and 25 percent in non-SEZs. It also provides for reimbursement of CVD/excise for capital equipment for the non-SEZ units. For high technology and high capital investment units, like fabs, reimbursement of central taxes and duties is also provided. The incentives are available for investments made in a project within a period of 10 years from the date of approval.

The incentives are available for 29 categories of electronic products and product components including semiconductor chips and chip components. The scheme also provides incentives for relocation of units from abroad.

The scheme is open for three years from notification. Approvals for incentives not exceeding Rs. 10,000 crores will be granted during the XII Plan period. The projects with incentives of Rs 10,000 crores have potential to create employment for nearly 0.5 million persons.

The policy is expected to create an indigenous manufacturing ecosystem for electronics in the country. It will foster the manufacturing of indigenously designed and

manufactured chips creating a more cyber secure ecosystem in the country.

## **Developing Human Resource**

The projected requirement to reach the target of USD 400 billion is 28 million people. Several initiatives have been taken up to meet this challenge. Sector Skill Council has been set up for Electronics and that for Telecom sector is in pipeline. The Department will work closely with these Sector Skill Councils to help them develop necessary competency framework for the myriad of skills required by this multi-faceted sector.

The Department is also strengthening capacities in NIELIT (formerly known as DOEACC) and CDAC to train larger number of students in electronics design and production technology.

The Department is in the process of extending and expanding the Special Manpower Development Programme for VLSI and chip design. The Phase II of the programme which covered 32 institutions and generated 5400 BTech/MTech and PhDs in the high tech segment is ending in March 2013. Phase-III of the programme will encompass chip to system design and will cover approximately 50 institutions and target around 10,000 students including 300 PhDs.

## **Standards**

Unlike most countries of the world India lacked a system of standardization of electronic products. This resulted in the unregulated inflow of sub-standard and unsafe electronic goods which pose safety hazard. The Department,

in consultation with Bureau of Indian Standards, industry and consumer groups is working on a standardization regime.

## **Initiatives in Pipeline**

Apart from the above, Electronic Development Fund (EDF) is another major initiative. The EDF would provide risk capital for taking up new product development and generating IPR in the sector. The draft Detailed Project Report (DPR) for setting up of EDF has been finalized after extensive stakeholder consultations and process for obtaining requisite approvals is underway.

## **Communication and Marketing**

Government of India is also making a concerted effort to market the policies and India as a destination for investment in ESDM. Initial work in this regard has already commenced.

A meeting of Chief Ministers and Ministers concerned of the States was organized on August 29, 2011 to highlight the importance of ESDM sector in India and role which the States can play in this sector by emphasizing the importance of the role of the State Governments in the promotion of ESDM industry in the country by developing attractive policies for attracting the investment to their respective states.

A Communications and Brand Building Campaign for promotion of ESDM sector in India has been launched with the objective to build "Made in India" as leading global brand in ESDM and increasing awareness regarding initiatives taken by Government to promote investments in ESDM

sector. As a part of the Campaign, State level workshops, specific verticals related Workshops and outreach activities in academia pertaining to ESDM are being promoted. A Communications Need Assessment Study to help orchestrate the Campaign is also underway.

An e-Newsletter relating to ESDM has also been launched with the objective of keeping the ESDM stakeholder community better informed about the policy initiatives, decisions and actions of the Government in the sector.

### **Strengthening of the Electronics Governance Structure**

There are over 50 major strategies which have been outlined in the draft National

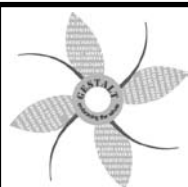
Policy on Electronics. The existing governance structure in the Department will be strengthened so that the desired focus on the sector can be provided in an ongoing manner. A Project Management Unit has been created and further strengthening will be taken up in due course.

### **Conclusion**

The last few months have been very exciting for the ESDM unit of DeitY. Large milestones have been achieved in terms of the NPE, approval of EMC's and MSIPS. The government is following a well thought out road map by which electronic manufacturing becomes the biggest driver of growth for India. Thrust would be to drive investments, innovations and create huge employment opportunity, but not at the cost

of environment or Intellectual Property.

In the recent years companies have started looking at a "China plus one" option to reduce dependency of manufacturing on one country and distribute the risks across Asia. Vietnam has been one of the favoured nations in such a case due to its friendly policies. The NPE is one big step to capitalize on the "China plus one" strategy of companies. India is already recognized as a strong design hub for electronics but our efforts are to drive India into an ESDM powerhouse. This is not about low end technology but how innovative ways and high end technology could be used to produce goods that bring down the price point. Thus we need to be excited about the opportunity. □



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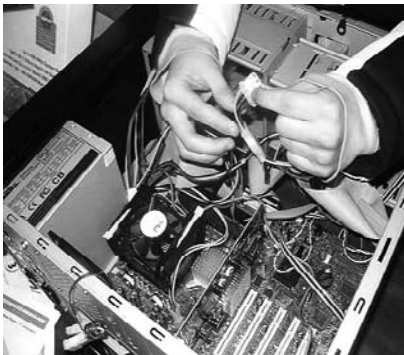
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# Design Innovations hold the future of Manufacturing in India

*Ajai Chowdhry*



***Our success in IT/ITeS will never be complete and will not touch the lives of masses without commensurate growth of the electronics sector***

**T**HE DOMESTIC ICT and electronics manufacturing industry is at the cusp of huge growth opportunities. While, the global Electronics Industry is one of the fastest growing in the world, the demand in the Indian market is expected to touch USD 400 Billion by 2020. Being the world's second most populous country coupled with robust growth, India is and will continue to remain one of the largest consumers of electronics products globally.

'Manufacturing' has been recognized as the main engine for economic growth as per the Eleventh Five Year Plan of the Information Technology sector. However, the share of ICT & electronics hardware manufacturing has been stagnating at a low 17 percent of GDP for over two decades now. With an aim of taking this to around 25 percent by 2025, as per the draft National Manufacturing Policy, Government and industry focus needs to be further sharpened to augment growth in this industry.

However, there exist many challenges in making this industry truly attain its potential. These include the inadequate infrastructure, limited focus on value addition and exports, changing tax structure, limited focus on R&D and availability of funding mechanisms. Domestic consumption will continue to surge and the gap between demand and supply will only widen if domestic production which is at present less than 45 percent of domestic consumption does not catch up.

The Industry and Government together need to ensure that we do not lose this opportunity to countries in South East Asia. Initially, manufacturing moved from the USA to Japan, to Taiwan and then to China. China in electronics manufacturing has taken the leadership position. In the last few years the cost of manufacturing has gone up in China due to new labour laws, currency correction etc. In addition, all global companies have been looking at a China +1 strategy. As a result many countries have moved fast to get the manufacturing to move

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The author is Founder, HCL and Chairman, Task Force on Stimulating Growth in IT, ITES and Electronic Hardware Manufacturing.

to them – e.g. Vietnam, Thailand, Indonesia. And India still continues to struggle with extremely low domestic production. I see this as a huge opportunity for India to create value and catch up with countries like China etc.

As we all know India has been very successful in IT/ITES exports, but momentum alone does not define leadership. We must build on this initial success with next level of aggressive growth in other domains of technology including electronics hardware systems and design. India needs to leverage her vast market size and identify market mechanisms and policy interventions for increasing her dominance in the key verticals of IT hardware systems, telecom, consumer electronics, defence and strategic electronics.

Furthermore, India presents a large market opportunity in electronics by its sheer size. In the year 2009 domestic production of electronics in India was \$ 20 bn. whereas the import bill was \$ 45 bn. By 2014 the import of electronics products will reach \$ 125 bn. whereas domestic production at current CAGR will remain at \$ 42 bn. The demand for electronic products will reach \$ 400 bn. by 2020 whereas domestic production at current CAGR will remain at \$ 104 bn. This will lead to a huge deficit in balance of trade. By 2015, India's consumer market is bound to emerge as world's 8th largest and eventually escalate to the 5th position in 2025. This implies an increase in aggregate private consumption from US\$ 370 billion in 2005, to US\$ 746 billion by 2015 and US\$ 1521 by 2025 (McKinsey Global Institute Report). Middle

class population will swell to 583 million in 2025 comprising 41 percent of total population calling for India Centric Products and aligning resources to address the bottom of the pyramid.

This large domestic market makes it essential that we draw investments into India. If we look at our needs in education, government social sector projects, UID, telecom and strategic sectors like defence/space/atomic energy, we also have specific needs to design and manufacture products. This also needs to be exploited as an opportunity. For our country we also need to define our own standards so that we can encourage domestic design and manufacturing. It is also imperative to bring a favourable policy environment to promote domestic manufacturing of electronics.

A government initiative of national importance that can unleash the innovation potential of domestic design and manufacturing is the UIDAI's initiative - Aadhar. With Aadhar, the Government of India has set for itself the mammoth task of creating a national database of citizen information based on 12 parameters of demographic and biometric data, where technology innovations have to play a pivotal role. UID will provide over a billion citizens with a unique digital identity. It is aimed at ensuring inclusive growth, reforming delivery of government benefit schemes, improving delivery of public services like the MG-NREGA, financial inclusion by reaching the unbanked, effective governance, negate security threats as well as avail a multitude of services across the country.

With the UID project, concepts like micro ATM can also be a big thrust in banking the unbanked. Government demand for micro ATMs and hand-held devices for financial inclusion will only further strengthen the innovation climate in India. With a target of issuing Aadhar numbers to 600 million by 2014, the UID programme holds huge promise and challenge for the domestic manufacturers to contribute in the success of this project with locally designed devices and technologies.

With tablets making it to the mainstream, we have another challenge at hand. The Project Aakash is a fantastic move by the Government, I call it a challenge thrown at the manufacturing industry to achieve a price point with the specification that the Government has in mind. I have always stood by 'Access for All' to be made a fundamental right. I firmly believe that any step taken in the direction to democratize access needs to be supported. Aakash too is a revolutionary concept and today needs design innovation with quality to lead the way. Whether the industry is able to meet this requirement or not will unravel with the passage of time. But what is important to note is that concepts such as Aakash backed by a huge domestic demand prompt an evolution of innovative ideas. Remember how the OLPC (One laptop per child) project gave rise to a similar scenario which gave a huge impetus to the netbook category.

Expansion in demand for set top boxes and smart meters are other such examples where government demand has led to increased focus

and innovation across sectors. With Government announcing that India needs atleast 100 million smart electricity meters, and entrusting the Smart Meter Task Force with the task of introducing low cost electricity meters, there lays a huge growth opportunity for the domestic manufacturing. The biggest achievement of domestic players will be to enable inclusive growth by developing designs and disruptive technologies locally at good quality and low costs to help such services reach out to the masses.

This industry is also a huge employment generator. It is also estimated that 16.1 mn people could be directly employed by the industry by 2014 and this could go up to 28mn by 2020. This makes it even more imperative for the government and industry to focus on proactively creating skills for this area.

India is going through a phase that will be one of the most exciting in this century and we are well-positioned to becoming a manufacturing and product servicing hub of the world. The industry is poised to ride the wave of domestic demand for electronic products. Developing core areas of design and application development will only help catapult the Indian Electronics and Manufacturing industry towards greater innovation in local and global markets.

The electronics industry has a high potential for domestic value addition and creation, in segments like semiconductor design and electronics system/product design. Semiconductors represent the convergence of many devices, systems and technologies and are

widely recognized as technology enablers for the entire electronics value chain. This has become pivotal in giving the domestic industry a competitive edge.

On a larger plane, as described earlier, this sector has a key role cut out in terms of the key support for Government's e-governance projects, inclusive growth process that involves the youth of India, and delivery of social goods such as education and healthcare. Importantly, the importance of ICTE manufacturing capabilities in relation to the country's strategic and defence needs can hardly be overstated.

In fact recently, I also had the opportunity to chair a Task Force set up by the Government in 2009 which created a series of recommendations and finally five were taken up by the government for implementation. The key recommendations of the Task Force that cut across all the verticals are:

- Ensuring a favourable business policy and regulatory environment;
- Building adequate basic, business and social infrastructure;
- Harnessing technology for inclusive growth by driving greater efficiency, transparency and monitoring of employment and livelihood related projects, e-governance projects and developmental projects;
- Fostering a sustainable ecosystem for innovation, R&D and manufacturing;
- Catalysing growth in domestic market;

- Investing in education and skill development to create a pool of high calibre talent so as to sustain India's competitive advantage;
- Allowing access to funds for investments in R&D, Innovation and Brand India; and
- Encouraging 'Made for India' designs, solutions and devices, local value addition and IP creation especially for developmental schemes, defence and strategic needs.

The Task Force's salient sector-specific recommendations were as follows:

#### **Software & Services**

- Establishing India as a trusted global hub for professional services - managing risks effectively
- Global trade development and actively advocating free trade in services, including the free global movement of service providers
- Maintaining a globally competitive tax regime – extend Section 10A/10B and provide parity with SEZ scheme. Ensure incentives under Section 10A/10 B and SEZ continue after the direct tax code is introduced.

#### **Electronics System Design & Manufacturing**

- Establishing a 'National Electronics Mission' – a nodal agency for the electronics industry within DIT and with direct interface to the Prime Minister's Office (PMO). The nodal agency would help in the synchronized functioning of



the industry through effective coordination across ministries and government departments in the centre and the states and would enhance the ease of doing business.

- Nurturing established electronics manufacturing clusters and develop them into centres of excellence, while encouraging new ones.

### **Strategic Electronics**

- Focusing on technology areas that need to be developed domestically as they are unlikely to be transferred by global players
- Identifying and providing support in areas where the private sector can collaborate and provide superior execution capabilities to Defence Public Sector Units (DPSUs) such as fabrication

Accelerating process by which private sector and indigenous participation happens. Initiate implementing the key recommendations from the Kelkar Committee Report.

I have for decades stood beside the need for a greater focus on design and manufacturing and I am delighted to see the key five points recommended by the industry making its way to the policy. The recommendations taken up by the government for implementation include -

#### **National Electronics Mission:**

To set up a National Electronics Mission with industry participation to evolve programmes in pursuit of the laid down policies and also to create institutional mechanisms to advance the implementation of various programmes aimed

at achieving the objectives enumerated in the national electronic hardware policy and to promote India as an Electronics Hardware Manufacturing Hub and suitably market “Brand India” in Electronics.

#### **Preferential market access:**

Preference for “Manufactured-in-India Electronic Products” / “Indian Electronic Products” for all Government Procurements and Procurement by Government Licensees except Defence procurement

#### **Modified SIPS/Electronic manufacturing clusters and standards:**

Encourage manufacture of specific high priority electronic product lines in India including standards to regulate manufacture in India and import of the sub-standard goods, Modified Special Incentive Package Scheme (SIPS-II) and creation of Electronics Manufacturing Clusters.

#### **Semi Conductor Fab:**

To facilitate setting up of two Semiconductor Wafer Fab facilities and its ecosystem for design and fabrication of chips and chip components.

#### **Electronic Development Fund:**

To create an electronic development fund for promoting the development of the electronics sector: This Electronic Development Fund will promote Innovation and IP and R&D, commercialization of products, etc. in the ESDM, nano electronics and IT sectors by providing appropriate funding/incentives to Industry/Academic/R&D institutions.

The Electronic industry today is at an inflexion point, a place where IT Services industry was

over two decades ago. A strong and sustainable eco-system of focused innovation and R&D, skilled designers and engineers to add to India’s talent pool, building basic and social infrastructure including well equipped manufacturing hubs as centers of excellence, quality standards, regulatory and sustainable Industry support including support to domestic companies setting up manufacturing units in India is critical for success. With industry working together with government, we will certainly be able to create the impetus in this important segment and establish India as an IT hardware hub in the near future.

In conclusion, I strongly believe that if we do not take decisive steps today, we may miss this bus forever. In addition to opportunity cost of potential loss to the GDP and employment, there is a huge strategic risk of dependence on our competitor-nations for this high tech and vital sector. Our success in IT/ITES will never be complete and will not touch the lives of masses without commensurate growth of the electronics sector. Given the right impetus, the scale and the unique requirements of this market, India can even make it very attractive for foreign players to invest in the Indian Electronics System Design and Manufacturing Industry. Moreover, with Government demand rising through projects like Aadhar, Financial Inclusion, and Aakash and steps like preferential access to domestic manufacturers, we will not just be able to spur domestic innovation but position India as a design and innovation leader on the global stage. □

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# IT in India

*Sowmyanarayanan Sadagopan*



***Although India has had significant success in IT services, it has yet to strike gold with IT products and intellectual property***

**I**T IN India has come a long way since it first appeared in the 1980s, when US technology companies started leveraging the cost arbitrage between US and Indian programmers. The liberalization of certain economic policies that started in 1991 led to the birth of innovative companies, such as Infosys and Wipro. These companies used the “quality route” to grow their business—Indian IT companies followed the five levels of the Software Engineering Institute’s certification more than any other country, including US.

The arrival of the Internet and imaginative government policies, such as fast and easy access to international data circuits and tax benefits through Software Technology Parks of India (STPI), led to further growth. Then, by the turn of the century, the IT industry started focusing on what I refer to as EQQ—English language skills for engineers and higher quantities of quality engineers. EQQ gave India an advantage over Ireland (which had fewer programmers), China (which lacked engineers proficient in English), and

the Philippines (which lacked qualified programmers). The Y2K phenomenon that led to a global shortage of programmers propelled Indian IT companies into a position of global leadership. By the middle of the last decade, Indian IT had arrived.

## **Achievements**

India’s IT industry is growing steadily. Indian IT companies have reached the global stage and are undertaking interesting IT projects.

## **Employment and Education**

The IT sector has created jobs for 2.8 million IT professionals (and has indirectly employed an additional 8.9 million. The rapid growth of engineering education, with more than 500,000 undergraduate IT engineers graduating per year, feeds into this steadily growing IT industry.

## **Business Growth**

For the 2012 financial year (which ended March 2012), annual business crossed US\$100 billion in sales revenue, with IT contributing to 7.5 percent of India’s GDP. Furthermore, India

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had 58 percent of the “global IT services” outsourcing revenue. Indian IT services account for 25 percent of its exports.

Most Fortune 500 companies outsource some of their work to Indian IT companies, and many (almost all in the top 100) operate either directly or indirectly in India.

The IT company Tata Consultancy Services reached \$10 billion in annual revenue by March 2012, with a healthy bottomline (22 percent). Another company, Infosys (with \$7 billion in annual revenue), created the “ACM Infosys Foundation Award for Computing Science” in 2007 to celebrate 25 years of service ([awards.acm.org](http://awards.acm.org)). Fortune magazine recently named Infosys founder NR Narayana Murthy, who is known for his unique way of combining capitalism and socialism, as one of the 12 greatest entrepreneurs of our time.

### **E-Governance**

Over the past five years, India has spent billions of dollars on its e-governance project—one of the largest e-governance projects in the world ([negp.gov.in](http://negp.gov.in)).

### **Moving Up the Value Chain**

Although India has had significant success in IT services (including business-process outsourcing), it has yet to strike gold with IT products (hardware and software) and intellectual property (IP). There are just a handful of success stories, one of which is the Finacle software suite from Infosys.

Finacle addresses the core banking, e-banking, treasury, wealth management, and customer

relationship-management needs of retail, corporate, and universal bank customers (including Islamic banking). Finacle is currently used by 148 banks spread across 75 countries with nearly 400 million accounts and 300 million customers ([www.infosys.com/finacle](http://www.infosys.com/finacle)). Gartner has placed it in the “Leaders Quadrant” of its “Magic Quadrant for International Retail Core Banking.”

Ittiam Systems offers another success story. It creates IP in the digital signal processing (DSP) area for video communications, automotive in fotonics, networking, and media (see [www.ittiam.com](http://www.ittiam.com)). It has been in business for 10 years and its current revenue is \$20 million—37 percent of which is generated through IP licensing. Such a revenue model isn’t common in many Indian companies. For the last seven years, Forward Concepts ([www.fwdconcepts.com](http://www.fwdconcepts.com)) has named Ittiam Systems the “World’s Most Preferred DSP IP Supplier.”

Indian IT companies must “move up the value chain” in the years to come. Possible strategies might include.

- producing focused products for either the domestic sector, specific markets (say, emerging or African markets), or global markets;
- developing technology in emerging areas (next-generation networking protocols, for example); and
- creating IP in areas where Indian IT companies have strength or for local markets.

The consumption of IT within

India must improve too. In addition to surging exports, IT

should improve efficiencies within the Indian industry. Although a lot has yet to be achieved, India successfully transformed its banking through widespread IT adoption. Thanks to the Reserve Bank’s constant push for technology upgrades in the banks, the banking sector saw core banking, ATM, and multichannel banking implemented across all the banks. Efforts are ongoing to get those citizens who aren’t covered by banking (a significant portion of India’s population) covered through “no frill,” inclusive, or mobile banking.

### **IT: India’s Tomorrow**

Former Indian Prime Minister Atal Bihari Vajpayee once described IT as “India’s tomorrow.” With the convergence of computing, communications, and electronics, the scope of IT is changing, as are key industries, such as

- transportation (road, rail, air, sea, and urban transport);
- financial services (banking, insurance, and stock trading);
- hospitality (hotels, restaurants, and tourism);
- automotive and aerospace;
- core industries (oil, gas, steel, and mining);
- services (education and healthcare); and
- retail.

Areas such as industrial automation and medical electronics are embracing open standards and starting to use commodity hardware. Leading companies in those domains—such as ABB and Siemens—could soon become “IT companies.” Indian IT is



thus likely to enjoy steady and sustained growth for at least another decade.

### **Roadblocks to Continued Growth**

However, the Indian IT industry must overcome some roadblocks to maintain its current rate of growth.

### **Anti-Outsourcing Sentiment**

Increasingly, global markets (including in the US) are trying to prevent outsourcing—particularly to “low cost” destinations like India.

### **Employment Changes**

India has seen higher internal costs (mostly wages), reduced productivity, and unionism among its IT employees. The Indian IT industry has had double-digit wage increases for many years, whereas wage increases have been considerably lower elsewhere. For example, the 2012 projected salary increase for India is 12 percent, whereas it's 9.5 percent for China and 7 percent for the Philippines.

### **Education**

Universities haven't been able to graduate large numbers of high quality professionals to take up jobs in the IT industry. There's an acute shortage of faculty in higher education due to much smaller enrolment in graduate studies compared to undergraduate degrees. In addition, faculty compensation is insufficient. However, things are improving with the start of new Institutes of Information Technology (IITs), Central Universities (including “Innovation Universities,” which focus on new technology and inter/cross-disciplinary research in emerging areas), and capacity

increases in existing institutions—along with the recommendations of the Sixth Pay Commission in 2010.

### **New Business Models**

India must address disruptions in business models. For example, new applications are fundamentally changing how software is produced (in very small groups or by just a single person), delivered (over the “cloud”), and consumed (using appliances like smart phones).

### **Key Projects and Emerging Companies**

Here, I look at some key IT projects and emerging IT companies in India. (For a brief discussion of how I selected these particular projects, see Box.)

#### **Aadhar**

Project Aadhar, which started in 2009 and is one of the most ambitious IT projects in the world, aims to provide a unique ID to every citizen (<http://uidai.gov.in>). By 2014, using a combination

of biometric measures, Aadhar aims to identify every Indian and accept or reject identity claims within a few seconds—for the 1.2 billion Indians spread out across the country.

#### **Flipkart**

In 2007, two IIT graduates, Sachin and Binny Bansal, started Flipkart, an Indian e-commerce store ([www.flipkart.com](http://www.flipkart.com)). It's current annual revenue is almost \$100 million, and it's expected to grow to \$1 billion by 2015. Flipkart focuses on

- ease of use;
- variety (books, stationery, and recently digital rights management (DRM)-free digital music);
- low prices (books are often sent with no shipping charges); and
- timely delivery.

Flipkart also address the unusual Indian needs of “cash on delivery” (most of the adult Indian

#### **Project Selection**

There are many potential companies to choose from, but I ultimately selected these four for a variety of reasons. They were featured at a couple of events (including a panel discussion at Stanford University) and have won awards. They've also reached a scale to make a societal impact—Aadhar will affect the entire Indian population, Flip Kart could make billions of dollars in the next few years, Red Bus has reached hundreds of operators, and Tutor Vista has thousands of tutors.

They represent novel applications—not just another browser, Tablet, or smart phone—and they help reach unique audiences. For example, Flip kart reaches those without credit cards or who prefer cash on delivery, and Red Bus helps those in rural India. Also, they relate to daily activities: shopping, transportation, and education.

Finally, I've been closely watching these companies. My colleagues and I use Flip Kart services; Red Bus had recruited some of our former students—some of whom were its very first set of proud employees; and Tutor Vista was incubated at the Indian Institute of Information Technology, Bangalore.

population doesn't use credit cards) and "credit-card swipe on delivery" (for the younger generation, which uses credit cards but doesn't trust online Internet commerce).

### RedBus

RedBus provides Internet-based ticketing solutions for small and often unorganized bus operators across the country ([www.redbus.in](http://www.redbus.in)). Founded by Phanindra Sama, Charan Padmaraju, and Sudhakar Parapuneni—IT professionals from three different parts of India—RedBus currently helps more than 350 operators driving more than 4,500 routes. Millions of RedBus customers can go to any of the 4,500 outlets to buy a ticket, from anywhere to anywhere.

Over the last three years, RedBus revenues were 5 million, 50 million, and 1 billion rupees, respectively, and it currently has almost 500 employees. In March, Fast Company named it

one of the 50 most innovative companies ([www.fastcompany.com/most-innovativecompanies/2012/redbus](http://www.fastcompany.com/most-innovativecompanies/2012/redbus)). Using an unusual model of offering its bus operators the same commission whether they sell 100 or 1,000 tickets has helped RedBus quickly win over the large number of operators who are new not only to Net-based service but also to the "organized sector."

### TutorVista

TutorVista, a leading online education company ([www.tutorvista.com](http://www.tutorvista.com)), was incubated at the Indian Institute of Information Technology, Bangalore. Its founder, serial entrepreneur Krishnan Ganesh, bet on the Internet in 2005 to help high school students in the US with online tutoring. His unique selling proposition was to offer quality teachers at an affordable price.

Pearson acquired TutorVista in 2011, and today it has 2,000

teachers across India, the US, the UK, the United Arab Emirates, Australia, China, and South East Asia. The tutors help students in math, physics, chemistry, biology, and English and with test preparation and homework. IT in India has seen amazing growth, thanks to the liberalization of economic policies, conducive government policies, growth in higher education, and the uptake in entrepreneurship. Several countries are attempting to leverage IT for their economic development, and focusing on the key issues of education, policy support, and entrepreneurship is likely to pay rich dividends. Unless Indian education and research (on the supply side), IT companies (on the demand side), and the government and media (enablers) continue to innovate, India might not be able to sustain its current leadership position in this area. □

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## 25 percent of Babies in Nine States Underweight

In a wide swathe of nine states in Northern, Central and Eastern India where nearly half of the country's population lives, a whole generation of condemned children is currently growing up. About a quarter of the children born in these states in 2010-11 were under-weight, that is, less than 2.5 kgs in weight at the time of birth. In some states like Rajasthan, the proportion was as high as 39 percent with Jharkhand not far behind with about 36 percent children born underweight. In Madhya Pradesh and UP about 28 percent of newborns are underweight while in Bihar and Odisha about 22 percent fall in this category.

This data is contained in the voluminous results of the Annual Health Survey (AHS) conducted by the Census office in 284 districts of Assam, Bihar, Chhattisgarh, Jharkhand, Madhya Pradesh, Odisha, Rajasthan, Uttar Pradesh and Uttarakhand.

As expected, in all the surveyed states, share of underweight newborn babies is more in rural areas than in urban areas. In Jharkhand the urban rate is 32 percent compared to a rural rate of 39 percent. In Rajasthan, the urban rate of underweight newborns is 31 percent which soots up to a shocking 42 percent in rural areas. In UP, Chhattisgarh, Bihar and Assam there is hardly any notable difference between underweight rates in rural and urban areas.

In India, according to the last estimation done in the National Family and Health Survey (NFHS)-III in 2005-06, the national average for underweight newborns was 22 percent. Results of the recent AHS show that except for Chhattisgarh, all the other eight states are still above this mark, almost six years after the NFHS III. The proportion of underweight newborns is less than 5 percent in developed countries.

The main cause for underweight newborns is maternal malnutrition. This is not just restricted to the pregnancy period, according to child health experts. □

# What has Changed? India Since 1950

Partha Mukhopadhyay  
Aditi Gandhi



*A key investor concern is the rising current account deficit. This increase is driven in similar measure by the rise in gold and oil imports*

**H**OW HAS the Indian economy changed since Independence? Was there anything underlying the spurt of growth since 2002 or was it merely a flash in the pan? We argue here that the Indian economy is today private-led, far less dependent on agriculture and much more integrated into the international economy. It saves and invests much more and its workforce is more educated. Given appropriate policies, a new, higher growth path is distinctly possible.

Figure 1 plots the growth in gross domestic product (GDP). Trend growth in India till mid-1980s was flat at around 3.5 percent, for so long that it was dubbed the 'Hindu' rate of growth. This growth fluctuated considerably, in part due to the large share of weather dependent agriculture. In the mid-1980s, as initial reforms were introduced (Rodrik and Subramaniam 2005), average growth moved up to about 5.5 percent and became more stable, till about 2002-03, when it begun to accelerate. Is

this acceleration sustainable, or is the current downturn signalling a return to earlier growth levels?

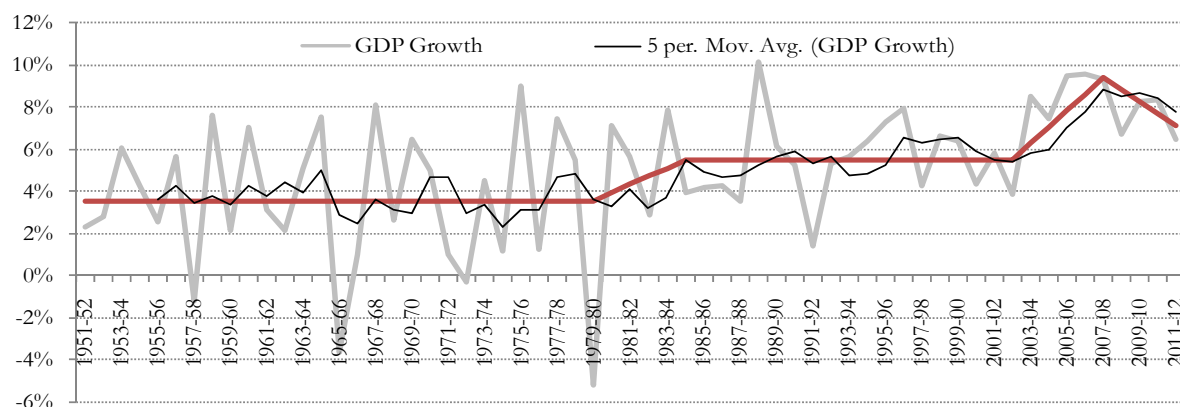
## Five Big Changes

### *Predominant Private Sector*

This is about a change that did not happen. The government has never dominated the Indian economy, but Figure 2a shows that in the first forty years, partly because of trying to secure the 'commanding heights' of the economy, its contribution rose from 8.7 percent to 21.6 percent. Since then it has remained stable, with a slight increase lately, given its recent counter-cyclical efforts. This is corroborated by the share of public sector GDP in Figure 2b. The real compositional change is the share of private investment, which we examine later. External contribution, i.e., net exports to GDP, has never been sizeable, though trade itself has become more salient (see fig). Private domestic consumption and investment continue to be the predominant components of GDP. Thus, the first big change is that the contribution of government is no longer increasing.

The authors are with the Centre for Policy Research, New Delhi.



**Figure 1: India's GDP growth rate**

Source: Reserve Bank of India series on constant price GDP at factor cost

### Leaving the Farm

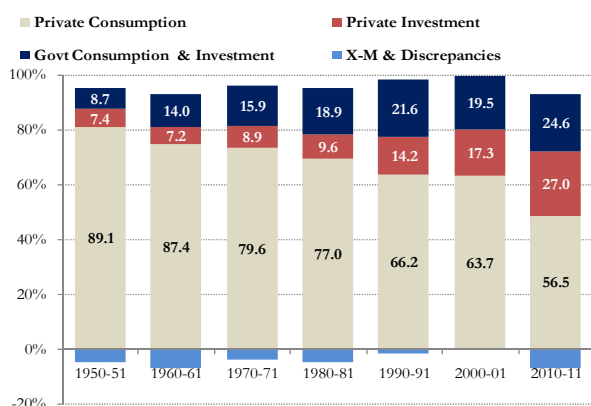
Despite the unchanging low growth till the eighties, the composition of GDP changed significantly. Figure 3a shows that the drop in share of primary sector, by 17.4 percentage points till 1980-81, was picked up in even measure by the secondary and tertiary sectors. However, the fall from 1980-81 to 2010-11, of 23.9 percentage points, saw the tertiary share rise by 21 points. Figure 3b shows employment shifts were much slower, with only about 4 percent of the work

force moving out of the primary sector till 1990-91. In sharp contrast, primary employment has fallen by over 17 percentage points since 1990-91, with labour shifting to both secondary and tertiary sectors. Output changes are thus now being followed by employment changes, with a growing share for construction within the secondary sector. This is consistent with the sharp increase in private investment. Primary sector today accounts for about half the work force and produces less than a seventh of the output, as compared to 1950-51, when it

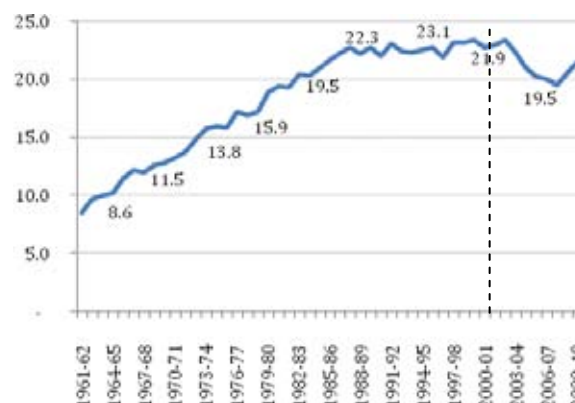
provided almost three-fourths of the employment and over half the output. The second big change is that the Indian economy is today far less agricultural.

### Engaging with the world

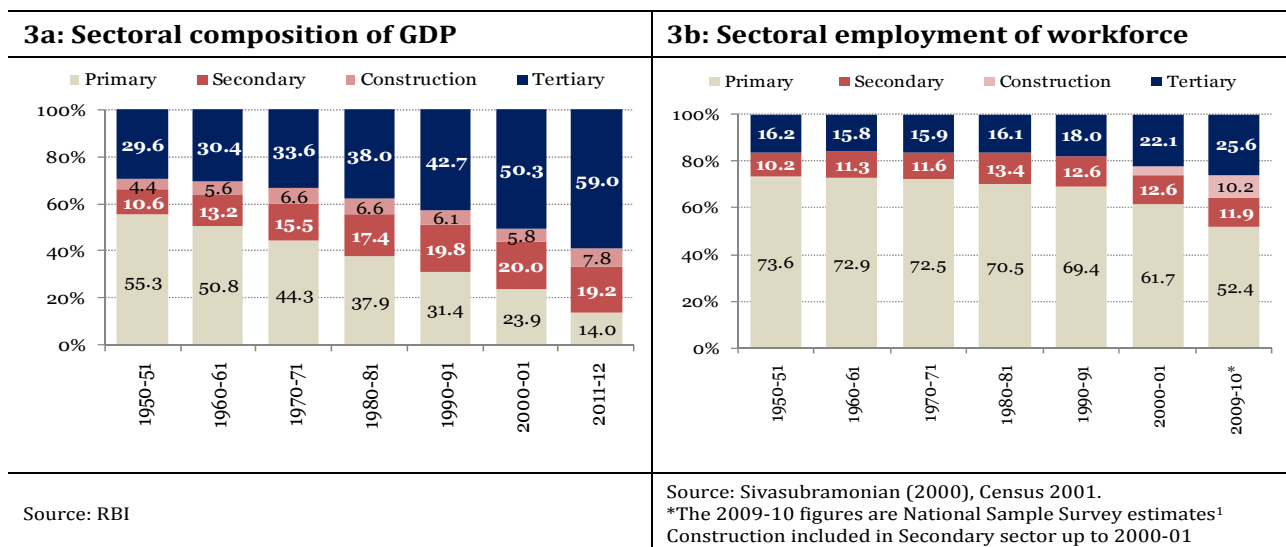
India's initial policy choices were inward-oriented. Figure 4a shows that, starting from the low teens, India's trade to GDP ratio fell to below 10 percent in the early 1970s. Since then, it doubled to about 20 percent at the start of the 1991 liberalisation. As growth accelerated, so did trade, rising to a peak of 61 percent

**2a: Government and Private Share in GDP**

Source: RBI series on GDP at current market prices

**2b: Public Sector GDP**

Source: RBI series at constant prices

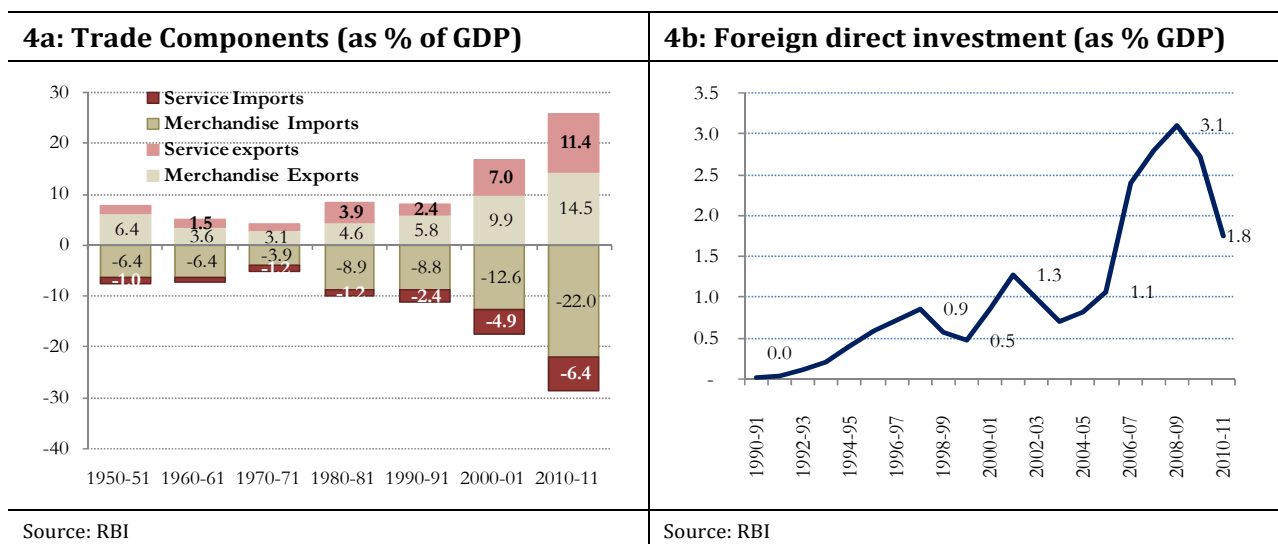


in 2008-09, before falling to a still impressive 54 percent in 2010-11. The contribution of net exports to GDP has been usually negative, but exports have become more skill-intensive, and we now trade much more with Asia. Not just trade, Figure 4b shows even foreign investment rose sharply. In 2006-07, it jumped to 2.4 percent of GDP and peaked at 3.1 percent in 2008-09. Regardless of the slowdown, both trade and investment remain at much higher levels. The third big change is that the Indian economy is today far more open.

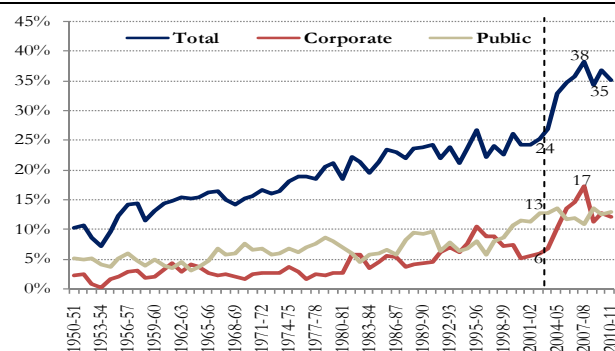
### Believing in the Future Capital Accumulation

Investment is based on a belief in the future - that one can build a better tomorrow by giving up today's consumption. Figure 5a shows that at the beginning of the 1950s, less than a tenth of the GDP was invested, but this has increased steadily over the years; reached a peak of 38 percent, a level comparable with the East Asian miracle economies. Both corporate and household investment rose, but the fall, in the wake of the

global financial crisis, has largely been in corporate investment. This investment, as seen in Figure 5b, has been largely financed out of domestic savings, first from households, with saving rates similar to China's, and lately from corporate, and public saving. This rise in investment is consistent with the increasing share of construction in GDP and employment (Figure 3). The upshot of this substantial rise in investment is that India today has a stock of physical capital that is newer and larger than it has ever been. This is the fourth big change.

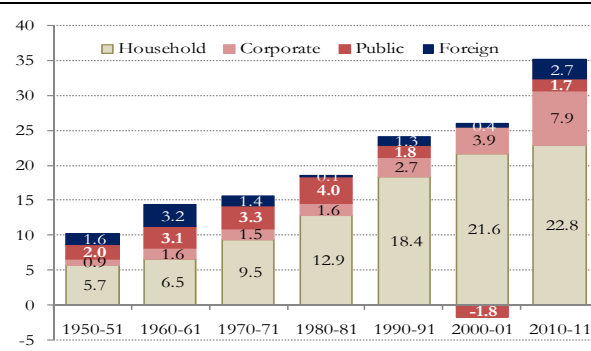


### 5a: Accelerating Investment



Source: RBI (sector capital formation as % of GDP)

### 5b: Rising Savings



Source: RBI. Sector savings as % of GDP (Foreign contribution is estimated as difference between savings and investment)

### People Investing in Themselves

While entrepreneurs are investing in physical capital, people are investing in themselves. Figure 6a shows the rate of completion of primary education (up to class 5) by age cohort. The oldest age cohort represents those completing primary education in the late 1950s, while the most recent age cohorts represent those completing in early 2000s. The most heartening aspect is not just the increase in completion rates, but the catch up by previous excluded groups like rural females. Almost everyone in the workforce today completes primary school. Figure 6b shows less encouraging higher secondary completion rates, with only 40

percent completing high school, but even here there is a strong catch-up story. Today's workforce entrants are much more educated than their counterparts in the past. This is the fifth big change.

Taken together, the physical and human capital stories indicate that Indians today are willing to make sacrifices in the present because they believe this would lead to a brighter future.

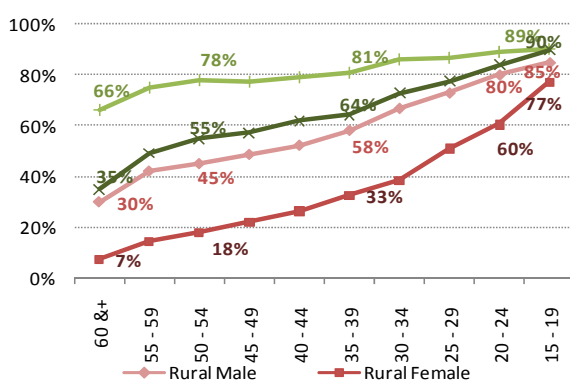
### The Current Slowdown

With these five big positive changes, why are we in these doldrums? While the broad features of the economy have remained, the post-crisis period has seen a break in trend in some

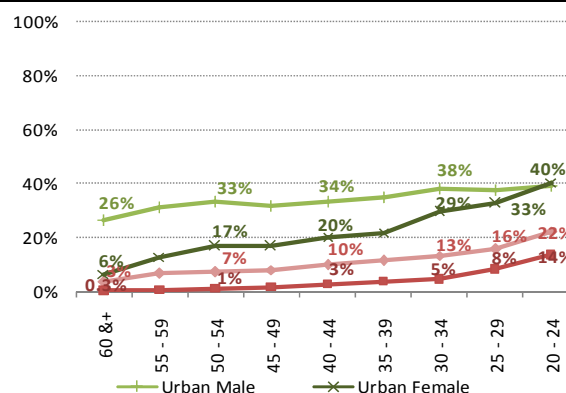
areas, specifically in government savings and private investment. During 2001-02 to 2007-08, while the households' contribution remained steady around 22 percent, saving by government (including public enterprises) rose by 7 percentage points and private corporate sector by 6 points. Post-crisis, government savings fell by 3 percent of GDP. This loss is yet to be recovered.

By contrast, the fall in investment is predominantly private. Gross capital formation peaked at 38 percent in 2007-08, led by both corporate and household investment. However since then, investment by the private corporate sector has

### 6a: Population with Primary Education (by age cohorts)

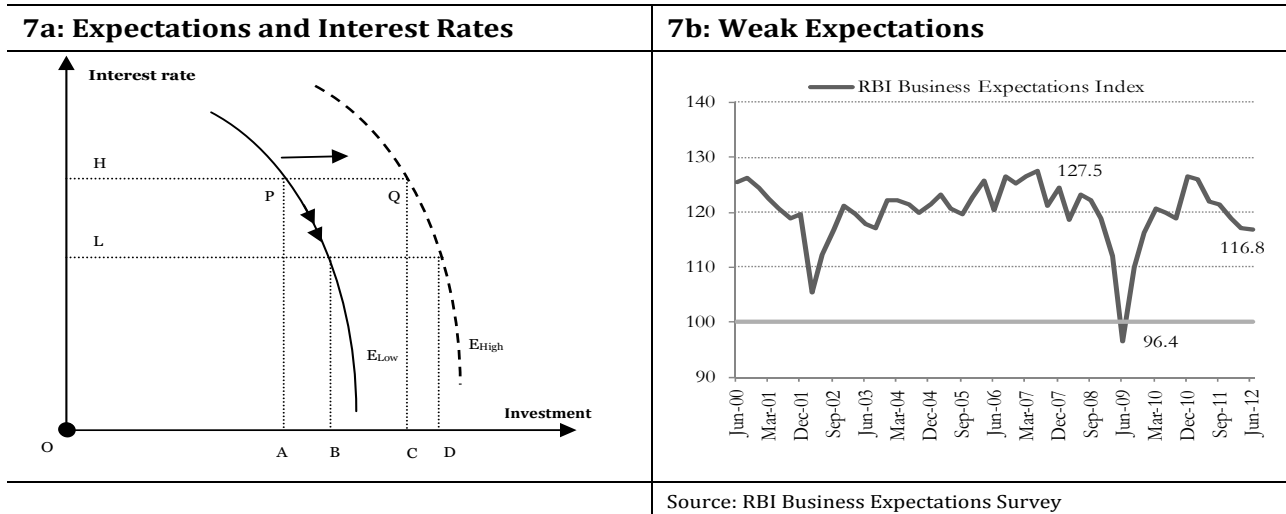


### 6b: Population with Higher Secondary Education (by age cohorts)



Source: NSS sixty fourth round survey "Education in India: 2007-08 Participation and Expenditure"





dropped by over 5 percent of GDP, from 17.3 percent to 12.1 percent, and is showing no visible sign of recovery. Though some of private investment has been compensated for by increases in public and household investment, its revival is central to a return to pre-crisis growth performance.

### Animal Spirits

In this context, the Prime Minister's diagnosis was spot on when he directed the Finance Ministry officials to "[r]evive the animal spirit in the country's economy." Fall in investment can, in principle, be attributed to two factors, viz. an increase in interest rates and changes in expectations about the future, as illustrated in Figure 7a. A reduction in the expected future growth, e.g. from 9 percent to 6 percent per year would mean that the corporate sector would invest less, since they expect to have to cater to a lower demand. This is illustrated by a downward shift in the demand curve from  $E_{High}$  to  $E_{Low}$ . So, even at a low interest rate of OL, the investment falls from OD to OB. In addition, due to the rise in interest rates from OL to OH, driven in part by

higher government borrowings, it falls even further to OA, assuming relatively low interest elasticity.

Without a high interest rate elasticity of private investment, its revival to pre-crisis levels would thus require an improvement in expectations. As Figure 7b shows, the RBI Business Expectation Index (BEI) has worsened steadily since 2010 although they remain above the lows seen in 2009 following the financial crisis. In Figure 7a, a move from P to R, along the investment demand curve  $E_{Low}$ , driven by a fall in interest rates from OH to OL would increase investment from OA to OB, while even with rates at OH, a movement from P to Q, driven by a shift in expectations to  $E_{High}$  would increase investment by much more, from OA to OC. "Revival of animal spirits" is thus key to getting growth back on track.

### Conclusion

How can one revive "animal spirits" to leverage the five big changes highlighted earlier?

The difficult aspect about expectations is that there is limited understanding about how they are

formed. The positive aspect is that it often takes relatively little to change them. The key concerns that are holding back private investment today are uncertainty about India's growth path and the perceived policy paralysis. CMIE data indicates a sharp drop in project completion rates and new announcements of projects, particularly in core sectors like mining, power and roads. As we have shown, there are few fundamental reasons to question India's ability to grow. The key is therefore to convince investors that the macroeconomic policy stance would remain similar to that during 2002-03 to 2007-08 and allay concerns about runaway inflation, trade and fiscal deficits. The hopeful part is that expectations can improve well before actual changes in these indicators.

A key investor concern is the rising current account deficit. This increase is driven in similar measure by the rise in gold and oil imports. As inflation is brought down, gold imported as a hedge against inflation should also fall. Fortunately, gold prices have started to decline, reducing its value in imports. Oil prices too have fallen recently. A high oil price affects not

only the trade deficit but also the fiscal deficit. Thus, if exports rise, following the depreciation of the rupee, and gold and oil prices stay weak, the current account deficit can be expected to improve soon.

But, while the government can only hope for the recent moderation in international crude prices to continue, it can break the link between the two deficits by raising diesel and LPG prices. This government has done so in the past, without apparent political repercussions, but has been unable to do so for the last two years. Not only is this decision key to reducing the fiscal deficit, it will also signal that the government retains the ability to take economically necessary but politically difficult decisions.

A number of legislative and administrative actions can also help send the right signals. There is no reason why the government has been unable to pass the Pension Fund Regulatory and Development Authority (PFRDA) Bill, in the absence of which the pension schemes continue to function without statutory supervision. The increase in FDI limit for

the insurance sector also needs legislative action. Stronger signals need decisions on key sectors like coal, power and fertiliser. On coal, the Committee on Allocation of Natural Resources, made a number of recommendations to bring more supply into the market. These need to be at least made public and discussed, if not immediately accepted. In power, a number of projects are stalled because they are no longer viable at the tariffs that were bid by an unreasonably aggressive private sector. An admittedly difficult decision is needed to either cancel or renegotiate these contracts. On fertiliser, one could move to direct cash transfers on a pilot basis, starting with districts where the UID registration is complete.

A set of such policy actions on the fiscal deficit, and the pension, insurance, coal, power and fertiliser sectors, and a little luck on global commodity prices, could go a long way in improving expectations. Renewed confidence of investors in the ability of the government to take complex decisions can then start a virtuous cycle.

Over the longer term, however, these measures alone will not

suffice. There are deeper issues that need to be addressed starting with clarity on land markets and acquisition processes. Further, while there are frequent references to the need to improve physical infrastructure, the quality of public administration in general and of a variety of other public services in particular, such as education, health, and judicial system, needs substantial improvement. To provide resources for this, it is important to raise the combined tax-GDP ratio, which had risen to a peak of 17.6 percent in 2007-08. Measures like the goods and services tax should help it get back there and go beyond. Regulatory mandates on firms, especially small and medium enterprises, need to be simplified and made more transparent. Such policies, together with improvement in workforce skills, should foster entrepreneurship across the range of economic activity, including manufacturing. Only then can we take fuller advantage of the fundamental and large positive changes that have occurred in the Indian economy. □

(E-mail : [pmukhopadhyaya@gmail.com](mailto:pmukhopadhyaya@gmail.com))



# YOJANA

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YE-12/1/2012

# Mobile Phone and Component Manufacturing

*Pankaj Mohindroo*



***The draft version of NPE has clearly set the tone, by envisioning India as a global hub for electronics system design and manufacturing, so as to meet the growing domestic and global demand***

**W**ITH THE Electronics sector in India projected to grow to \$400 billion by the year 2020 from \$ 45 billion in 2009, the absence of adequate manufacturing facilities to cater to this demand would make India an import-dependent country, a scenario which might compromise India's security and strategic interests. The importance of setting up of an ESDM eco-system in the country at the earliest, therefore, cannot be over stated. Despite India being a knowledge powerhouse with significant human resources, the lack of a manufacturing ecosystem could be a big hindrance in realization of this vision.

A considerable and definitive factor is that total domestic production presently stands at 45 percent of the total production. The huge existing gap between demand and supply is expected to widen further, when the domestic demand will expand without a corresponding increase in domestic production. In financial year 2009-10, while the demand for electronics stood at USD 45 billion, only goods worth USD 20 billion

were produced in India. What's more, a significant portion of India's present consumption is met through imports from China - a scenario that could pose a serious challenge to the country's strategic and security interests.

## **Mobile Phone Manufacturing – a phenomenal success story**

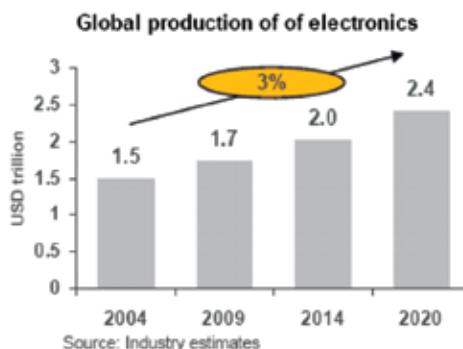
Despite there being a complete drought of ESDM industry in India as of now, the presence of a robust and flourishing Mobile Handset Manufacturing industry is a significant silver lining and should pave the path for many other sectors to create their own success stories. Mobiles manufactured in India which stood at only 0.6 million in 2004 crossed the 165 million mark with a turnover of over INR 28,000 crores by 2011 and are projected to grow to 720 million units by 2020. Currently, Indian manufactured handsets are getting exported to more than 80 countries around the world, which makes it the only successful ESDM industry in the country. Between 2002 - 2005, global giants like Nokia, Samsung, Sony Ericsson, LG and Motorola started manufacturing in India. Nokia

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The author is National President, Indian Cellular Association, New Delhi.



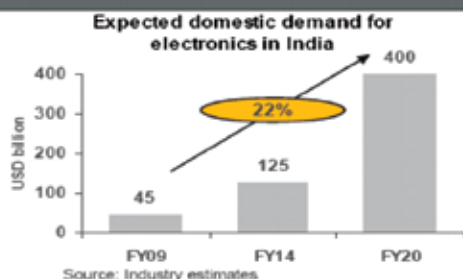
- ▶ For the 2004–09 period, the global industry has grown at an annual rate of 3%.
- ▶ At the current pace, the global production is projected to reach USD2 trillion in 2014 and USD2.4 trillion in 2020.



India is the second largest subscriber market in the world with more than 750 mn subscribers. This currently translates into an annual handset demand of close to 200 mn units and is expected to touch 250 mn units by 2014 and about 350 mn by 2017. In terms of value, the handset market in India is estimated to be to the tune of USD 10bn or close to INR 46,000 crores by 2012. With an average addition of 10-15 mn subscribers per month along with replacement demand, handset Original Equipment

#### Domestic demand

- ▶ The domestic consumption of electronics reached USD45 billion in FY09.
- ▶ Domestic demand is expected to reach USD125 billion in FY14 and USD400 billion in FY20.



**With a total demand projected at USD400 billion for FY20, there is significant potential to develop an electronics ecosystem in India.**

today operates the world's largest mobile manufacturing facility from Sri Perumbudur near Chennai. The facility also houses the global sourcing headquarters for all Nokia manufacturing facilities around the world. The plant is estimated to have an annual capacity of 200

mn of which almost 75 percent is currently utilized for both the Indian market as well as exports. The pace, at which the market has grown, has attracted the entry of several new players in the segment. In 2009 alone, the market saw the entry of more than 100 new players.

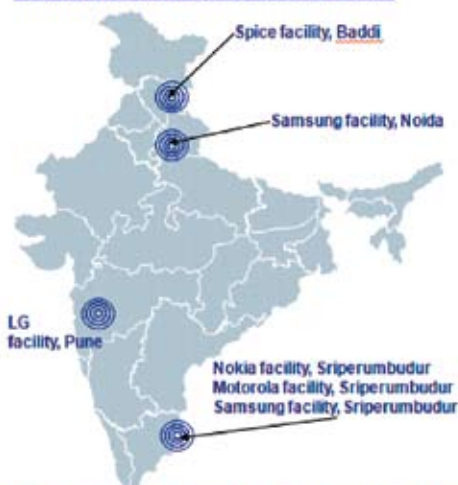
Manufacturer Manage have a sizable domestic market to cater to. Added to this is the prospect of nurturing a potential export opportunity to other emerging markets.

Considering this success, which has been achieved by the mobile handset industry in India on the manufacturing front, there is a tremendous potential for other sectors of the ESDM industry to create their own success stories, which in turn could open up floodgates of economic prosperity for the country and its people. Also, this will mark the onset of a rare event in the history of Indian Industrialization, when Indian manufactured

**Driven by reforms and availability of skilled labor, India could witness a significant increase in handset and component manufacturing**

- India's market share has shot up from almost nil about 6 years back to almost 10 percent of global handset manufacturing now
- This has been primarily on account of Nokia setting up its largest handset manufacturing facility in the world at Chennai
- While India has made progress with some OEMs setting up manufacturing facilities, even now close to 80 mn handsets are imported into the country annually.
- There is a huge opportunity for component manufacturing as almost 85 percent of components (by value) for handsets manufactured in India are imported

#### OEM Manufacturing Locations in India



**With demand shifting to Asia Pacific in a big way, India has the opportunity to emerge as an export hub on similar lines as China**

electronics products will be traded/ made available all around the world.

However, while the demand scenario makes a pleasing story, the methodology of demand fulfillment is an issue. The current demand scenario should have translated into thousands of jobs for the Indian workforce, ensured development of the SME sector and seen the emergence of new entrepreneurs.

*If only that were so.*

### Learning from our neighbour

While India is still dreaming of becoming a global manufacturing hub, China has emerged as the manufacturing backbone of the world. This holds true in several sectors, but none more than the electronics industry and in particular, the handset industry.

Today, China's contribution to global handset manufacturing is 50 percent (more than 650 mn units annually) vis-à-vis India's contribution of 12 percent or close to 165 mn units annually. OEMs

around the world depend on China for electronics components – almost 75-80 percent of global handset sourcing touches China in one way or the other. A symbiotic relationship with Taiwan, which has some of the world's foremost companies in the handset design and component space, has only helped matters. China and Taiwan dominate the handset component manufacturing landscape. The value chain is covered end to end which enables cost effective component manufacturing. This includes design houses, ODMs, EMS, component manufacturers as well as OEMs.

The Indian handset market is also heavily dependent on China and with close to 110 mn handsets imported into the country every year. Though India's market share in handset manufacturing has shot up from almost nil about 8 years back to almost 12 percent of global handset manufacturing now, this has been primarily on account of Nokia setting up its largest handset manufacturing facility in the world at Chennai

While all major multinational OEMs such as Nokia, Samsung, LG and Motorola have set up manufacturing facilities in India, all Indian OEMs continue to source their handsets from China. According to CMIE, as on 31 March 2009, India imported USD 19.77 bn worth of electronics goods and exported worth USD 3.17 bn.

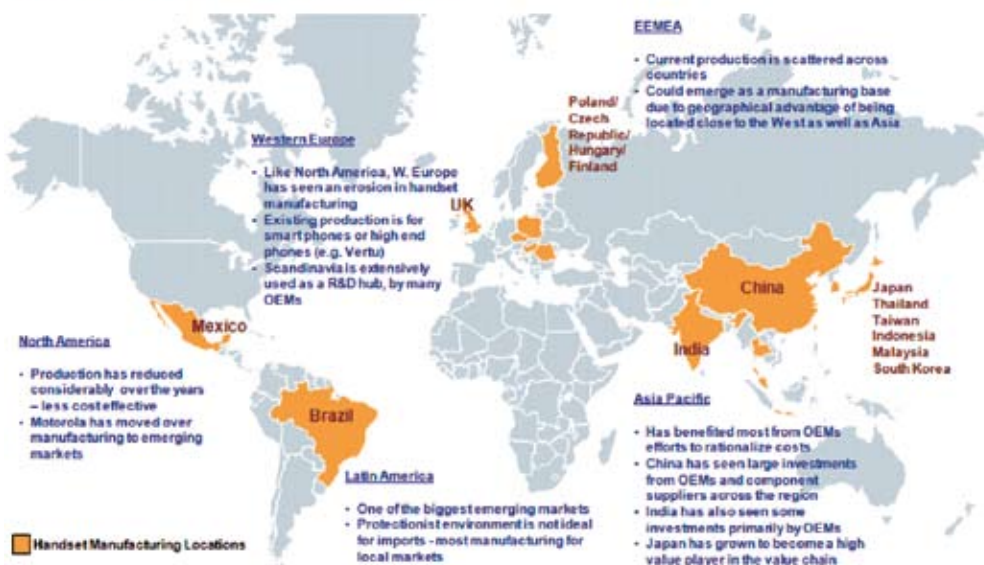
Currently most tier I suppliers in India import components from China as the linkages to a wider ecosystem are missing. This represents an opportunity for handset and component manufacturing as 90 percent of components (by value) for handsets manufactured in India are imported.

### A helping hand...from the Government

If China and Taiwan have grown to this size and scale, it is primarily due to the efforts of the Government which supported the industry through a series of both fiscal and non-fiscal incentives and initiatives.

The example of Taiwan also clearly demonstrates the role of the Government in fostering innovation and technology, in terms of establishing hardware parks, promoting industry and research collaboration and providing funding to incentivize IP creation and design capabilities. The result - Taiwan today is a global hub for electronics manufacturing; with its component makers becoming market leaders.

**Globally, manufacturing of handsets has witnessed a clear shift towards cost competitive centers such as China, Taiwan and increasingly India**



India has the capability to become one of the premier destinations for handset and component manufacturing. The opportunity to mould India into a component manufacturing hub has to be initiated through the policy and business enablers from the Government, as component manufacturing for handsets will eventually percolate into bigger opportunities in manufacturing for the entire electronics value chain.

It is important to put in place policies encouraging Indian players to invest in this space and establish partnerships/ JVs to enable technology transfers. The success of new entrants in the Indian market should encourage the Government to formulate policies which encourage local manufacturing, instead of depending on imports. This could further help in creating the eco-system and value chain linkages which could have a multiplier effect.

#### **Needed: Parking space**

To ensure that handset and component manufacturing in India becomes competitive by global standards, establishment of Handset and Component Manufacturing Parks is the need of the hour. We need to establish Mega Handset and Component Manufacturing Parks with a view to provide state-of-the-art infrastructure for handset manufacturing in the country on a pre-identified cluster basis with a strong backward and forward linkage and to provide value addition in a demand driven manner.

The park should be aimed at translating the country's booming telecom sector into benefits for the wider economy by establishing manufacturing centers which allow

linkages to the wider value chain through convergence and a supply chain management that will take products to the retail outlet or for exports.

R&D has not taken off the way it should have, considering the skilled resources and abundantly talented work force that India possesses. The Government needs to follow Taiwan's model to encourage R&D where state funded ITRI is run in close collaboration with industry, with funding often provided by companies for research activities. Successful ventures are taken up by industrial houses and offshoots are born, with strong innovative capabilities. Revenues from the Hsinchu Science Park in Taiwan stand at more than USD 25 bn annually.

#### **Current Government Policies**

The Draft National Policy on Electronics (NPE) which was released last year and the subsequent approval by the Union Cabinet of various related sub-policies like setting up of Semiconductor Wafer Fabs, Electronics Manufacturing Clusters (EMCs), Modified Special Incentive Package Scheme (M-SIPS) policy and Preferential Market Access Scheme (PMA) have definitely given an impetus to the industry to work closely with both the Union and state Governments.

Regular workshops/conferences in association with the Department of Electronics and Information Technology (DeitY), different state Governments and other stakeholders are currently taking place in different parts of the country to educate the state Governments about the importance of this sector, which eventually is expected to

facilitate for promotion of this industry. State Governments like Andhra Pradesh has already come up with its state level electronics hardware policy clearly outlining various policy initiatives it has been proposing for prospective investors like subsidized power, schemes for improving employee skills, tax rate benefits, etc., are welcome measures.

#### **Proceed...with caution...to prosperity**

Even though India stands on the verge of becoming one of the fastest growing economies in the world through the setting up of an ESDM eco-system, the country should not be oblivious to the missed opportunities of the past. While the future holds a lot of promise, India remains surrounded with numerous challenges namely inadequate infrastructure, irrational taxation structure, supply chain and logistics issues, inflexible labor, limited R&D focus, funding, limited focus to value addition and exports, which can shackle the growth of the industry. Key policy interventions by the Union and state Governments such as continuing with a rational taxation system, are the need of the hour. The electronics industry has the potential to make an important contribution to the GDP and to employment generation - it is estimated that this industry will create 25-30 million new employment opportunities by 2020.

Whether it actually goes on to do so or whether this moment passes as another missed opportunity depends on us and our representatives. In the words of Horace, it is time to *Carpe Diem*. Seize the day.

And the future will be ours. □

(E-mail : [ica@ica-ind.org](mailto:ica@ica-ind.org))



# India Raises An Electronics Industry

## A Solution to Some Major Problems

**Brig B D Kapoor**

**E**LECTRONICS IS a technical word which conveys little meaning to the layman. Yet a layman has given an apt definition of it: "What the brain conceives, electronics achieves". And that is actually the state in which the world is in now. We are now turning to electronics for the solution of our major problems.

Electronics has begun to enter every phase of human activity. In general use are the radio, the television, the talkie and many other useful appliances such as hearing-aids. It is now beginning to dominate the industrial activity also.

### A Vital Industry

Although of recent origin, electronics has developed into a major industry in the last 20 years. World War II gave it the necessary impetus. Its present stage of growth may be judged from the production output figures for 1954: the United Kingdom achieved an output worth Rupees 450 crore and the American output reached nearly Rupees 4,000 crore!

In its efforts to attain early self-sufficiency our Government has set up an electronics factory in Jalahalli, Bangalore-the Bharat Electronics (Private) Limited. On 21st April 1954 the company was started as a limited concern, the capital being fully subscribed by the government.

As technical consultants, the government selected a French firm, Compagine Generale de Sans Fil of Paris. Advisers from this firm are helping to develop the Indian factory.

Although it looks too large for a radio factory, the project aims at meeting all the requirements of the country in electronics equipment in time to come.

The main factory is divided into three distinct departments: equipment manufacture, valve production and production of component parts. In fully developed countries each type of manufacture mentioned, has matured into a fully established separate industry. In India an attempt is being made to organize all these industries into a major nationalized venture.

In the range of equipment likely to be manufactured in this factory are: transmitters, communication receivers, radars, portable trans-receivers, broadcast stations and any other electronic equipment for which there may be a large demand in the country. The factory went into production on the 1st January 1956. The first two equipment being manufactured are a communication receiver and a transmitter of 400 watts.

The machine and tool shops, laid out in a spacious hall, are already buzzing with activity producing various component parts. Most of the machine tools have been imported from various European countries, but some of them are of indigenous manufacture.

Two wings are intended for the use of the valve plant and the electronic component manufacturing plant respectively. It is likely that valve manufacture will be established by 1958, when the needs of the country for radio tubes will begin to be supplied

indigenously. Component making is a major task and will have to be progressed slowly as demands become economically large for manufacture.

### Research and Development

It is clear that without a strong technical echelon, it would never be possible to achieve technical independence in the factory. It is also felt that special problems will arise due to the peculiar conditions under which the equipment is required to function in our country. In view of this, a research and development division of the factory is planned to be built up with the expansion of the factory.

A temporary training centre was established in October 1954 with a view to training apprentices for the radio mechanic and mechanical fitter trades. This centre has already proved its worth by providing highly skilled Indian tradesmen for launching the factory into production. The pioneers will lay the foundation of this great industry.

A number of assistant foremen and young engineers have been put through a training course at the consultants' factories in France. A major and a vital industry in our country is taking shape. As it expands, its demand for trained technicians, engineers and managers will increase. It will increase employment opportunities to that extent. Far more significant is the fact that the Bharat Electronics constitutes the foundation of an essential industry for the progress of the Nation. □

*Excerpts from the June 30, 1957 issue of  
YOJANA)*



# NORTH EAST DIARY

## NORTHEAST'S FOURTH MEGA FOOD PARK IN TRIPURA

**T**he Northeast's fourth mega food park will be set up in Tripura at a cost of Rs.72 crore to accelerate the growth of food processing industry in the region. It will be used to preserve fruits and vegetables coming from the country and abroad.

Assam has two Green Field Mega Food Parks while another such park is being set up in Manipur. Tripura grows abundant varieties of fruits and vegetables. By their processing and value addition through the proposed food park, the state is waiting to earn huge returns from both domestic as well as international markets. The food park will help expand industries based on fruits and vegetable produces.

The Tripura government has allotted 50 acres of land for setting up of the food park, being created by a private developer at a cost of Rs.72 crore, in Tulakona, 15 km north of state capital Agartala.

Of the Rs.72 crore, Union Ministry of food processing industries (MFPI) would provide Rs.50 crore. A Kolkata based private company will develop the mega food park by next year end.

Fruits and vegetable growers would gain enormously if value addition is ensured.

The food park will consist of necessary infrastructure such as cold storage, warehouse, workshops and weighbridge, and other common facilities like power and water supply would be made available.

The mega food parks scheme, a flagship programme of the MFPI, approved during the 11th Five Year Plan, aims at accelerating growth of food processing industry in the country through facilitating establishment of strong food processing infrastructure backed by an efficient supply chain. □

## MIZORAM TO LAUNCH COPTER SERVICE IN REMOTE AREAS

**P**eople of Mizoram can now avail of helicopter services. The helicopter service has been introduced in remote and bordering areas to oversee developmental works, provide connectivity to people in emergency situations and carry dignitaries.

Mizoram Chief Minister Lal Thanhawla flagged off the helicopter service from the main operational hub, Thuampui helipad in Aizawl recently. The helicopter service would be utilized for supervising developmental works in remote areas, offering medical care during emergencies in far-flung places, facilitating visits of dignitaries and tourists in inaccessible areas and carrying passengers in an emergency situation.

One twin-engine helicopter with carrying capacity of minimum seven passengers excluding crew would be operated by India's national helicopter company Pawan Hans Helicopters Ltd. The chopper service would be operated between capital Aizawl and nine district and sub-divisional towns. It will help improve accessibility in remote, hilly areas and those bordering Myanmar and Bangladesh during monsoon (June to September) or in emergency situations.

The chopper service can be chartered at a cost of Rs.70,000 per hour with free waiting charge for 45 minutes. The waiting charge will be Rs.10,000 per 30 minutes after the stipulated 45 minutes. The helicopter service will be available on all days except Sundays. The chopper service would be immensely beneficial for people of Mizoram where landslides frequently cut off road connectivity during rains.

It would be helpful for the tourists and for immediate carrying of critical patients from the rural and remote areas to the state capital. For the last 10 years, the Pawan Hans Helicopters company has been operating services in the interior areas of Arunachal Pradesh, Meghalaya, Tripura, Sikkim, Nagaland and Manipur with the union home ministry subsidizing fares by up to 75 percent. □

# 66<sup>th</sup> Independence Day



Ministry of Information & Broadcasting  
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YE-122/2012

# DO YOU KNOW?

## MOBILE GOVERNANCE

### What is Mobile Governance?

Mobile Governance (m-Governance) is a strategy and its implementation to leverage available wireless and new media technology platforms, mobile phone devices and applications for delivery of public information and services to citizens and business.

### What is Mobile Services Delivery Gateway (MSDG)?

MSDG is the core infrastructure for enabling the availability of public services through mobile devices. The prime objective of creating the MSDG is to put in place government-wide shared infrastructure and services to enable rapid development, mainstreaming and deployment of m-Governance services. It will enhance interoperability across various public services as well as reduce the total cost of operation of m-Governance services by providing a common pool of resources aggregating the demand for communication and e-Governance services, and act as a platform for various Government Departments and Agencies to test, rapidly deploy, and easily maintain m-Governance services across the country.

### What is the purpose of setting up the MSDG?

The purpose of setting up the MSDG is to provide a one-stop ecosystem for enabling the delivery of various electronic government services through mobile devices in an efficient manner with minimum effort for the participating Government

Departments and Agencies.

MSDG will also help in enhancing the interoperability of mobile-based services among various Government Departments and reduce the total cost of development and deployment of applications for m-Governance services.

### What are the functions of MSDG?

MSDG will have facilitates such as hardware and software to test and deploy the m-Governance applications. It will support the delivery of both voice and data services and content in a network and device independent manner to the extent possible and feasible. MSDG is proposed to be used as a shared infrastructure by the Central and State Government Departments and Agencies at nominal costs for delivering public services through mobile devices.

### What are the Delivery Channels?

MSDG will support the following delivery channels for development and deployment of mobile-based applications for Government services.

- SMS (Short Message Service)
- IVR (Interactive Voice Response)
- WAP (Wireless Application Protocol)
- USSD (Unstructured Supplementary Service Data)
- CBC (Cell Broadcast)
- SIM Toolkit (STK)/Dynamic STK, 3G-Video

- Others (WiFi/ WLAN)

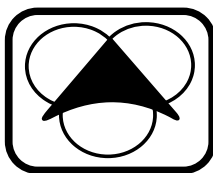
The Department of Information and Technology (DIT) outlined its objective to “make all government services accessible to the common man in his locality, through common service delivery outlets, and ensure efficiency, transparency, and reliability of such services at affordable costs to realise the basic needs of the common man”.

Besides, the plan is for the websites of all government departments and agencies to be made mobile-compliant; open standards will be adopted for mobile applications to ensure the interoperability of applications across various operating systems, and uniform pre-designated numbers shall be used for mobile-based services to ensure convenience. It will be One Web Approach enabled. This implies that all Government Web sites should be compliant with mobile devices to enable users of such devices to access the same information and services as available.

### What steps will DIT take to promote the m-Governance initiative?

DIT, or any of its designated agencies, will undertake awareness creation and capacity building exercises for according greater visibility to the Mobile Governance initiative amongst stakeholders and potential beneficiaries across Government, Industry, and Civil Society. □





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YE-118/2012

## Electro Tyre Retreading Machine



*The innovation is a much needed solution for thousands of small scale retreading units spread across highways and towns of India, working in tiny workshops with few helpers and narrow operational margins*

**T**HOMASAUGUSTINE (53) hails from Athani in Thrissur, which is the rubber heartland in Kerala. Augustine was born in a small village of Vazhoor, Kottayam in an average middle class family on 12th June, 1955. His father was a primary school teacher in a nearby St Dominic School and mother was a housewife. His family consists of an elder brother, sister, two younger brothers and a younger sister. They had around 12 acres of land in this village, where rubber, tapioca and tubers were cultivated.

His entire life took a new turn, when his father died in a bus accident, while he was studying in the 8th standard. By that time, his elder brother had got a job in Andhra Pradesh and the responsibility of the family fell on him. While continuing his studies, he took up agriculture as a full time vocation to support his family.

He decided to start a retreading unit, nearby his village, in Manimala. His brothers also joined him. They took a loan of Rs 48,000 from Kerala State Financial Cooperation by mortgaging their farmland and started the workshop in 1978. Business started off well.

The unit started with just one machine for retreading the tyres of trucks and two wheelers. The tread rubber is made from natural

rubber by adding carbon black and a synthetic material through a process called extruding. But, they soon faced the problem of getting quality raw material in the form of tread rubber rolls.

In 1979, they decided to start a production unit for manufacturing tread rubber. Subsequently, they got a big order to supply tread rubber to a well-known company named Midas based in Kottayam. The company 'Midas' was a bulk supplier of tread rubber to Kerala State Transport Cooperation (KSRTC) and with these large orders, their manufacturing unit started flourishing. By then, the focus had shifted from rubber retreading to manufacturing the tread rubber. They took loans and added another unit to manufacture tread rubber.

### Genesis of innovation

In 1983, with great expectation, Thomson had added another manufacturing unit to produce tread rubber. Calamity befell when KSRTC suspended the agreement with Midas. Midas, in turn refused to buy the large quantity of tread rubber manufactured by their unit. Left with large amount of stock, they were forced to sell this at throwaway prices.

Augustine then decided to revive the old business of tyre retreading. Over the years, he had

observed many problem areas in the existing steam based units. These units usually deployed boilers, which consumed upto 1.5 tonnes of firewood to cure a 14 kg of matrix and generate a temperature of 150 degrees for proper curing. The bulky units required a lot of space and manpower, lacked operational precision, and depleted natural resources.

The rudimentary steam based units could not maintain the constant temperature required to deliver high quality treads. It was observed that a 10 percent variation in the steam temperature resulted in more than 20 percent reduction in service life of the tyre. The boilers sprung leaks in three to four years, thus, altering performance and requiring recurring maintenance. The units required more than 30 minutes to deliver the required pressure of 80 psi, and involved heating the entire unit along with the casing. Workers used hard tools to pry open the tyre and load into the machine. This heating of the entire tyre unit and rough handling often damaged the casings and reduced the service life of the tyre.

Since, the heavy tyre disc also had to be fitted into the machine; it entailed, employing sturdy labour (more than one person) and also keeping a watch on the steam and air pressure. Observing that chappal making units used electricity instead of steam boiler, he thought of using an electric powered heater for the tyre retreading. After inspecting some of these units, he noticed that the moulds used in chappal making were flat, horizontal and needed much modification for his purpose.

Having learnt about electrical wiring and repairing from his father since childhood, he had the necessary confidence in building an electric unit for treading. First he used a strip heater in the device and partially succeeded after spending four years in standardizing the operation. In 1989, he met P.S

Esho, an officer in district industrial center, who asked him to exhibit this innovation in the local trade fair 'Index 89'. He also helped him with making the very first writeup and taking product photographs. The machine was displayed in the exhibition and a press conference was also organized. The provisional patent was filed in 1989.

While marketing this new technology for retreading, he faced stiff opposition and false propaganda from manufacturers of conventional treaded systems, who felt threatened by this new entrant. Since, the major tyre retreading industries and skilled labour in making moulds were located in Thrissur, he relocated to Thrissur in 1991 and purchased a plot in an industrial estate located away from town. Here, he built a temporary shed and continued his research.

By 1996, he dropped the idea of strip heater and introduced 18 gauge resistance wires, which were then bent over the mould. But the problem was not solved. The temperature variance in outer and inner side of mould was not found acceptable. While the temperature in outer side of the mould reached 600 degree Celsius, the inner side was only having 300 degree Celsius. When heated, the mould expanded and the coil got tightened and it broke away and this resulted in short circuits.

He then changed the contouring; made a series of grooves over the mould, through which the coiled resistance wire was inserted. A ceramic insulation was given over the resistance wire. With this, the problems were controlled to a great extent. By 1998, he was able to develop the machine with trouble-free performance. He started marketing the machine with a three-year guarantee. During that time, the mould making was outsourced to local workshops that were given the raw material (aluminium alloy). But they often missed delivery dates and wasted the materials. So

he took a bank loan again of eleven lakhs and bought the mould-making machinery and built the facilities in-house. With this, he had all parts of the manufacturing process under his control.

However, he was still hampered by the fact that his unit was located far from town, his technology was not yet familiar among local customers and his detractors and business rivals were still discrediting his technology. While his business was slowly getting established, he also built the electrical control panels for his machine. Now that his efforts were bearing fruit, he faced a new problem. Local workshops tried to copy his methods and while they succeeded in copying the vertical loading process of the moulds, they failed miserably in copying the horizontal loading process.

### **Product application and dispersion**

The innovation is a much needed solution for thousands of small scale retreading units spread across highways and towns of India, working in tiny workshops with few helpers and narrow operational margins.

The innovator has manufactured and sold more than 100 units across the country till date. He has been provided with micro venture funding to the tune of five lakh rupees by National Innovation Foundation in 2007. This first version of this innovation was granted an Indian patent in 1989. Subsequently, the specification for patenting the latest version of machine has been filed in January, 2009. NIF facilitated the technology licensing to Eastern Threads, a group company of Eastern Masalas, hoping that the benefits will reach many more people, saving energy in the process and making vehicles go farther than ever before. □

(E-mail : [campaign@nifindia.org](mailto:campaign@nifindia.org),  
[www.nifindia.org](http://www.nifindia.org))

## GEARING UP TO TACKLE FLOOD IN WULLAR

**W**ullar, Asia's largest fresh water lake located between Bandipore and Sopore some 60 km from Srinagar, is often termed the mother of all lakes in Kashmir due to its sheer size. The lake is one of the six Indian wetlands designated as a Ramsar site. The Ramsar Convention is an international treaty for the conservation and sustainable utilisation of wetlands.

But now, like many other water bodies in the state in particular and the country in general, it is facing threat. Encroachments, siltation and presence of thousands of willow trees inside the lake can cause a major flood in Kashmir in the near future. Experts say if the government doesn't take immediate steps to remove the willow trees and launch a massive dredging to desilt Wullar, it cannot modulate floods now, creating a dangerous situation in the valley.



As absorption basin of Wullar is decreasing, "any increase in the water level of the lake will trigger simultaneous increase in upstream water level of rivers and lakes, threatening every town and district, including Srinagar, stated a senior official of the Flood Control Department. The lake, till a few decades ago, acted as a huge absorption basin for the annual floodwaters, maintaining a balance in the hydrographic system of the Valley. However, due to massive encroachments and siltation, Wullar has been reduced from nearly 273 sq km some decades ago to less than 70 sq km. Official figures state that nearly 70,000 kanals (one-eighth of an acre of land) of converted land of Wullar have been occupied illegally. The problem is compounded by continuous inflow of silt from nearby catchment areas which has turned a large chunk of the water body into a land mass.

The Jammu and Kashmir government with financial help from the Centre has prepared a conservation and management plan for the lake. Under the plan, the state forest department proposes to fell thousands of trees and a massive dredging work will be carried out in the coming months.

The Union Government has sanctioned Rs 120 crore under the 13th Finance Commission for the conservation plan of Wullar. The plan envisages the lake's water and land resources management, bio-diversity conservation, livelihood improvement and institutional development. The plan also emphasises on eco-tourism as a potential tool to conserve the lake and its rich bio-diversity while providing economic incentives to the local community. According to Additional Principal Chief Conservator Forests Abdul Razak Khan, who is Officer on Special Duty (OSD), Wullar, they have completed 90 per cent demarcation work in the last six months.

Khan revealed that they have already completed some work in the catchment area targeting afforestation on more than 2,600 hectares and aided regeneration on more than 1,500 hectares in the next four years under catchment area treatment. After September, when the water level recede, and in the first phase more than 18,000 willow trees have been identified for uprooting. According to the project report prepared by the Wetland International South Asia (WISA), about 45 percent of population living in and around the lake is below poverty line.

The WISA report has highlighted issues which include absence of policies and strategies to guide coordinated action within the River Jhelum Basin, marginalisation of wetland dependent communities, absence of effective institutional mechanism for coordination and implementation and lack of baseline information for planning and decision-making. The report suggests that after the successful implementation of the project, the forest cover would go up to 40 percent and there will be 70 percent reduction in flooding due to increased water holding capacity. □



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YE-113/2012

# Forest Man of India: Making a Difference

*Sivasish Thakur*



***“The forest is my home and I will keep nurturing it till my last breath. The local villagers are now taking interest in conservation activities and I am sure they will be the caretakers of this jungle after I am gone***

**A**S A 16-year old, he witnessed the most tragic sight of snakes dying in their hordes under the scorching sun on a barren sandbar on the Brahmaputra. This was the turning point in the then 10<sup>th</sup>-standard boy's life who gave up everything – including his studies – to devote himself wholeheartedly to transform the sandbar into a dense forest teeming with diverse flora and fauna.

Meet Jadav Payeng – Forest Man of India – whose single-minded perseverance against heavy odds scripted a unique success story with few parallels in the field of conservation. And this remarkable accomplishment was made without any kind of support from any quarters covering a span of three decades.

Unlike most of the modern-day NGO activists engaged in conservation who receive substantial funds but accomplish little when it comes to the all-important issue of preservation and restoration of habitat, this humble, rustic person has shown that constraints matter little if one is armed with single-minded devotion towards the endeavour undertaken.

“It was in 1979 that I witnessed the pathetic sight of bodies of snakes strewn across the sandbar, dying from the blazing heat that

had turned the barren sandbar into an oven. It left a scar in my mind which I felt would heal only when I did something to make it a haven for wildlife,” Payeng, popularly known as Molai, says.

A large tract of the sandbar comprising 5.5 square km (550 hectares) today presents a sight soothing for stressed eyes. Expanses of verdant forests comprising a wide array of vegetation – big trees, bushes, shrubs and creepers – dot the landscape. A significant number of wildlife including mega species such as elephant, rhino and tiger have found a shelter in this jungle – popularly called ‘Molai Kathoni’ (Molai Woods) in reference to the inspiring saga scripted by Payeng. Deer have been another common resident of the forest.

“This was not easy. First I pleaded with the locals and the Forest Department to plant saplings on the sandbar but to no avail. I was told that nothing would grow on this desolate land. Then I took matters in my own hand and started planting – first bamboo and then varieties of tree species – which I watered in the morning and evening,” he says.

All along Payeng had been living in his woods till a few years back when obligations of his children's studies compelled him to shift to a nearby settlement.

Payeng had to fight with the local people and even the district administration to protect the forest he created. "Whenever locals came to cut a tree, I used to intervene and tell them that they would have to cut me first before laying their hands on a tree. The administration had about a decade back wanted to rehabilitate flood-affected people in my forest which I resisted tooth and nail, and was finally able to convince the authorities to abandon that plan," he adds. The main tree species in Payeng's forest include *simul*, *sisu*, *dimoru*, *velco*, *arjun*, *palm*, *gamari*, *sonaru*, *krishnachura* and *segun*. Particularly impressive has been the avian wealth of this habitat that includes a number of species of both residential and migratory birds.

This wildlife haven created and nurtured by Payeng, incidentally, was 'discovered' only in 2007 by the Forest Department when its officials were deployed in the area to ward off a herd of wild elephants

causing depredation in nearby villages.

"The team found that the elephant herd used to stay in the forest by daytime and come out in the night," assistant conservator of forests, Gunin Saikia says.

Apart from sheltering wildlife, the forest is playing a critical role in maintaining some sort of contiguity with the nearby Kaziranga National Park. "This has turned out to be a major animal corridor frequented by even the tiger. Now I have forwarded a proposal to the Forest Department to carry out a similar afforestation drive in an adjoining area of 600 hectares for securing the long-term goals of conservation," Payeng says.

Though he has maintained an extremely low profile all these years, recognition and accolades have finally come the way of this soft-spoken conservationist. The Jawaharlal Nehru University (JNU) recently decorated him with

the honour 'Forest Man of India.' Payeng is confident that his legacy would be continued by the local people after he is no more.

"The forest is my home and I will keep nurturing it till my last breath. The local villagers are now taking interest in conservation activities and I am sure they will be the caretakers of this jungle after I am gone," he says.

Payeng, however, is a bit upset that poachers of late were eyeing this Eden of Nature. "Last year two poachers were caught by the local people while they were trying to kill a rhino. I have requested the Forest Department to set an anti-poaching camp here," he says.

Located near Kokilamukh village on the outskirts of Jorhat town in upper Assam, the forest created by this conservationist ought to be a pilgrimage centre for every nature lover. □

(E-mail : [sivathakur@gmail.com](mailto:sivathakur@gmail.com))

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# Future of Chip Design Industry

*PVG Menon*



*ISA is very upbeat about the initiatives announced by the government in the recent past for promoting the fabless industry and also setting up an India fab to kick-start manufacturing activity in the country*

**E**LECTRONICS, A USD 1.75 trillion market, is the largest and fastest growing manufacturing industry in the world. The year 2020 has special significance for the Indian Electronic Systems Design and Manufacturing (ESDM) industry with the Government announcing its vision for the years to come as per the National Policy on Electronics 2011. “Vision 2020” is an ambitious yet strategically crucial vision of the Indian ESDM industry reaching a turnover of USD 400 billion by 2020.

The Indian chip design industry – including VLSI design, embedded software development and hardware/board design - is an integral part of the ESDM ecosystem. Pegged at USD 7.5 billion in 2010, the industry is expected to reach USD 10.2 billion in 2012. As part of Vision 2020, the government aims to make India a global leader in Very Large Scale Integration (VLSI), chip design and other frontier technical areas, and achieve a turnover of USD 55 billion by 2020.

If Vision 2020 defines the future

of the Indian ESDM industry and consequently the future of the Indian chip design industry, the question that is pertinent is, “How do we realize this dream?”

## Evolution of the Chip Design Industry

To put these numbers into perspective, let us take a look at how the semiconductor chip design industry has evolved over the years. A relatively young industry, the Indian semiconductor industry was initiated in the late sixties when the country took its first step towards R&D in germanium and silicon technologies, and the first saleable integrated circuits were made and marketed domestically. MNCs such as Texas Instruments and Indian companies such as Arcus (later acquired by Cypress Semiconductor and Broadcom) were the first movers in the Indian market at a time when the industry was dominated by state-run companies. It was during the years of the IT boom (1995-2000) that an ecosystem consisting of Indian and global companies began to develop in the country. And it was only as late as 2000 that the industry witnessed the first signs of

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The author is President, ISA (India Semiconductor Association).

explosive growth, driven primarily by growing domestic demand, strong government support and availability of talent. In fact, about 42 percent of the companies that currently operate in the country, made their India foray during 2000-2005.

Post 2005, the industry is in, what is popularly termed as, the “Innovation Phase”. Perhaps, the most defining times for our industry, today we see the ecosystem gradually moving up the value chain towards design innovation and product development. Companies, both captives and non-captive, are orienting themselves to execute projects of enhanced strategic value.

### Where We Stand Today

Growing demand for consumer electronic goods, a burgeoning telecom / networking market and significant growth in the use of portable / wireless products is driving the growth of the semiconductor design industry. With the top 10 global cable companies and the top 25 semiconductor companies present in India today, we have found our unique place on the global radar. While India currently has little claim to success in manufacturing, the fabless design industry has been on to a good start. With over 120 design units as on

2010, India is well recognised as a favourable destination for fabless design services.

### Embedded Software Development

Embedded software development, estimated at USD 8.6 billion in 2012, is the biggest contributor to the industry’s revenues. Product customization due to localization and legislative requirements, lower entry barriers and adaption to open-source platforms provide an impetus to this segment.

The embedded software industry is expanding as third-party service providers are moving up the value chain to offer more high-value activities relating to middleware, driver design and associated applications. Captives now prefer to work on the hardware abstraction and the device driver layers and outsource application-related work to third-party design companies to shorten their time-to-market.

### Board / Hardware Design

Estimated around USD 672 million in 2012, this is the smallest segment in the Indian semiconductor design industry. The growth of this segment can be attributed to captive design centres of major product companies concentrating on pure-play VLSI activities and preferring to outsource their reference and new

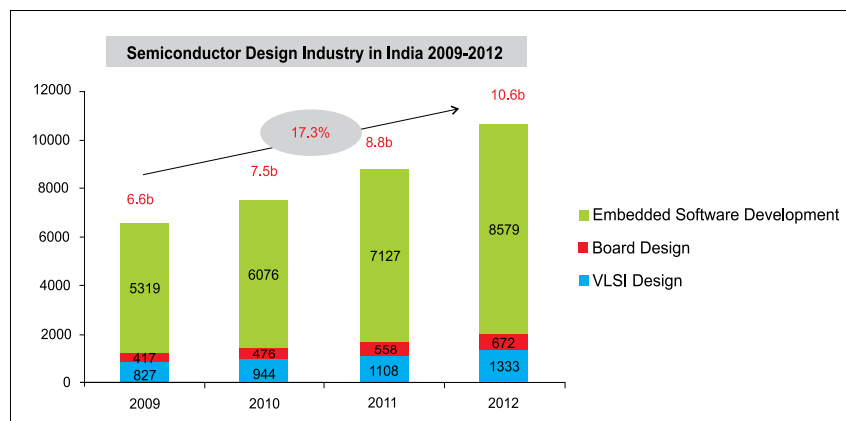
board design activities to Indian design companies. The multiple reengineering and localization opportunities available in the Indian markets provide further impetus to this segment. Most projects in board/hardware design are between six to eight layers. Projects in the 10+ layers space are mostly related to telecom/network gigabit ethernet switches.

### VLSI Design

Total revenues from VLSI design are estimated at USD 1.3 billion in 2012. Despite captives and third-party service providers building capabilities to service the entire value chain, end-to-end product ownership does not typically rest within the country. This is primarily because product ownership is a function of proximity to the end customer. With most of the VLSI business for India originating from USA and Europe, higher-end activities like specification definition and architecture design, are restricted to the regional headquarters that directly interact with the end customers. It is, however, interesting to note that given the distributed and collaborative development methodology adopted by most global semiconductor companies, no single centre holds total ownership of a product. IPR rights for all designs continue to remain with the headquarters of these companies.

### Who is Making Design Decisions?

As the industry is maturing, companies have begun investing in India to develop their IP within the country. Several captives are beginning to partner with third-party service providers to participate in early chip development programmes and provide modular IPs to reduce their time-to-market.



Reinforcing India's competitive position in the design services segment is the fact that global companies are increasingly moving their high-end work to their Indian locations. In terms of complexity, more than 50 percent of the projects completed in India in 2009 were in the 1M–10M gate range. While this gate range continues to grow at a steady rate, there is significantly increased activity in projects in the 10M–20M gate range.

While captive centres continue to account for about 70 percent of the total revenues for the segment, third-party design and development partners are beginning to gain equal importance in the market. According to a recent VSLI design services study, outsourced product design companies in India include industry behemoths such as Wipro as also relatively young companies such as Smart Play Technologies and Sasken Communications. Companies like Mindtree are also fast moving from design implementation to high-end product design development.

Outsourced product design companies are also increasingly in a position to influence the Bill of Materials. On the one hand, these companies are taking “socket decisions” for their customers –

deciding on crucial parameters like which microprocessor to choose, which IP provider to integrate with, etc. On the other, they are independently making crucial decisions related to soft IP and development of SoCs to replace discrete chips to reduce overall cost.

Apart from scaling in size and volume, these companies today attract a talented pool of resources capable of serving major industry verticals as also niche domains. Indian design engineers have proven their ability to handle complex projects by taping out some of the world's best chips used in several devices. Indian companies have designed chips on a 28 nm scale that have already been successfully taped out. In 2012, it is expected that 22 nm scale chips designed in India will also be taped out to hit markets across the world. Further, it is expected that Indian companies will graduate to 3D chip designing in the forthcoming quarters. In fact, it would be safe to make the statement that there is practically no chip in the world today, which is not “touched” by India [design centres] in some way.

### The Age of Value Addition

As Indian companies continue to inch higher up the value chain, the

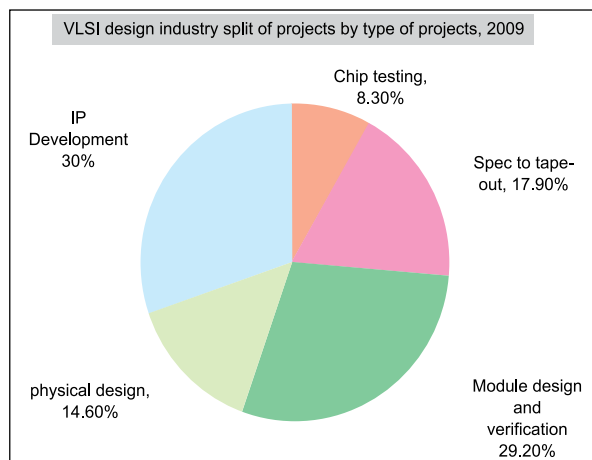
IP creation generates about 10 times more revenues in the form of royalties than ‘creation costs’. Currently, as users rather than owners of IP, although India creates as much as 90 percent of the value, we are credited only for about 10 percent. If the IP is owned by India, we will be given credit for the full value chain and also earn significantly higher revenues.

There are very few Indian companies that today have the capability to create IP. Cosmic Circuits is one such company which started with power management IP and now has over 300 analog and mixed-signal IP offerings. Cosmic Circuits has been profitable from the very first year. Ittiam Systems is another Indian company that has deployed an IP licensing model. The company recently announced that more than 35 percent of their annual revenues come from royalties.

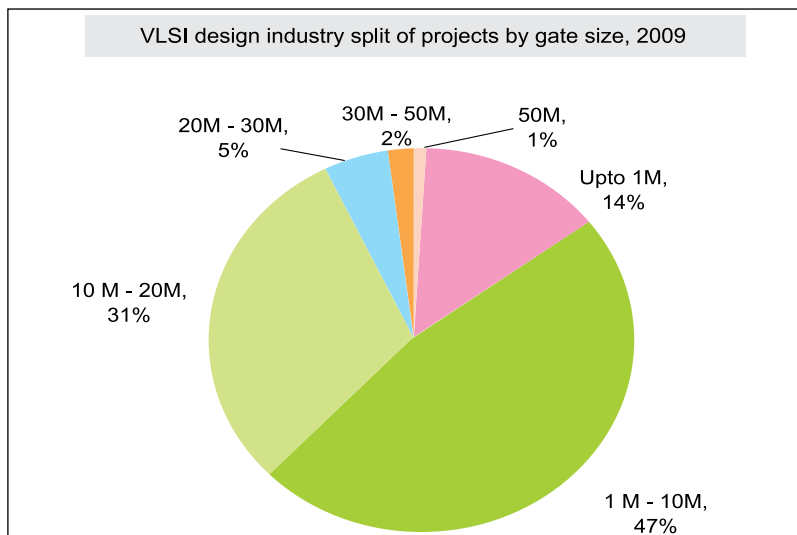
Semiconductor IP creation is a long-drawn process where the IP has to be proven before it is marketed, making it a very difficult to sustain in the initial years. Industry trend watchers, however, believe that more IP will be generated here in the years to come. According to analysts from Frost & Sullivan, India accounted for less than 1 percent of global chip IP in 2005 but currently produces about 5.5 percent, making our country the second largest IP producer along with the U.K.

### Talent Availability

The India semiconductor sector employs over 163,000 engineers, of which an estimated 20,580 serve the VLSI design services industry directly. Cumulatively, these 20,000+ engineers worked on a total of 4,150 projects in 2011. More than 82 percent of the jobs are in the embedded software space.



time is ripe for us to collectively build and present Brand India to the world. While the move towards product design and development is significant in this regard, there is an urgent need for Indian companies to establish their leadership by developing IP within the country.



The industry has a young workforce with close to 78 percent consisting of engineering graduates and close to 60 percent with less than eight years of work experience. The industry cites six months to a year for talent graduating from colleges to become deployable and industry-ready. Only about 8 percent of the total workforce hold post graduate degrees. Diploma holders are mainly recruited in the board segment. Around 6 percent of graduates, who are relevant to the semiconductor industry, come from tier 1 institutes such as the IITs and NITs. One major cause for concern is the critical shortage of PhDs in the country. Innovation and IP development can happen only if the workforce is not only of high quality but also capable of conducting quality R&D.

In all, although in terms of availability of skilled talent, India is among the best placed countries for semiconductor design, there is a clear deficit of people who are capable of high-level R&D and innovation.

### Realizing the Dream

Clearly there is a lot that is working well for the Indian chip design industry; and there are an equal number of challenges to be

overcome.

While the Indian semiconductor, and also the overall electronics, industry is growing rapidly, we still have a long way to go before catching up with other international players like China or Taiwan.

While the Indian fabless industry has made a mark for itself in the global marketplace, our presence in the manufacturing space is close to negligible.

While our design companies are creating a lot more value indigenously, we are not creating enough IP to own the entire value chain.

While we are generating adequate number of graduates to skillfully deliver projects, the industry is singularly lacking in PhDs who can lead innovation.

While we are happy to note that the domestic market for electronics will leapfrog in the years to come, we are also facing a possible scenario where India's import bill for electronics is likely to be more than the bill for crude oil unless remedial action is taken immediately.

As is evident, these wide ranging challenges require intervention at all

levels from different stakeholders of the ecosystem. ISA is working closely with all the stakeholders - government policy makers, industry and academia – to achieve our common goal of Vision 2020.

### Fab and Fabless: Creating a Symbiotic Ecosystem

ISA is very upbeat about the initiatives announced by the government in the recent past for promoting the fabless industry and also setting up an India fab to kick-start manufacturing activity in the country. We strongly believe that a vibrant fabless industry is the key – not only to take us closer to the revenue targets we have set ourselves as per Vision 2020, but also to provide impetus to the proposed India fab.

Fab is expensive, depreciates rapidly and needs high turnover to remain profitable. The India fab, when it comes up, will have to find customers and generate enough volumes quickly to stay profitable. It is here that Indian fabless companies can contribute towards the growth and sustenance of the India fab by becoming its “customers”. So while these fabless companies can fulfill all their manufacturing requirements right in their backyard, the fab will have the opportunity to match up to the scale and volumes requirement while retaining reasonable margins. Such a symbiotic relationship between the fab and the fabless industry can be ideal to boost the industry as a whole.

Also, once we start creating IP within the country and start owning end-to-end product design and development indigenously, we will find that we have all the right pieces ready to be put together and offer to the world, electronics that are truly Made in India. □

(E-mail :pvg@isaonline.org)



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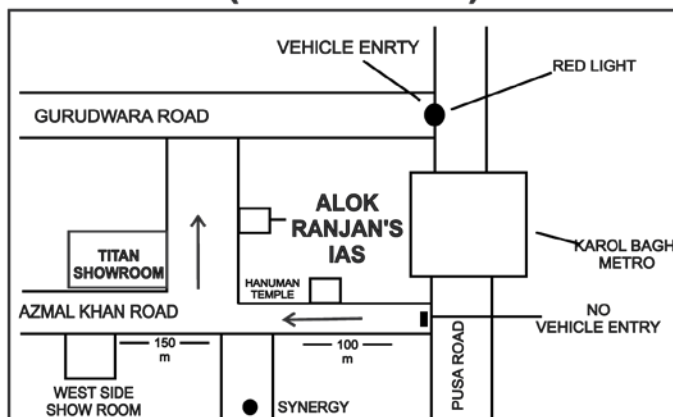
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# Indian IT-ITES Industry-A Success Saga

*Anita Bhatnagar Jain*



***The liberalization of Indian economic policy, de-regulation of key sectors and progressive moves towards further integrating India with the global economy has been a key driver of increased IT adoption in the country***

2012 will be remembered as a landmark year in the history of Indian Information Technology - Information Technology Enabled Services [IT-ITES] industry, as aggregate industrial revenue crossed USD 100 billion dollars with a y-o-y growth of 14 percent. With USD 69 billion, exports [excluding hardware] contributing the lion's share of 78 percent, accounted for the growth of +16 percent over 2011. The domestic revenue [including hardware] is expected to account for USD 32 billion, a growth of +9 percent over 2011. There is no doubt that IT-ITES industry has emerged as one of the most dynamic sectors in India's economic boom and is responsible for the global recognition of India as a "soft" power. The consistent growth of the IT segment has created phenomenal wealth, employment, exports and a significantly large reservoir of highly competent technocrats and knowledge workers.

Majority of the Fortune 500 and Global 2000 corporations are sourcing IT/ITES from India. Further most of Capability Maturity Model (SEI-CMM) Level 5 firms are based in India. On the plus side,

the Indian IT-ITES industry has also moved up the value chain of global perception. India is delivering several mission critical services to clients globally. Indian companies have set up delivery centres across the world and are actually providing services from different regions. 340 delivery centres in 184 cities across 48 countries in 2007 have now increased to over 560 centres in over 200 cities across 70 countries.

India is fundamentally advantaged and uniquely positioned to sustain its global leadership position, grow its offshore IT-ITES industries at an annual rate of 13-14 percent, sustain nearly 10 million direct jobs and generate export revenues of about USD 175 billion by 2020. This represents an opportunity capable of catapulting India into a higher growth orbit.

## **Evolution of the Indian IT-BPO Industry**

Before venturing into the alley of Future Vision it would be appropriate to rewind and dwell on the birth and various life stages of this sector. The Indian IT Services Industry has undergone many changes over the last decade but

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has become a globally recognized success story. The evolution of this industry can be categorized into three broad phases.

**Phase 1: Emergence (1998 – 2000)** – Post 1998 the industry came into its own with Software and Internet Services seen as the new growth engines. The first ‘Offshore Development Centres’ were set up to provide low cost/high quality IT services from India-based locations. The industry grew at a scorching pace, recording almost 50 percent CAGR. Growth to India was driven by IT services spurred by the Y2K phenomenon, focused largely on Application Development & Maintenance (ADM) and software R&D services.

**Phase 2: Resilience (2001 – 2005)** – The end of 2001 brought with it the dot com crash and a host of new challenges for the industry. While the sentiment and view of ‘technology’ services post the crash was extremely negative, Indian IT Services Companies proved their resilience by realigning their service offerings to serve geographical and vertical markets. In particular they took advantage of the need for technology cost saving in the US and Financial Services vertical to maintain an extremely strong CAGR of ~37 percent.

**Phase 3: Dominance (2006 – till date)** - Driven by relentless growth, 2006 was the year which saw Indian IT Services Companies cement themselves as a force to be reckoned with. Backed by tremendous growth in offshore adoption and strong sustained demand from favoured areas such as the US and BFSI, five Indian companies racked up

in excess of INR 45 Billion in revenues. Growth of BPO services and more recently, offshore delivery of IT services such as package implementation/systems integration, as well as remote IT infrastructure management have witnessed increased buyer adoption. Multinational companies aiming to replicate the offshore services model have rapidly scaled up in India. With core geographies (US) and core verticals (BFSI) nearing saturation, the industry has looked to develop new geographies such as Continental Europe and new verticals such as manufacturing, healthcare and retail. Additionally, increased focus on cost efficiencies and customer satisfaction has helped the industry to rapidly evolve from a provider of project based development activities to an “end to end” solutions provider.

While the sector has maintained a CAGR of over 30 percent in the tenth plan (2002-2007), the IT-ITES industry has continued to sustain growth rate in the Eleventh Plan (2007-2012) despite the global economic downturn, which has impacted the growth trajectory of the industry to single digits in FY 2009-10. With worldwide technology spending declining significantly in 2009, and it being an export led sector with a key thrust on banking and financial services, there was single digit growth in export revenues.

The industry in this phase (2008-2010) has demonstrated maturity by reducing costs, focusing on new markets, investing in sales and development, domain expertise, enhancing operational excellence and thrust on customer centricity.

Thus, there has been a marked improvement in FY 2010-11 and FY 2011-12.

### **The Stimulating Strengths**

This unparalleled success saga has emerged from a tapestry of myriad factors.

The liberalization of Indian economic policy, de-regulation of key sectors and progressive moves towards further integrating India with the global economy has been a key driver of increased IT adoption in the country. Government of India has played a key role in supporting development of this sector. From providing tax incentives under Section 10A/10B, setting up 52 STPI centre across the country, creating capacity and competition for telecom services to zero import duty on software are some of the steps taken for this industry to develop as the leading global sourcing hub of the world.

The phenomenal growth can be attributed to only some states and regions like Karnataka, Andhra Pradesh, Maharashtra, Tamilnadu, NCR. This skewed growth is a consequence of these states being proactive and coming forward with a variety of incentives like capital subsidy, reimbursement of stamp/transfer duty, registration fees and patent filing costs, exemption from statutory power cuts and industrial tariff instead of commercial, waiver of NOC from Pollution Control Boards, Simplification of Labour Laws, Additional Floor Space Index, venture funding and special incentives to start up companies, recruitment assistance, etc. The states which had allowed setting up of private engineering colleges

in 1990s had the advantage of availability of human resource.

## Exports

The exports revenue of Indian IT-ITES industry has grown from US\$ 4 billion in FY 1999-2000 to US\$ 69 billion in 2011-12. The export industry is diversified across three major focus segments – IT Services, BPO and engineering services. While IT Services have been the mainstay of the industry, BPO and engineering services sector has built upon India's value proposition and today there exist integrated service providers across the three focus areas as well as niche providers.

### Segment-wise IT-ITES Exports in 2011-12

US\$ Bn

Service Lines	FY 1999-2000	FY 2006-07	FY 2011-12
IT Services	3.1	17.9	39.2
BPO	0.6	8.4	16.5
Software products/engineering	0.3	4.9	13.3
<b>Total</b>	<b>4</b>	<b>31.2</b>	<b>69</b>

Source : NASSCOM

## Domestic Market

The domestic revenue of IT-ITES industry has increased from US\$ 1.9 billion in the year 1999-2000 to US\$ 19 billion in 2011-12. The several large e-Governance initiatives launched by the Government under the National e-Governance Plan (NeGP) are expected to provide sustained growth in domestic demand for IT Services over the next few years.

### Segment wise domestic IT-ITES revenue in 2011-12 (US\$ Bn)

Service Lines	FY 1999-2000	FY 2006-07	FY 2011-12
IT Services	1.5	5.5	12.2
BPO	- -	1.1	3.1
Software products/engineering	0.4	1.6	3.7
<b>Total</b>	<b>1.9</b>	<b>8.2</b>	<b>19.0</b>

Source : DIT Annual Report and NASSCOM

## Employment generated

The direct employment of IT-ITES industry has increased from 0.52 million in the year 2000-01 and has reached 2.8 million in FY 2011-12. About 2.28 million jobs have been generated during the last decade. This also translates to the creation of about 8.9 million indirect job opportunities in diverse fields such as commercial and residential real estate, retail, hospitality and transportation, etc. IT-ITES/BPO industry provides employment to people with various skill levels i.e. Engineers, Lawyers, Arts/Science/Commerce/ Literature etc. graduates; High School Pass outs etc. With 30 percent women in the workforce this sector is the largest employment provider for women.

## The Path Ahead

The domestic IT-ITES industry in India is at an inflection point today. As Indian consumers and corporations rapidly adopt mobile phones, and Internet access and broadband connectivity expand, there is likely to be a significant increase in spend on IT hardware,

software and services. Finally, the biggest domestic opportunity in most sectors (e.g., banking, insurance, retail, telecom and healthcare) lies in tapping the opportunity to serve the billions of underserved at the bottom of the pyramid.

The other big positive is that our knowledge sector is largely driven by youth—the average age of employees in the industry is between 25 and 28. The basis of the “demographic dividend” is that in 2020, the average age in India will be only 29 years, compared with 37 in China and the United States, 45 in Western Europe, and 48 in Japan. Moreover, 70 percent of Indians will be of working age in 2025, up from 61 percent now. According to the Indian Labour Report, 300 million youth would enter the labour force by 2025, and 25 per cent of the world's workers in the next three years would be Indians. India's young demographic profile, where over 3.5 million graduates and postgraduates including over 500,000 IT & Electronics & Communication Engineering graduates are added annually to the talent base, will continue to give us an unassailable edge. Today, no other country offers a similar mix and scale of human resources.

Department of Electronics and Information Technology (DeitY) has recently introduced a new IT Investment Regions (ITIR) Schemes to develop infrastructure facilities in Tier II and Tier III cities. Few states have already shown strong interest and have begun taking steps to set up such ITIRs.



DeitY has formulated National Policy on IT which aims to maximally leverage the power of ICT to help address economic and developmental challenges the country faces. The National Policy on IT focuses on application of technology-enabled approaches to overcome developmental challenges in education, health, skill development, financial inclusion, employment generation, governance etc. to greatly enhance efficiency across the board in the economy. The policy seeks to achieve the twin goals of bringing the full power of ICT within the reach of the whole of India and harnessing the capability and human resources of the whole of India.

## **Twelfth Five year Plan (2012-2017)**

### **Objectives**

The main aim is to harness the potential of the software and services sector to contribute to the country's development and growth, particularly in terms of investment, exports, employment generation and contribution to GDP; to retain India's leadership position as a global IT-BPO destination, consolidate and grow in both mature and emerging markets.

1. Enhance innovation and build India as the hub for global design, IP and product development.
2. To harness ICT technology for inclusive growth, promote gender inclusivity and ensure balanced regional growth.
3. To nurture and accelerate the growth for the SMEs and start-up enterprises in the country.
4. Build India centric software

industry, drive domestic market IT adoption, and enhance SMB competitiveness in the country.

5. To focus on development of IT-ITES/ BPO industry beyond the current 7 Metros including NCR which account for 90 percent revenue.

### **Targets**

Over the next decade, several global mega trends will shape the technology and ITES/BPO industry as they reshape the global economy. Hence with increased GDP growth of emerging markets, and shrinking working age populations, these megatrends will present a new set of hitherto untapped opportunities that will include emergence of new verticals, service lines, geographic and customer segments. On the back of these trends, the addressable market opportunity for the IT-ITES/BPO sector is likely to expand from the current USD 500 billion to USD 1.5 trillion by 2020.

Given the backdrop of large untapped demand potential and strong fundamentals, India is uniquely positioned to secure global leadership, grow its IT-BPO exports at a compounded annual rate of 13.8 percent, and

generate export revenues of USD 130 billion, and domestic revenues of USD 40 billion by FY 2017. Direct employment generation is expected to increase by 65 percent from FY 2011 levels, to 4.2 million, while indirect employment is expected to touch 10.6 million by FY 2017. This translates to incremental direct employment of about 1.4 million people and incremental indirect employment of 2.3 million. Attaining these ambitious outcomes will require breakthrough collaboration amongst central and state governments, industry players and industry associations.

### **Key Constraints and Challenges**

The future growth trajectory will depend on how these are tackled.

- (i) Competition and strong pull from other countries: China, Phillipines, Vietnam, Poland, Hungary, Mexico, Brazil and Egypt is an indicative list of countries that are emerging as competitive locations, with this increasing to almost 50 locations. Many of these are offering a host of incentives posing a danger that some of these locations can transform into primary sources. China is intent on transforming from a

**The goals identified to achieve the aspirations are as under:**

Description	Revenue	Current (2007-11)	Target 2012-17
Revenue	IT-ITES/BPO Exports	USD 59 Bn	USD 130 Bn
Revenue	IT-ITES Domestic	USD 17.2 Bn	USD 40 Bn
Total		USD 76.2 Bn	USD 170 Bn
Direct Employment	No of professionals employed	2.54 million	4.2 million (Net addition ~ 1.4 Million)

manufacturing engine into a services hub. As the industry is less capital intensive and flexible it can be relocated in a very short time.

- (ii) Reduced competitiveness of the industry due to diminishing employable talent pool, rising costs due to concentration in Metros and inadequate infrastructure in other towns.
- (iii) Improving the supply and capacity of suitable talent as industry has to spend + 1.5 percent of its revenues on training to make them employable.
- (iv) Lack of early stage and angel funding
- (v) Global Economic Recovery as this industry's mainstay is exports with USA and UK accounting for 75-80 percent
- (vi) Direct and indirect protectionism in key markets.
- (vii) Transparent, stable and uniform fiscal and labour policy structure
- (viii) Need for Made in India procurement by Government
- (ix) Lack of research resulting in significant usage of imported IPR

### Strategies

Build an enabling policy environment for India to sustain and grow its leadership in the global sourcing sector in developed and emerging markets.

To support small and medium enterprises and provide competitive edge through fiscal benefits, innovation fund and incubation.

1. To build world class infrastructure in identified tier II and tier III cities to create new hubs for industry development as potential centers of excellence.
2. To address the gap of employability through skill development initiatives.
3. Some of the recommendations relating to IT-ITES industry would cut across the other sub-groups of DeitY for the twelfth plan and also come under the purview of other Ministries/departments (viz, MHRD, DOC, MEA, MSME). □

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# National e-Governance Plan: Vision, Challenges and the Way Forward

*Rajendra Kumar*



***The National e-Governance Plan (NeGP) is the most significant initiative taken in India during the last decade to mainstream ICT in governance at both central and state levels***

**E**GOVERNANCE IN India owes its origins to the in-house development of applications during the 1970s and 1980s in defence, economic planning, census, tax administration and elections. Subsequently, massive efforts were made during the 1980s by the National Informatics Centre (NIC) to connect all the district headquarters in the country through a VSAT network. However, all these efforts were mainly government centric with the primary objective of exploiting information and communication technologies (ICTs) for automating internal government functions. Citizen centricity with a focus on improving delivery of services to the citizens was not the primary goal during this period.

In the late 1980s, a few computerization initiatives in the government started making an impact on citizen services. The most prominent among these was the computerization of the passenger reservation system by the Indian Railways (Ramani, 1991). E-governance during this period received a major thrust with the launch of NICNET in 1987, followed by the launch of DISNIC

that aimed at computerizing all the district offices in the country (2<sup>nd</sup> Administrative Reforms Commission, 2008). During the 1990s, several government departments at both central and state levels launched projects aimed at deploying ICTs for improving services to citizens. Initial attempts were made by some government departments during the latter half of this decade to use the World Wide Web mainly for providing information to the citizens. Several states, particularly the southern states, achieved significant successes in using e-governance to improve delivery of services to the citizens during this period. This trend continued during the early years of the last decade with several states across the country implementing citizen-centric e-government projects. However, these initiatives were isolated and fragmented due to lack of adequate and integrated ICT infrastructure reaching down to the block and village levels, lack of comprehensive backend computerization, lack of connectivity, and lack of adequate capacity at all levels of government to efficiently deploy ICTs for improving the quality of governance. The National e-Governance Plan (NeGP), conceptualized in the early

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part of the last decade, aimed at addressing all these deficiencies.

In this paper, I examine how the NeGP has performed against its original aims and objectives and the challenges that the various Mission Mode Projects (MMPs) under it have faced during their implementation. I also discuss how its effectiveness and citizen-centricity in terms of delivery of public services can be improved through adoption of new and innovative technologies and processes.

### **National e-Governance Plan**

The National e-Governance Plan (NeGP) is the most significant initiative taken in India during the last decade to mainstream ICT in governance at both central and state levels. It lays emphasis on creating the right governance and institutional framework within the country, establish the core IT infrastructure, and implement a number of Mission Mode Projects at the central, state and integrated levels. The original vision of NeGP was to “Make all Government services accessible to the common man in his locality through common service delivery outlets and ensure efficiency, transparency and reliability of such services at affordable costs to realize the basic needs of the common man”.

The plan, consisting originally of 27 Mission Mode Projects (MMPs) and 8 Components, was approved in May 2006. Subsequently, during July 2011, four new MMPs on Health, Education, Public Distribution System (PDS) and Posts were added. The respective ministries and departments in Government of India are responsible for overall formulation, financial approvals and implementation of the MMPs.

### **Integrated Approach to Implementation**

The overall strategy for implementation envisaged an integrated approach focusing on six key aspects and seven guiding principles (Chauhan 2009). The six key aspects included connectivity, capacity building, content creation, cyber law, citizen interface, and capital. The seven guiding principles included the following: centralized initiative and decentralized implementation; delivering public value; think big, start small, and scale fast; change management; common core and support infrastructure; capacity building; and public private partnerships (PPPs).

### **Governance Structure under NeGP**

NeGP has conceptualized a well-defined governance structure to ensure its implementation as a comprehensive and integrated plan cutting across various central line ministries and state governments. At the highest level, there is a Committee headed by the Prime Minister to provide the overall leadership for the implementation of the NeGP. A National e-Governance Advisory Group headed by the Minister of Communications and IT has been constituted to seek views of the various stakeholders and deliberate on the policy issues and interventions needed to mainstream ICT in governance in the country. An Apex Committee on NeGP chaired by the Cabinet Secretary has also been constituted to monitor its implementation, provide policy directions and resolve any inter-ministerial issues. For the actual conceptualization, financial approvals, and implementation of the MMPs, the respective line ministries and departments are responsible. DeitY serves as the

secretariat for the Apex Committee in managing the NeGP and provides technical advisory and appraisal services to the various departments implementing the MMPs. It is also responsible for implementing the core infrastructural and other technical support components of the plan.

### **Components under NeGP**

The NeGP consists of eight components. The three main core components consist of State Wide Area Networks (SWANs), State Data Centres (SDCs), and Common Service Centres (CSCs). All these three projects are being implemented by DeitY. The other five components comprise standards, awareness and communication, capacity building, assessment, and research and development. DeitY plays a pivotal role in these areas as well.

### **Mission Mode Projects under NeGP**

The 31 MMPs under the NeGP consist of 11 central, 7 integrated and 13 state projects. The 11 central MMPs are as follows:

1. **Banking** - This MMP has been led by the banking industry and aims at integrating the core banking solutions across various banks in the country.
2. **Insurance** - This is another industry led initiative that focuses on services in the insurance sector being provided by the public sector insurance companies.
3. **MCA 21** - This project provides various services of the Ministry of Corporate Affairs such as registration of companies, filing of documents, etc. through a secure portal. It has 8 service categories.
4. **Income Tax**: It aims at providing all income tax



related services to citizens and businesses under 18 service categories.

5. **Central Excise:** It provides excise and customs related services such as online filing of service tax and excise returns, e-payment of customs duties, etc. under 16 service categories.
6. **National ID/UID:** It aims at providing unique identification numbers to all the residents in the country.
7. **Passports:** It offers all passport related services under 17 service categories including applications for new passports, renewal of passports, tracking of status of applications, etc.
8. **Immigration and Visa:** It provides immigration and visa related services under 9 service categories at the Indian Missions abroad.
9. **Pensions:** It provides pension related services to pensioners under 2 service categories.
10. **E-Office:** It aims at automating all internal file management processes within government departments.
11. **Posts:** This new MMP focuses on providing all postal services in the country including postal savings accounts and postal insurance.

Out of the 11 central MMPs mentioned above, 10 have gone live and are offering services to their stakeholders. However, not all services under their defined service categories may be operational.

The 13 state MMPs are as follows:

1. **National Land Records Modernization Programme (NLRMP):** It aims at comprehensive

computerization of land records, integration of registration and mutation processes, automatic updation of land records, etc. under 16 service categories.

2. **Commercial Taxes:** It provides online filing of returns and taxes, automatic refunds, etc. under 22 service categories.
3. **Transport:** It includes services like vehicle registration and driving licenses under 18 service categories.
4. **E-District:** It provides district and tehsil/block level G2C services such as various certificates, welfare services, etc. under 10 service categories. While five categories are defined, states can add five categories specific to their requirements. An E-District pilot project has been implemented across 41 districts in 16 states and now the project is being rolled out across all the states.
5. **Treasuries:** It includes all payment related services through treasuries under 13 service categories.
6. **Municipalities:** It provides municipal level G2C and G2B services such as birth and death certificates, payment of taxes and fees, licenses, etc. under 8 service categories.
7. **Police – Crime and Criminal Tracking and Networking System (CCTNS):** It aims at comprehensive automation of police and criminal administration system in the country with 23 service categories.
8. **Agriculture:** It provides services such as market prices, crop diseases and management, best practices in agriculture, horticulture, sericulture, etc. under 12 service categories.

9. **Gram Panchayats:** It includes services like house taxes, trade licenses, certificates, etc. under 12 service categories.

10. **Employment Exchange:** It includes services such as registration of job seekers and guidance to them, potential employers and online registration of vacancies, etc. under 6 service categories.

11. **Health, Education and PDS:** These three MMPs have been added in July 2011 and aim at providing a comprehensive range of services in their respective sectors.

Out of the 13 state MMPs four MMPs, i.e., NLRMP, Transport, e-District (Pilot), and Commercial Taxes have gone live and are delivering various services. Two MMPs, Treasuries and Municipalities, have become live partially. Three MMPs, CCTNS, Gram Panchayats, and Agriculture are under implementation and Employment Exchange MMP is yet to be launched. The three new MMPs are under conceptualization stage.

The 7 integrated MMPs are as follows:

1. **India Portal:** It aims at providing a single window access to all government services under various departments at both central and state levels.
2. **National Service Delivery Gateway (NSDG):** It is a messaging middleware to route intelligently and securely all service requests to the relevant backend databases and the processed services to the service seeker. It facilitates exchange of information across various backend databases of different departments. It has 6 defined service categories.

3. **Common Service Centres (CSC):** It provides ICT enabled front end kiosks for delivering various G2C and G2B services to citizens in rural areas.
4. **E-Courts:** It aims at automating court related services such as e-filing of cases, online availability of judgements, etc. under four service categories.
5. **Electronic Data Interchange (EDI) for Trade:** It enables online filing and clearance of import and export documents, online payment of charges and fees and exchange of documents among different government departments and agencies such as ports, customs, etc. It has four service categories.
6. **E-Biz:** It aims at providing integrated services through a single window for businesses and investors related to approvals and permissions, payment of various fees through one lumpsum payment, etc. under 29 service categories.
7. **E-Procurement:** It provides all procurement related services to various government departments and agencies.

Except the e-Biz MMP, all the other MMPs listed above have gone live though not all the services under various categories might be operational. E-Biz MMP is expected to go live shortly.

### **Cross-Case Comparative Analysis: Issues and Challenges in Implementation of NeGP**

Though several projects under the NeGP have achieved significant success in implementation and have started delivering services to their stakeholders, many projects are facing challenges in implementation. What are these issues and challenges?

#### *Operational*

The main operational issues and challenges mentioned by the MMPs include lack of dedicated project teams, frequent changes in project leadership, lack of capacity and change management, inadequate engagement with the key stakeholders and issues in project management due to the sheer scale and diversity of some very large projects.

#### *Institutional*

The main institutional issues and challenges noted by the MMPs include inter-departmental coordination, duplication of infrastructure, lack of an institutionalized incentive scheme, inadequate business process reengineering (BPR), delays in obtaining necessary approvals, and exit management for PPP projects.

#### *Legal*

Some MMPs pointed out that recognition of electronic records is still an issue despite the legal mandate provided by the IT Act for the same. In some cases, BPR needed legal enactments to be implemented.

#### *Financial*

Some MMPs noted that delays in obtaining financial approvals were hampering the progress of implementation. Delays in release of funds to the states and their utilization was also mentioned by some state MMPs as a major challenge in making projects go live in those states.

#### *Technological*

The major technological challenges pointed out by the MMPs included dependency on core infrastructure for implementation, software customization, system

integration, compliance with security standards and third party audit, lack of a central network and lack of adequate disaster recovery (DR) facilities.

### **Critical Factors Affecting the Implementation of NeGP**

We can observe from the above analysis that the issues and challenges being faced by the MMPs can be broadly classified into seven critical factors: information, people, management, process, structure, strategy and technology. This analytical framework allows us to suggest interventions to make the MMPs more effective and outcome oriented in their implementation. I attempt to do this in the next section.

### **NeGP: The Way Forward**

How can the MMPs be made more effective in terms of their outcome orientation and how can they take advantage of the latest new and innovative technologies such as cloud and mobile to make implementation faster and more resource efficient? Based on the analysis in the preceding sections, the following recommendations can be made for the MMPs in this regard.

#### *Redefining the Strategy: Outcome Orientation*

The MMPs should redefine their service delivery strategy with a renewed focus on outcome orientation through provisioning of all feasible services through the electronic mode, well-defined service levels and measurable transactions either through CSCs or in self-service mode.

#### *Process: Focus on BPR and Aadhaar Integration*

The process interventions should include comprehensive BPR,

digital signing of all the documents, electronic authentication, integrated services and integration of the Aadhaar platform for service delivery.

*New and Innovative Technologies: Cloud Computing, Mobile, and Localization*

There is tremendous scope for exploiting the new and innovative technologies such as cloud computing and mobile platform for making rollout of services faster and more resource efficient. Cloud computing offers tremendous opportunities for fast-tracking the implementation of different projects and for quickly replicating the successful e-governance projects in various states across the country. Similarly, as access to mobile phones is much higher compared to the same for computers and internet,

mobile platform holds tremendous potential for widening the reach of e-governance, especially in rural areas. Use of local languages in applications can facilitate easy access to them for the people.

*Institutional Structure and Management*

Ensuring inter-departmental coordination and coordination among the central ministries and state government departments are sine qua nons for the success of any project. They are also vital in avoiding unnecessary duplication of efforts. Such coordination can also help in timely sanctions and releases of funds to the implementing agencies and states. There is also need for an institutionalized performance linked incentive scheme to be put in place for the MMPs. A proper management information system

(MIS) must be put in place by all the MMPs to effectively monitor the performance of the projects. Proper policies for strategic control and exit management also need to be put in place. Appropriate revenue models for ensuring financial sustainability of the projects also need to be carefully examined.

*People and Information: Capacity Building and Empowering Stakeholders*

Capacity building at all levels within the government is a must for the success of any project. The importance of dedicated project teams and change management cannot be overemphasized. Disseminating proper information and empowering the key stakeholders can go a long way in ensuring the success and sustainability of the projects.

**Conclusions**

NeGP has achieved notable successes after six years of its implementation. However, several projects under NeGP still lack a clear focus on outcomes and face a number of challenges that have prevented them from becoming fully operational and effective in terms of delivering services to the people as per the original vision of NeGP. At this critical juncture, there is a need for enhancing the effectiveness and speed of implementation of these MMPs to make them more outcome oriented. Interventions focused on BPR, adoption of new and innovative technologies such as cloud and mobile platforms, localization, e-authentication and Aadhaar integration in service delivery, capacity building, change management, and empowering the key stakeholders can go a long way in enhancing the effectiveness of NeGP and in realizing its original vision. □

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Issues and Challenges faced by MMPs	Critical Factors as per Heeks and Bhatnagar (1999) Model
Operational: dedicated project teams, project leadership, capacity and change management, inadequate engagement with the key stakeholders, project management	Information, People, Management, Structure
Institutional: inter-departmental coordination, duplication of infrastructure, lack of an institutionalized incentive scheme, inadequate business process reengineering (BPR), delays in obtaining necessary approvals, and exit management for PPP projects.	Management, Process, Information, Structure, Strategy
Legal: electronic records, BPR	Process, Management
Financial: delays in financial approvals, release of funds	Process, Management
Technological: core infrastructure, system integration, customization, Security, DR	Technology



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## Giving Preference to Domestically Manufactured Electronic Goods

*Ajay Kumar*



***Domestically manufactured electronic products are expected to be more secure because effective monitoring processes can be put in place for manufacturing processes of security sensitive electronic products***

**W**ITH INCREASING deployment of electronic devices and Information Technology applications in various sectors, the critical applications and associated infrastructure are becoming vulnerable to cyberattacks including espionage, financial theft and cyber terrorism. The forms of attack include backdoors, malicious code, identity-theft and information warfare. Instances of malware and other cyber attack tools pre-loaded on to electronic hardware equipment have been detected world-wide. Imported software and hardware IT products are often shipped with maliciously embedded malware. There have been concerns about supply chain security as computers, portable devices and other electronic devices pass through several suppliers before the final product goes on sale and somewhere along line someone could compromise a component or design a capability that could enable cyber attacks. Backdoors are not necessarily limited to software applications as hardware components, such as embedded Radio Frequency Identification (RFID) chips or hardware encryption products

could be compromised. Even critical infrastructure in civilian sector like Power System is being targeted with targeted attacks on Supervisory Control and Data Acquisition Systems (SCADA) emerging.

Using modified hardware provide attackers with a fundamental advantage compared to software based attacks. Due to the lower level of control offered attackers can more easily avoid detection and prevention. Hardware encryption products have also been found to be embedded with malicious software to enable leakage of encryption keys and reduction of encryption strength. In all these instances, the attack code is found to be hard coded in hardware.

In a connected world, telecommunication is a vital and critical component of the economy. In the context of emerging cyber attacks, the security of the telecommunication infrastructure and network elements such as routers and switches and exchanges are of paramount importance. Maliciously modified devices are reality. Wikipedia cites several reports of cyber security breaches and views expressed by top

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security experts which lend credence to these concerns.

All electronic devices work on extremely complex miniature semiconductor integrated circuits or “chips”. A typical electronic device may have several chips. A maliciously designed chip can initiate an internal trigger to launch a cyber attack or such an attack can be externally triggered through encrypted data sent through normal communication channels. By implication, both the connected and isolated devices are vulnerable. When conducted on a large scale, in a systematic matter, the effect can be devastating. Alternatively, a covert chip can send copies of confidential data to a third-party destination. Another threat could be the chip corrupts the data, thereby making the device malfunction at a critical juncture. A malicious hardware can be triggered months or years later, to open a backdoor to install software, which could launch an attack. The situation is further compounded because the technology has yet to develop which can detect such malicious hardware.

Considering the potential for large scale damage and loss to life and property and limited technological capabilities available globally in testing hardware for detection of malicious backdoors, it is necessary that electronic hardware used in systems having security implications for the nation be manufactured indigenously to ensure trust worthiness. In March 2011, the Senate Armed Services Committee in US initiated an investigation regarding counterfeit electronic parts in Department of Defense supply chain and uncovered overwhelming evidence of large number of counterfeits making their way into Defense systems.

It also found companies from one country were the primary source of counterfeit electronic parts; 1800 cases involving millions of parts were detected. Despite one of the best testing standards, especially for critical applications, the existing testing framework has not ensured counterfeits and defective electronic components getting into the system in the US.

Domestically manufactured electronic products are expected to be more secure because effective monitoring processes can be put in place for manufacturing processes of security sensitive electronic products. Conformance to safeguards can be ensured and desired encryption levels and enforced.

### **Government Policy to Provide Preference to Domestically Manufactured Electronic Goods**

The Government has recently approved a policy to provide preference to domestically manufactured electronic products, in procurement of those electronic products which have security implications for the country and in Government procurement for its own use, consistent with our World Trade Organization (WTO) commitments. Electronic product or products having security implications and agencies deploying them will be notified by concerned Ministry/Department. The notified agencies will be required to procure the specified electronic product or products from a domestic manufacturer. When the electronic goods are specified by the concerned Ministries/Departments, rationale for such items being covered as essential security interest may also be clearly detailed. Listing of electronic goods as security

sensitive can also be done by a designated authority which may take a project wise decision on which projects are sensitive from the security angle. In Government procurement, the policy will be applicable to all Ministries/ Departments (except Defence) and their agencies for electronic product or products purchased for Governmental purposes and not with a view to commercial resale or with a view to use in the production of goods for commercial sale.

Each Ministry/Department would notify the sector specific electronic product or products for which preference would be accorded to domestically-manufactured electronic product or products. However, generic products which are procured across sectors, such as, computers, communication equipment etc., would be notified by the Departments of Electronics and Information Technology/ Telecommunications, as the case may be. The notification issued by each Ministry/Department for providing preference to domestically manufactured electronic product or products, either for reasons of security or for Government procurement, would specify the percentage of procurement to be made from domestically manufactured electronic product or products but it shall not be less than 30% of the total procurement value of that electronic product or products. Further each Ministry/ Department would also specify the domestic value addition requirement which the electronic product should satisfy for the product to qualify as domestically manufactured electronic products. However, such specification should not be below the generic value-addition of domestically manufactured

electronic products provided in the policy. The preference to domestically manufactured electronic goods shall be subject to matching of L1 price and on satisfying technical specifications of the tender.

The graded value-addition norm for domestically manufactured electronic products is described in Table below.

<b>Table: Domestically Manufactured Electronic Products</b>	
<b>Year</b>	<b>Percentage domestic value-addition in terms of Bill of Material (BOM)</b>
Year 1	25%
Year 2	30%
Year 3	35%
Year 4	40%
Year 5	45%

### Challenges in Operationalizing the Policy

The policy is likely to address the security concerns as well as spur investment in the Electronics System Design and Manufacturing (ESDM) sector. However, there are several challenges in operationalizing the policy. These challenges relate to determination of which electronic good to notify, and in which sequence, what value addition to be prescribed to qualify as domestically manufactured electronic product, how to assess the value addition objectively, and without creating an inspector-raj. There are no precedents of a similar effort having been launched in other sector.

To answer some of these challenges, efforts to create operational guidelines for the said policy are underway. These guidelines

have been extensively discussed with all stakeholders, including concerned Ministries/Departments and industry representatives. Some of the thinking which has emerged from these discussions has helped create a draft set of guidelines which are objective, fair and transparent in the process being adopted. Some of the salient features of the draft guidelines are as follows. “*Bill of Material*”: is defined as the sum of costs of all inputs which go into the product including parts, sub-parts, components, assemblies, manufacturing costs including cost of design and development/ assembling/testing/sourcing/power/finance/logistics/insurance done in-house, and/or by external Electronic Manufacturing Service provider, royalties or licensee fee for IPR, and/or in-house R&D costs incurred/ amortized to create IPR, embedded and other software integral to the device. The “profit after tax” and warranty cost of the manufacturer is not part of the BOM. *Domestically Manufactured Electronic Products* are defined as those electronic products which are manufactured by entities that are registered and established in India, including in Special Economic Zones (SEZs), and engaged in manufacture of such electronic products in India and would include OEM and their Contract Manufacturers, but not traders. In addition, such products are required to meet the criteria of domestic value-addition as laid down in the Policy, for being classified as DMEP.

The guidelines also suggest that while Ministry/Departments should strive to notify all electronic products relating to their sector but should take up those electronic products which constitute significant part of the demand for Government on priority. It stresses on the need for developing an

understanding of the domestic manufacturing base preceding the identification of an electronic product for notification under the Policy. Only those electronic products in respect of which at least one domestic manufacturer exists, shall be notified. Consultation with industry, as necessary, may be carried out. The configuration / specifications representative of the entire range of a product should be categorized in a single notification. For example, there may be a separate notification for Desktop PCs, Servers and Tablets, but all Desktop PCs, with different configurations, may be clubbed under a single notification. Since identification of all electronic products cannot be taken up simultaneously, the products having high value of procurement in Government may be identified for notification on priority. Moreover, it also suggests that each Ministry/ Departments should assess the prospective annual demand for Government procurement over the next 5 years, with the objective of encouraging development/ investment in such manufacturing, along with the prospective date on which the product will be notified for applicability of the policy.

The percentage of total procurement value for which preference is provided to domestically manufactured electronic products should be so fixed after an understanding of the domestic manufacturing base including the available production capacities with the indigenous manufacturers and their number as well as that of their suppliers of inputs, which should, inter alia, meets the value addition norms proposed to be notified. This would inter alia depend on the availability of multiple domestic manufacturing units with sufficient capacities, so that the Government

requirement can be fulfilled without compromising on timelines. The after-sales service support network of domestic manufacturer/s also needs to be factored in.

The guidelines for deciding the value-addition for the electronic product being notified is proposed to be determined as follows. This involves identifying main inputs as per industry norms, constituting the Bill of Material (BOM) for the electronic product. The granularity at which the inputs need to be identified (i.e. the number of inputs) should not be very large and be based on industry practices. Secondly, the value of input should, as far as possible, be clearly discernible based on industry billing practices. Thereafter the status of manufacture of the input needs to be ascertained and accordingly, define what would mean to manufacture the input domestically. Based on the cumulative understanding of these inputs, the value addition will be determined.

The policy has attracted great deal of interest and responses. There have been concerns whether the policy is discriminatory to foreign companies and whether it is compatible with the commitment under the WTO; whether it would actually help achieve cyber security objectives, whether it would eventually help in developing a manufacturing base of electronics in India. There are also concerns regarding its wide scope in terms of electronic products which it covers. A factual analysis of the policy will show that these concerns are largely unfounded. Let me briefly reiterate some of the basic facts relating to the policy.

The Policy does not per se mandate preference to any electronic product. It only provides an enabling framework. Each

Ministry/Department is free to decide whether any products are to be notified under the policy. Department of Electronics and IT does not notify preference for all products, but only those products which it is concerned with.

The Policy is in conformance with India's WTO commitments. The procurement by Governmental agencies is exempted from the provisions of GATT (Article III). Besides, India is not a signatory to Government Procurement Agreement (GPA) of the WTO and, therefore, is not constrained by the stipulations of the GPA. Article XX and XXI of General Agreement on Trade and Tariffs (GATT) provide for member countries to take such steps as are necessary in its essential security interests. The extant scheme also does not differentiate between Indian companies and foreign companies and the benefit of the scheme is available to all companies manufacturing electronic products in India without discrimination. India also allows 100% Foreign Direct Investment (FDI) in electronics hardware manufacturing which further provides a level playing field to foreign companies (except in strategic products relating to defense, Space etc.). The extant scheme does not provide any price preference to domestic manufacturers over imported electronic products. Neither is any concession with respect to technical requirements is provided.

Several countries including USA, Australia, and Taiwan among others have put various restrictive clauses regarding entry of foreign companies in their country on security grounds. According to reports, US blocked bidding by Huawei Technologies for wireless networks for emergency

responders. The US Committee on Foreign Investment blocked Huawei's attempt to take over Server Company 3Leaf Systems. Australia recently blocked Huawei from taking part in that country's National Broadband Network. Taiwan had earlier blocked Chinese companies from participating in telecom networks in that country.

The policy should not be seen in isolation. The overall National Policy on Electronics framework, including the five key pillars, would make it extremely competitive to manufacture electronics in India. The new National Manufacturing Policy also addresses these concerns and will further improve the manufacturing ecosystem in the country.

Several companies in the ESDM sector have already started looking for alternative bases as part of China plus one strategy and to be proximate to the large demand of the South Asian market. The policy provides additional incentive to do so.

## Conclusion

The policy to provide preference to domestically manufactured electronic goods is one of the several initiatives which have been taken up by Government of India as part of its effort to develop India into a secure and globally competitive destination for ESDM sector. The companies which manufacture in India take advantage of several other financial incentives as announced under the Modified Special Incentive Package Scheme, Electronic Manufacturing Clusters scheme, and above all, can take advantage of the talent pool available in the country. □

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