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INDIA'S HI-TECH EXPORTS: POTENTIAL MARKETS AND KEY POLICY INTERVENTIONS

CONTENTS

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INTRODUCTION

Manufacturing remains one of the most important areas for the country to focus on, especially those kinds that entail high technology intensiveness. Technology oriented manufacturing has the ability to not only provide impetus to enhance revenue generation (through exports) but also has the potential to have a multiplier effect on job creation. The hi-tech manufacturing strategy will ramp up the industrial base that is key to our economic growth, and make the country self sufficient in critical technology oriented manufacturing products. The spin off benefits would be skilled jobs, enhanced exports coupled with less reliance on imports, resulting in a sustainable trade balance.

This study has differentiated manufacturing, based on technological intensiveness – high, medium and low technology manufacturing. The focus of the study include analyse the trends in international trade of hi-tech manufactured products, make an attempt to identify a product –market segmentation for dynamic hi-tech products, and suggest strategies for realising the growth of hi-tech manufacturing, with special thrust on promoting their exports while at the same time providing avenues for import substitution. Exports have been the key to economic growth in most countries. With India's appetite for technology goods and the focus increasingly shifting to newer markets, there is immense potential for our country to build competitive advantage in hi-tech manufacturing, such that we are able to cater both to domestic and foreign demands.

Economic theory commonly associates accumulation of R&D with the economic growth of a country. Various national governments continue to revise their policies in a bid to stay competitive and relevant, and thus, it becomes an imperative for a country like India to shift from traditional export items, which are largely low in technology intensiveness, to medium and high technology intensive exports. In a globally competitive space, countries dependent significantly on exports

of select primary products which are largely not technology oriented, face constraints in the long run in their development process.

The initial chapter highlights the key reasons for India to focus on technology oriented exports. The overarching concern is that the contribution of India's manufacturing sector to the country's GDP has remained stagnant, peaking at about 16 per cent of GDP, and later declined to 15.1 per cent. India's share in global manufacturing is also at only 1.8 per cent. India needs a renaissance in manufacturing with a massive dose of new investments in the sector, which can spur country's growth. Secondly, the average value addition of technology in products currently manufactured by Indian industry is around 8 per cent, very low compared to even that of other emerging developing nations. Indian manufacturing is rather shallow, with more focus on assembling and sales rather than design and development. Thirdly, India ranks globally at 52nd position in 2010, and stands below many of the developing and emerging countries like Thailand, South Korea, China, Indonesia, Mexico, Singapore, and Bangladesh in terms of manufacturing value added. Fourthly, it is observed that India's share of hi-tech exports as a percentage of manufactured exports, though has improved during the period 1991 - 2001, by over 200 basis points, it has remained largely stagnant in the last 10 years period. When compared with world average, India lags far behind. This attests well to the fact that there is a tremendous investment opportunity in hi-tech product manufacturing in the country. Fifthly, the manufacturing sector in India has been a laggard for decades now, and one could argue insignificant R&D orientation in Indian manufacturing as one of the major reasons. Technology oriented manufacturing is the only way forward for Indian manufacturing to come out of the slumber and take a leap jump towards achieving a greater level of economic and export growth.

GLOBAL HI-TECH TRADE : ANALYSIS

Second chapter details the international trade of tech exports, analysing the trends in trade by countries and products. The global exports of hi-tech sector are largely dominated by electronics and pharmaceuticals, which together constitute 80 per cent of world hi-tech exports. On the other hand, medium-tech exports are dominated by capital goods and automobiles, and low-tech exports are dominated by metal products and textiles. While developed countries continue to rule the roost in exports of technology oriented products, some developing countries have also managed to take

a slice of the pie. China, in particular, has emerged as a key hi-tech exporter in the world with a share of 20 per cent in world hi-tech exports in 2011.

HI-TECH TRADE ANALYSIS: INDIA PERSPECTIVE

The third chapter analyse the trends in India's international trade of hi-tech products. Hi-tech exports from India have been witnessing a significant CAGR of 26.7 per cent during the period 2007-2011, with exports having touched US$ 20.9 bn as compared to US$ 8.1 bn in 2007. Notwithstanding this, the country's potential in technology oriented manufacturing exports is yet to witness its full potential. Pharmaceuticals and electronic goods sectors predominate exports of hi-tech products from India, with the share of electronics in hi-tech exports almost doubling during the period 2007 and 2011. While key export destinations of hi-tech items remain largely the developed countries, there is a need to diversify into developing markets which have shown dynamism in import demand. The basket of India's hi-tech imports is similar to the country's hi-tech export basket, but for the absence of many pharmaceutical products, unlike in hi-tech exports, where they contributed significantly. India's hi-tech imports from the world in 2011 touched US$ 33.6 bn, increasing from US$ 23.9 bn in 2007, thereby registering a CAGR of 8.8 per cent. A rapid change in technology and India's increasing appetite to buy such hi-tech products has increased the import demand for hi-tech items like semi-conductors. Consequently, the share of these products in India's imports of hi-tech items has witnessed a significant rise.

PRODUCT & MARKET IDENTI-FICATION OF HI-TECH MANUFACTURING

The fourth chapter undertakes analysis of identifying hi-tech products that have potential for exports from India. While India needs to further strengthen its share in the major import markets, there are countries where India is already exporting but at relatively lower levels. These markets are the latent growth drivers for India's hi-technology exports and need to be suitably targeted. The chapter also has sought to identify products where domestic capacity expansion could yield significant results including higher exports.

STRATEGIES FOR INCREASING TECHNOLOGY BASED EXPORTS

The final chapter makes an attempt to provide a roadmap which could potentially enable the country to enter the league of top hi-tech exporting nations. This gains significance

considering that India's development story, post liberalization, has been one driven by the services sector, with the manufacturing sector playing only a second fiddle, mirrored in its stagnating contribution to the country's economic output. That this may not be a sustainable developmental model has been taken cognizance of by the government, which has now set a target of 25 per cent contribution by the manufacturing sector to India's GDP by 2022. Focus on hi-tech manufacturing products, especially in terms of their international competitiveness, needs to be an integral component of achieving this target. Achieving this goal requires coordinated advances in science, technology, innovation, and diffusion of the same. This strategy requires investments in multiple drivers, technology, education, capital formation, and industry infrastructure.

CAPACITY ENHANCEMENT

Analysis in the previous chapter revealed 41 hi-tech products which were classified as 'Product Champions' and 6 as 'Underachievers'. In order to give a special thrust to hi-tech exports, the prime objective would be to create avenues which result in enhancing exports of products identified under these categories, and thereby reduce the country's mounting trade deficit. The cumulative value of India's exports of products under the Product Champions category amounted to US$ 2.0 bn (9.5 per cent of total hi-tech exports from India in 2011) while cumulative net trade deficit for the same set of products aggregated to US$ 2.8 bn in 2011. The top 5 products with the highest trade deficit included digital computers (SITC 7522); other control etc instrument (SITC 87465); microtome; parts of instruments for physical or chemical analysis (SITC 87449); and parts, checking instrument (SITC 87426); and chromatographs etc. instrument (SITC 87442). These 5 items together contributed to a trade deficit of US$ 2.3 bn out of the total trade deficit of US$ 2.8 bn of the identified 41 product champions. Given that the total exports of these 5 products from India aggregated to US$ 168 mn in 2011, it is apparent that India does have manufacturing capabilities of these hi-tech products. Anecdotal evidence would suggest that creating capacities for manufacturing these products could help push India into the big league for export of hi-tech products having maximum potential.

In the 'Underachievers' category, 6 hi-tech export products have been identified. The cumulative value of India's exports of products under this category amounted to US$ 842 million in 2011, while the world import market for these 6 products stood at US$ 139.8 bn during the same period. Though for

these products, the world market has grown significantly faster than the average for all products (in the world) put together during the 2007-2011 period, India seems to be losing out market share to competing countries in these dynamic products. Further, for 5 products in this category, India's imports were higher than exports resulting in a cumulative trade deficit of US$ 1.4 bn. While manufacturing capabilities exists in India, the fact that the country is importing significant amounts and that these imports have increased during the 2007-2011 period is indicative of shortage of manufacturing capacities.

The Government could consider building up capacity in these identified products under Product Champions and Underachievers by creating an enabling environment that promotes investments, especially foreign investments, in these product lines, and businesses and industry may focus on these products to enhance their revenues both by catering to domestic and overseas markets.

Sectoral Focus: Hi-Tech Products

Electronics

India also needs to focus on specific sectors like electronics and capital goods. The share of hi-tech exports in the electronics sector has increased from 16.8 per cent in 2007 to 30.1 per cent in 2011, with total exports amounting to US$ 6.3 bn in 2011. At the same time imports of hi-tech electronic items by India have increased from 66.4 per cent in 2007 to 69.9 per cent in 2011. It may however be noted that India's share in exports of hi-tech electronics to world have witnessed an increase from 0.1 per cent to 0.4 per cent during analysed period. Given the increasing propensity of India's exports of hi-tech electronics, and the significant import appetite globally, impetus on increasing production of electronics becomes a win-win situation, both to satiate domestic demand as also to earn foreign exchange through exports. While the Government of India already has in place a number of fiscal incentives which envisages enhancing production of electronics, it could also learn from the examples of the successful development of this industry in other countries. For example, Taiwan fashioned a system that offered incentives to firms that succeeded in raising their productivity or their export levels, and penalise firms that did not achieve such goals by withdrawing the tax credits and other financial incentives. In this way, Taiwan's leadership maintained a tight focus on policy goals and on

performance toward those goals rather than allowing incentive programs to become mere rent-seeking systems. Institutions in Taiwan were fashioned to encourage performance-oriented behaviour. Institutional learning took place, from country to country and within countries, as the institutions created adapted to new circumstances and acquired new experiences. For every step in the industry-building process, Taiwan's firms developed strategies to complement the strategies being pursued by established firms overseas. India could follow a similar approach of inculcating the successful experiences from abroad while creating a niche for itself in the electronics industry.

Capital Goods

The capital goods sector which has a multiplier effect and has a bearing on the growth of the user industries, as it provides critical inputs, is a strategic one. The sector primarily comprises machinery, nuclear reactors, boilers, electrical, electronic equipments, etc. Although exports of capital goods from India increased from US$ 8.7 billion in 2007 to US$ 14.9 billion in 2011, its share in world exports remains marginal at 0.6 per cent as in 2011. Imports, on the other hand, were at staggering US$ 44.5 billion as in 2011, with the country accounting for a share of 2 per cent of world capital goods imports. Given the huge demand domestically, there is an urgent need to capitalise upon the domestic market and encourage import substitution. Hi-tech oriented capital goods are a huge opportunity for India to focus upon, not just for the domestic market but also to tap the overseas markets. This would entail acquisition of technology know-how, especially from overseas firms through knowledge sharing, joint ventures, acquisitions, and investments, both inward as well as outward.

Policy Incentives to Encourage Private Sector Investments and FDI in Hi-Tech Manufacturing

One of the major reasons cited for low volume of hi-tech goods production is low greenfield FDI inflows and limited focus on R&D by Indian companies. Indian investment in R&D is largely government driven. On the other hand, countries such as Japan and South Korea are looking out for alternative investment destinations, instead of China, because of geopolitical reasons. Since hi-tech manufacturing is also high value added, they are not constrained by logistics and wage rates as compared to low-tech or mid-tech

goods. Hence, there has to be a pull factor to attract investments into this sector. This could be attained through fiscal and financial incentives.

A Special Subvented Financing Package

Countries like Brazil have been providing special financing package under its investment support programme, viz. PSI Programme (Programa BNDES de Sustenção do Investimento) which subsidizes the interest rate of loans from the state development bank, BNDES, to purchase capital goods and support export and technological innovation. The Government of India / RBI could also consider setting up a similar credit facility exclusively for investments in hi-tech industries, so as to level the playing field and augment the country's export competitiveness for such products. Such mechanism, if considered for implementation, should provide low cost funds cheaper than the cost of ECB financing, as also the ECA financing and pave the way for India to either move into hi-tech products which are currently not being manufactured or enhance its competitiveness in such products where it is competing with other global players. The BNDES model could be studied in detail and adapted in the Indian context so as to draw out the modalities of this proposal including the purpose, scope and coverage.

Tax Incentives for Investments in Hi-Tech Products

For the hi-tech sector to prosper, tax incentives for investments in hi-tech products is crucial. Fiscal reliefs raise the net present value of prospective research projects by reducing the cost of R&D. Fiscal measures allow markets – rather than governments – to determine the allocation of R&D investments across sectors, firms and projects. China presents an interesting case of fiscal incentives to attract investments in hi-tech sectors. Under its Enterprise Income Tax (EIT) Law that took effect in 2008, enterprises qualifying for the High-New Technology Enterprises (HNTE) Status regime are entitled to a preferential EIT rate of 15 per cent, rather than being subject to the normal rate of 25 per cent. The Chinese government provides a list of eight state encouraged industries that are considered in awarding HNTE status which benefits out of this program. India also provides certain fiscal incentives for R&D expenses which is mostly sector neutral. This includes a 100% deduction for R&D expenses (other than land) that satisfy a set of basic criteria and a super deduction of up to 200 per cent of qualifying R&D

expenses and research activities (150 per cent super deduction in the case of China). However, with a focus on promoting hi-tech manufacturing and exports, India could as well take a cue from the Chinese HNTE system and adopt suitable policy incentives. A key mechanism of this policy incentive would be preferential corporate income tax treatment for units manufacturing hi-tech products and meeting certain pre-defined criteria as in the case of the Chinese HNTE.

The Government of India announced a package of incentives in July 2012 for one of the hi-tech sectors, viz. the Electronic System Design and Manufacturing (ESDM) sector within Electronics Manufacturing Clusters (EMC), under the Modified Special Incentive Package Scheme (M-SIPS). This scheme provides for a 25 per cent subsidy on capital investments in new ventures and a 50 per cent grant for common facilities for units located in an area (viz. EMC), in addition to reimbursement of central taxes and duties. The benefits of M-SIPS are available for a period of 10 years after the initial investment. The Government could consider extending such special incentives for investments across all pre-notified hi-tech manufactured products which would catalyse investments (both domestic and FDI) in hi-tech manufacturing. The enabling provisions as highlighted above would help promote greenfield FDI inflows into hi-tech manufacturing sector, facilitating technology transfer and capacity development in domestic manufacturing. There would also be spin-off benefits of such package of incentives as outlined above, viz. creation of ancillary segments supplying to the large high technology manufacturing units, as was the case in the auto-component sector where larger mother units created a ready demand for development of OEM auto ancillary suppliers. While in the short term, there could be a marginal fiscal impact on the government, but over a longer term horizon, this could potentially benefit if the units are profitable through job creation, investments and eventually revenues (through both direct and indirect taxes).

Cluster Development Approach

Financial Assistance to set up World Class Hi-Tech Clusters

Industrial clusters have been proven to have several advantages in promoting the growth of a particular sector or industry. The National Manufacturing Policy has proposed the creation of massive National Investment and Manufacturing Zones (NIMZ) which are being conceived as industrial greenfield townships to promote world-class manufacturing activities.

A critical advantage the NIMZs can deliver is the clustering of small and large manufacturers (essentially customers and suppliers among themselves). While the setting up of NIMZ would be a longer-term option, the Government, in the near-term, could consider broadening the scope of the Electronics Manufacturing Clusters to include select identified hi-tech products thereby driving innovation and developing an entrepreneurial ecosystem. Under the EMC scheme, which supports setting up of both greenfield and brownfield clusters, financial assistance in the form of grant-in-aid would be provided to a Special Purpose Vehicle (SPV) promoted by private companies, industry associations, financial institutions, R&D institutions, State or Local governments or their agencies and units within the EMC. For Greenfield EMCs, the assistance would be up to 50 per cent of the project cost (subject to a ceiling of ₹ 50 crore for every 100 acres of land) while for brownfield EMCs, assistance would be up to 75 per cent of the project cost (subject to a ceiling of ₹ 50 crore). There is a need to expand the scope of the EMC scheme, in toto, to all hi-tech manufacturing clusters. This would help flow of both domestic and global investments for the development of world-class infrastructure specifically targeted towards attracting investments in the hi-tech sector.

*Foreign banks with 20 and above branches
**Foreign banks with less than 20 branches

Mitigating Financial Bottlenecks: Include Lending to Hi-Tech Clusters as part of Priority Sector

Over the years, the Indian financial system has played a crucial role in terms of directed resource mobilization in favour of sectors of strategic importance to the country, borne out by various policies, chief among them being Priority Sector Lending. At present, domestic commercial banks are required to achieve a priority sector target of 40 per cent of Adjusted Net Bank Credit* (ANBC), and the foreign banks are required to achieve 32 per cent of ANBC**. Within the overall priority sector lending target, sub-targets are set for domestic commercial banks to lend a minimum of 18 per cent to agriculture, and 10 per cent to weaker sections. Though Micro and Small Enterprises (MSE) sector is also included under the priority sector for domestic commercial banks, there is no sub-target set. Given the Government's strong focus on hi-tech manufacturing, one of the policy options could be to include lending to notified hi-tech clusters and the units operating therein as a part of the overall priority sector lending. Depending upon the thrust of the Government to make India a key manufacturing hub of hi-tech products, RBI could also consider putting sub-targets for lending to hi-tech industries clusters at 10 per cent of ANBC.

Institutional linkages quintessential for Technology Clusters

Empirical studies across geographies have established the fact that technical universities are an integral component for building a successful cluster. In India, this causal relationship has been rather non-existent with hardly any concrete intervention of institutes or technical universities in clusters. As against this, in USA, if Stanford University and University of California at Berkeley are disconnected from the Silicon Valley, this region would fast deteriorate as a technology cluster. That would be unlikely in the case of say Indian Institute of Science, Bangalore or Indian Institute of Technology from New Delhi, if removed or shifted from the respective cities – the technology companies present in the nearby clusters would still continue to perform without any significant adverse impact. While the Government does not need to intervene directly, it can surely facilitate an enabling environment for strong industry-academia linkages, wherein institutions are motivated and encouraged to share common platforms with clusters for knowledge sharing and research. It may be worthwhile to mention here that for reinvigorating its manufacturing sector, USA has allocated US$ 500 million to six universities to initiate the Advanced Manufacturing Partnership program between industry and institutions. The partnership includes 11 manufacturing companies including Ford Motor Co., Caterpillar Inc., Procter & Gamble Co., and Northrop Grumman Corp., and Dow Chemical Co., among others.

Other Measures

Leverage Public Procurement for Localization and Technology Transfer

India represents one of the fastest growing markets in the world. Local demand provides a unique opportunity for hi-tech manufacturers to scale up, especially considering the country's ever increasing trade deficit in this segment. The government needs to ensure an environment that promotes investments in local manufacturing and enables the domestic players to compete on a level playing field. Examples of countries such as China and Korea, where this has been the basis for creating global giants, could be suitably adapted in the Indian context.

Adapting and Replicating Successful Development Models of Hi-Tech Manufacturing

India also needs to adapt and replicate successful development models of hi-tech manufacturing. Analysis of hi- tech zones like Chengdu (China) and Colorado (USA) reveals that these regions, despite being land-

locked (away from ports by about 800 kms) have been able to develop successful hi-tech manufacturing industries. These have, over the years, increased their exports significantly, provided additional employment and generated higher tax revenues than neighbouring regions that have not adopted a hi-tech manufacturing strategy. These two examples indicate that hi-tech manufacturing is region-neutral and does not require large land area. Suitable geographies may be identified in various states to develop hi-tech zones. A conscious attempt is required to be made to attract foreign and domestic investment in these sectors by offering special incentives as is being offered by other countries, some of which have been highlighted in the subsequent sections.

Creating Institutes of Strategic Importance

India could consider building institutes of strategic importance which are focussed on developing and implementing innovative ideas related to hi-tech products. These institutes could help ensure technological competence, while allowing India to leapfrog its global competitors in the medium to long term. The National Innovation Council could perhaps take a lead in this initiative. USA, for example, while being aware of the power of manufacturing, has invested in the development of National Manufacturing Innovation Institutes. One such institute that is already up and running is the National Additive Manufacturing Innovation Institute (NAMII) in Youngstown, Ohio. NAMII is a public-private partnership initiative with member organizations from industry, academia, government, and workforce development resources, all collaborating with a singular, shared vision. NAMII's goal is to transition additive manufacturing technology to the mainstream U.S. manufacturing sector, and create an adaptive workforce capable of not only meeting industry needs but also increasing domestic manufacturing competitiveness. India too needs to establish institutes of such magnitude which can help the country to create niche hi-tech products that could potentially earn greater levels of foreign exchange through exports.

1. INTRODUCTION

Competitiveness is critical for sustainable industrial development, and the element of competitiveness is arrived at through technological interventions in manufacturing. Technology oriented manufacturing not only induces higher returns but also strengthens other forms of industries while creating capabilities to deepen manufacturing. Technological depth also ensures self-reliance in strategically important sectors and ensures a healthy trade balance. The technological structure of production invariably entails a shift of the production structure from relatively simple to higher order activities and complex technologies. Moreover, technologically oriented manufacturing offers other benefits or externalities namely: they tend to grow more rapidly in terms of the variety in production and trade; they have greater scope in economies, exists learning potential and beneficial spillovers; and all these together help in making countries more responsive to new technological demands. This chapter highlights the key reasons for India to focus and concentrate on technology oriented exports. The reasons on hindsight as explained include: the deteriorating share of manufacturing in the country's GDP, the critical nature of technology intervention that is essential in manufactured exports, stagnant Manufacturing Value Added (MVA) for a period of almost two decades, laggards in share in technology oriented manufactured exports when compared with other emerging peers, and the importance of R&D orientation in manufacturing. Given the impetus by the Government to accelerate and increase the share of manufacturing in India's exports in a decade, this study attempts to highlight some directions to attain the same.

Economic theory commonly associates a positive relationship between investments in research and development and economic growth of a country. As governments continue to revise their policies in a bid to gain competitive edge, it becomes imperative for a country like India to move up the technological value chain to realise higher returns while at the same time maintaining its competitiveness in traditional export

items. In a globally competitive space, countries dependent significantly on exports of select primary products which have low technology orientation, face constraints in the long run development process. Uncertainty arising from price variability, consequent fluctuating export earnings, and difficulties in achieving economic diversification can prove to be detrimental for such countries which are still in the process of development and have relatively low incomes. This study makes an attempt to apprise of the significant potential that technology-laden exports have, and India's potential therein.

There have been various definitions of technology products. World Bank defines high technology exports as "... those that are products with high R&D intensity, such as in aerospace, computers, pharmaceuticals, scientific instruments, and electrical machinery"; Eurostat defines it "... as being involved in, or making use of highly advanced technological development or devices, mainly the use of electronics (especially computers); while UNIDO actually classified them under SITC 3-digits, wherein 17 products have been identified across industries.

While the demand and the production of high-end technology oriented products have gained significance, it becomes important to convey the benefits of such an endeavour, which will enhance the productivity of the sector in India.

Lagging Share of Manufacturing in India's GDP

In the last two decades, the Indian economy has witnessed a transformational change to emerge as one of the fastest growing economies in the world. Economic reforms unveiled in 1991 have brought about a structural shift enabling the private sector to assume a much larger role in the economy. GDP growth has largely been enabled by growth of the services sector. The overarching concern is that the contribution of India's manufacturing sector to the country's GDP has remained stagnant at about 16 per cent of GDP, and later declined to 15.1 per cent. India's share in global manufacturing is also at only 1.8 per cent. It may be noted that the share of manufacturing in India's GDP currently has been at the lowest level in the past 10 years. This is in stark contrast to the experience of other Asian nations, who were at similar stages of economic development, particularly China, where manufacturing constitutes 34 per cent of national GDP and 13.7 per cent of world manufacturing - up from 2.9 per cent in 1991.

India needs a renaissance in manufacturing with a massive dose of new investments in the sector, which can spur country's growth. Manufacturing sector has the propensity to act as a panacea, to many of India's long standing challenges, namely, unemployment, trade deficit, etc. A modern manufacturing sector is essential for the development of our scientific and technological base, for the growth of our knowledge economy, and for our national security. The realization of the need to substantially increase the share of manufacturing in India's GDP, from the current levels of around 14 per cent to 25 per cent by 2022, to address the problem of unemployment and under-employment in the country, has as its natural corollary, the strategy to 'Boost India's Manufacturing Exports' during the XII Five Year Plan.

Importance of technology content in manufacturing output and exports

Exports have been the key to economic growth in most countries. With India's potential technology strengths and with the focus shifting to export of newer products and to newer markets in the Foreign Trade Policy (2009-14) announced by the Government of India, there is an excellent opportunity for India to evolve competitive advantage through technology-led exports. The average value addition of technology in products currently manufactured by Indian industry is around 8 per cent, very low compared to even other emerging developing nations[1]. Indian manufacturing is rather shallow, with more focus on assembling and sales rather than design and development. Despite having one of world's largest and fastest growing markets, the country captures only a very limited part of the product value chain, thus limiting its potential to undertake assemblies/ sub-assemblies in India. Industry's investment in R&D is the main indicator to measure industrial innovation. In the developed economies, the share of industry's investment in R&D is around 3/4th of the Gross Expenditure in R&D (GERD) whereas in India the picture is diametrically opposite. India's overall GERD is low (compared to innovation driven economies) at around 1 per cent of GDP, and the situation becomes alarming when large portion of GERD is Government driven (3/4th of GERD is from the Government sector).

This has, among others, resulted in low levels of manufacturing value added (MVA) in the country, a situation that has remained virtually the same over the past two decades. *Table-1* clearly

[1]National Manufacturing Competitiveness Council

depicts India's mediocre position globally in the list of countries ranked in terms of manufacturing value added (as a percentage of GDP)[2]. India ranked 52nd globally in 2010, and stands below many of the developing and emerging countries like Thailand, South Korea, China, Indonesia, Mexico, Singapore, and Bangladesh.

Share of Hi-Tech Exports in Manufactured Exports of India

India's hi-tech exports as a percentage of manufactured exports has remained largely stagnant during the last ten years. When compared with world average, India lags far behind. A comparison with select developing and emerging economies in the world *(Table 2)* shows that India was ranked 8th just above South Africa and Kenya. Countries like Malaysia, China, South Korea, Mexico, and Israel, exhibits a double digit share of hi-tech exports in their total manufactured exports (43.4 per cent, 25.8 per cent, 25.7 per cent, 16.5 per cent and 14 per cent, respectively). Further, the divergence is even more stark in terms of absolute values of hi-tech exports – China's exports is 25 times that of India (US$ 517.4 bn vs. US$ 20.9 bn), South Korea is 6 times (US$ 129.4 bn) and Malaysia 3 times (US$ 64.2 bn).

SUM UP

The manufacturing sector in India has remained on the fringes for long,and one could argue insignificant R & D

Table 1: Share of MVA in GDP in Select Developing Countries*

	Thailand	South Korea	China	Indonesia	Malaysia	Singapore	Philippines	Mexico	Bangladesh	Brazil	India	South Africa	Kenya
1991	28.2	27.4	32.5	21.4	25.6	26.1	25.3	20.6	13.4	25.3	15.2	22.9	12.0
2010	35.6	30.3	32.5	24.8	24.6	21.6	21.4	17.3	17.9	16.2	14.9	14.7	11.3

* MVA is calculated as a percentage OF GDP
Source: World Bank Indicators, 2013

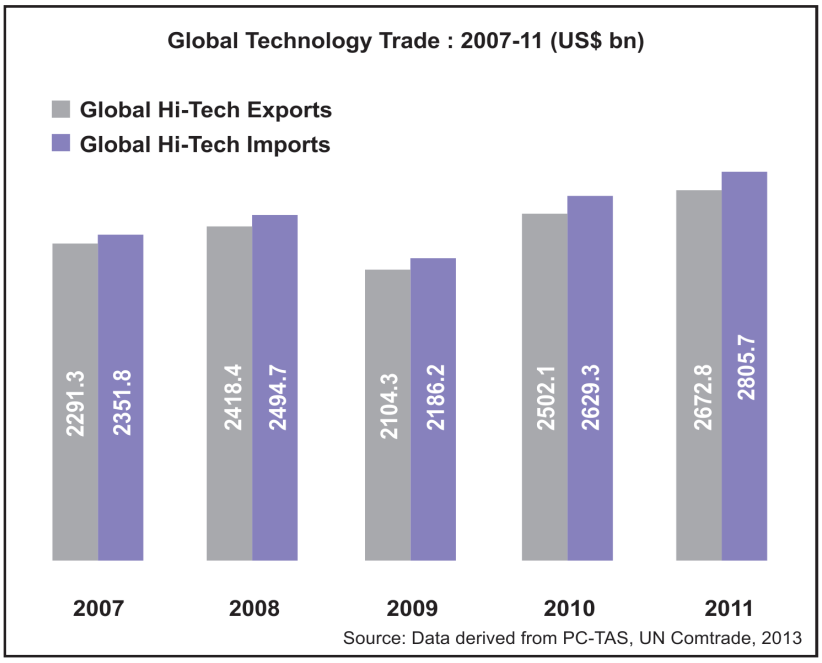
[2] Value added is the net output of a sector after adding up all outputs and subtracting intermediate inputs. It is calculated without making deductions for depreciation of fabricated assets or depletion and degradation of natural resources

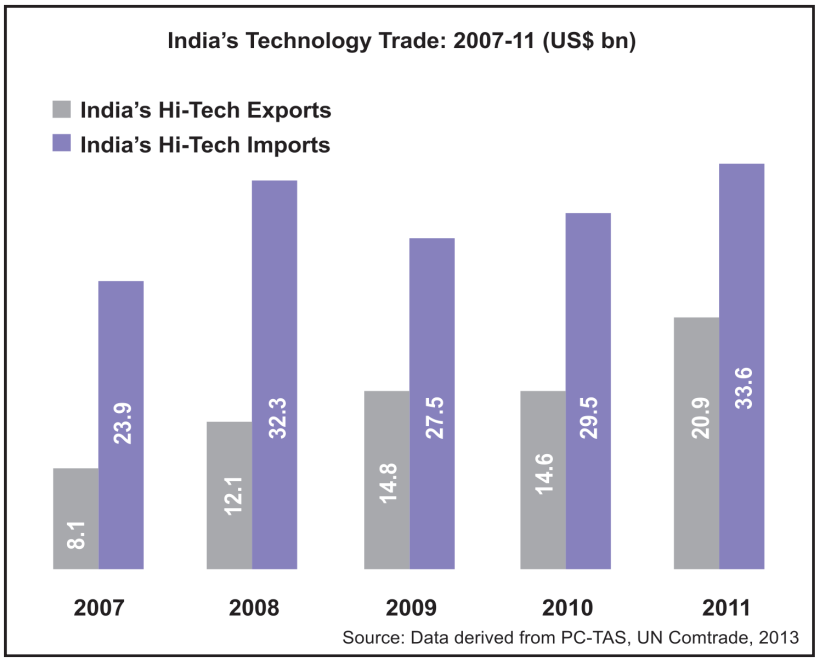
Table 2: Hi-Tech Exports (% of Manufactured Exports) for Select Countries

COUNTRY NAME	1991	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
WORLD	**18.7**	**22.9**	**22.2**	**21.1**	**20.9**	**20.7**	**20.8**	**17.5**	**16.6**	**18.3**	**17.5**	**17.6**
DEVELOPING ECONOMIES												
Malaysia	38.2	58.1	58.2	58.9	55.7	54.6	53.8	52.3	39.9	46.6	44.5	43.4
China	na	21.0	23.7	27.4	30.1	30.8	30.5	26.7	25.6	27.5	27.5	25.8
Singapore	40.5	60.9	60.6	56.5	56.9	56.9	58.1	45.2	49.4	48.1	49.9	45.2
Mexico	8.7	22.1	21.4	21.4	21.3	19.6	19.0	17.2	15.7	18.2	16.9	16.5
Israel	11.3	18.6	15.5	16.8	16.9	14.0	14.5	7.5	11.1	17.6	14.7	14.0
Indonesia	1.9	14.2	16.7	14.8	16.4	16.5	13.5	11.0	10.9	12.9	9.8	8.3
Russia	na	14.0	19.2	19.0	12.9	8.4	7.8	6.9	6.5	9.2	9.3	8.0
India	4.7	7.0	6.2	5.9	6.0	5.8	6.1	6.4	6.8	9.1	7.2	6.9
South Africa	na	6.5	5.2	4.8	5.5	6.7	6.5	5.6	5.1	5.4	4.3	5.1
Kenya	3.0	4.9	10.6	3.6	3.2	2.9	3.2	5.5	4.2	5.3	5.7	na
DEVELOPED ECONOMIES												
South Korea	19.3	29.8	31.5	32.3	32.9	32.5	32.1	30.5	27.6	28.7	29.5	25.7
United Kingdom	24.7	34.1	31.7	26.3	24.5	28.3	33.9	18.9	18.5	21.8	21.0	21.3
United States	32.4	32.6	31.8	30.8	30.3	29.9	30.1	27.2	25.9	21.5	19.9	18.1
Japan	24.2	26.6	24.8	24.4	24.1	23.0	22.1	18.4	17.3	18.8	18.0	17.5
Germany	13.1	18.3	17.5	16.9	17.8	17.4	17.1	14.0	13.3	15.3	15.3	15.0

Source: Data derived from World Indicators Developement, World Bank; Exim Bank Research

Exhibit 1: Technology Trade: Globally and in India





orientation as one of the major reasons for its current state of affairs. Enhancing technology intensiveness in the manufacturing sector would perhaps be the right approach that could catapult India to the select league of hi-tech exporting economies. It is imperative for the sector to urgently innovate and produce technology oriented goods, so as to gain ground in global manufacturing. From a developing economy's perspective, technological upgrading depends on the extent of adoption and implementation of new technologies that are in use in the advanced countries, through technology diffusion. The important mechanisms of technology diffusion include R&D intensity in indigenous manufacturing, besides transfer of technology through foreign direct investment.

Technology oriented manufacturing will not only provide impetus to enhance revenue generation (through exports) but also has the potential to have a multiplier effect on job creation. The hi-tech manufacturing strategy will ramp up the industrial base that is critical to our economic growth, and make the country self sufficient in critical technology oriented manufacturing products, including defence. This resurgence will not only create new jobs but also make India competitive in the global marketplace where other peer countries are making rapid strides.

This study has differentiated manufacturing based on technological intensiveness – high, medium and low technology - in its analysis. The focus of the study is analysing the trends in international trade of high tech manufactured products, make an attempt to identify a product –market segmentation for dynamic high tech products and suggest strategies for realising the growth of high tech manufacturing, with special thrust on promoting their exports, while at the same time providing avenues for import substitution.

2. GLOBAL HI-TECH TRADE: ANALYSIS

Globally, technology exports have witnessed an increase across the categories, high, medium, and low. The global hi-tech export sector is largely dominated by electronics and pharmaceuticals, which together constitute 80 per cent of hi-tech exports. On the other hand, medium-tech exports are dominated by capital goods and automobiles, and low-tech exports are dominated by metal products and textiles. While developed countries continue to rule the roost in exports of technology oriented products, some developing countries have also managed to take a slice of the pie. China, in particular, has emerged as a key technology exporter in the world with a share of 20 per cent in world hi-tech exports. China's share, especially in global hi-tech exports, has shot up significantly since 2007. This chapter details the international trade of hi-tech exports analysing the trade trends by countries and products.

HI-TECH EXPORTS

Hi-tech exports were valued at US$ 2672.8 bn in 2011, growing from a level of US$ 2291.3 bn in 2007, recording a CAGR (compounded annual growth rate) of 3.9 per cent, during the period 2007-2011. Within hi-tech exports, while electronic products continued to remain the largest sector, its share declined from 62.9 per cent in 2007 to 61.7 per cent in 2011. On the other hand, exports of hi-tech pharmaceutical products witnessed an increase in share from 16.0 per cent to 18.3 per cent during the same period. A similar increase was witnessed in the case of electrical equipment sector with its share increasing from 7.8 per cent to 8.6 per cent.

Analysis at SITC 4-digit level reveals that electronic microcircuit (SITC 7764) was the predominant hi-tech item traded in the world, accounting for a significant share of 15.0 per cent of total global hi-tech exports in the year 2011. Other major hi-tech items traded include: telecommunication equipment and parts (SITC 7649); TV, radio transmitters etc (SITC 7643); digital computers (SITC 7522); and parts

Exhibit 2: Share of Hi-Tech Exports Sectorwise from World

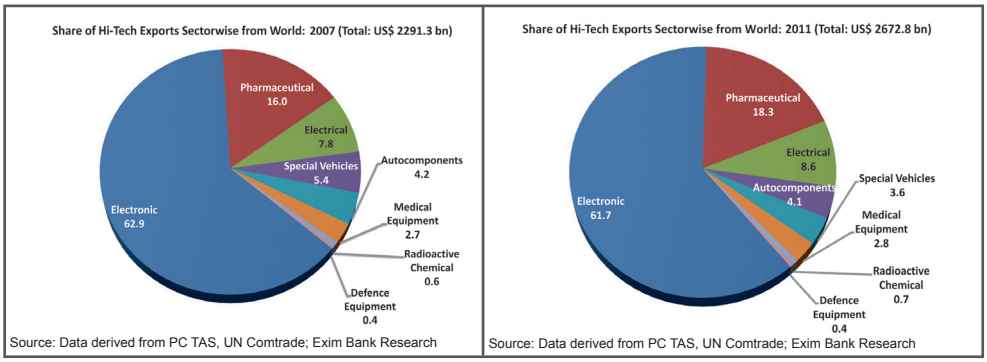


Table 3: Top 5 items of Key Categories of Hi-tech Exports from World

ELECTRONICS (2011: 61.7 per cent share)				PHARMACEUTICALS (2011: 18.3 per cent share)			
SITC Code	**Product Name**	**Share 2007**	**Share 2011**	**SITC Code**	**Product Name**	**Share 2007**	**Share 2011**
7764	Electronic microcircuits	15.6	15.1	5429	Glycosides; glands etc.	2.3	3.6
7649	Parts And Accessories Suitable For Use Solely Or Principally With The Apparatus Of Telecommunications And Sound Recording And Reproducing Equipment	7.0	6.6	5416	Medicaments, hormones etc	1.1	1.2
7643	TV, radio transmitters etc	5.9	6.1	5422	Medicaments, antibiotics	0.7	0.8
7522	Digital computers	4.6	5.8	5421	Medicaments containing antibiotics or derivatives thereof	0.6	0.7
7599	Parts And Accessories For Use Solely Or Principally With Office Machines (except Photo- Or Thermo-copy) And Automatic Data Processing Machines	6.6	4.9	5419	Pharmaceutical goods, other than medicaments	0.5	0.6

Source: Data derived from PC-TAS, UN Comtrade, 2013, EXIM Bank Research

and accessories of data processing etc. machinery (SITC 7599). Among the top 10 export items, glycosides, glands etc (SITC 5416); diodes, transistors etc (SITC 7763); digital computers (SITC 7522); and liquid crystal devices, lasers (SITC 8719); registered significant growth during the period 2007-2011 *(Table 4)*.[3]

Electronic microcircuits continued to dominate the hi-tech export market during the period 2007-2011 with its share in world hi-tech trade hovering in the 14 per cent to 15 per cent range. While most of the major products have more or less remained the same, one particular item that merits a mention is glycosides, glands, etc (SITC 5416),

Table 4: Major Hi-Tech Items Traded in the World

SITC	PRODUCT NAME	VALUE (US$ BN)					CAGR (%)
		2007	2008	2009	2010	2011	2007-11
7764	Electronic microcircuits	357.3	332.4	305.1	391.5	402.3	3.0
7649	Parts, telecommunication equipment	161.5	175.0	141.4	165.5	176.6	2.3
7643	TV, radio transmitters etc	136.0	136.3	121.5	135.6	162.9	4.6
7522	Digital computers	106.5	115.2	106.9	138.9	154.7	9.8
7599	Parts And Accessories For Use Solely Or Principally With Office Machines (except Photo- Or Thermo-copy) And Automatic Data Processing Machines	151.2	151.4	120.4	141.1	131.0	-3.5
7763	Diodes, transistors etc.	62.6	78.6	67.5	112.4	113.2	16.0
8719	Liquid crystal devices; lasers	67.5	77.0	68.2	92.4	96.9	9.5
5416	Glycosides; glands etc.	52.3	63.3	76.9	85.2	95.5	16.3
7924	Airplanes And Other Aircraft, Mechanically Propelled (other Than Helicopters), Of An Unladen Weight Exceeding 15,000 Kg	97.0	99.3	60.3	70.6	79.2	-5.0
7712	Other electric power machine, part	53.3	59.8	49.9	67.5	74.0	8.6
TOTAL HI-TECH EXPORTS		**2291.3**	**2418.4**	**2104.3**	**2502.1**	**2672.8**	**3.9**

Source: Data derived from PC-TAS, UN Comtrade, 2013, EXIM Bank Research

[3]All residual items which are categorised as not elsewhere classified have been excluded for the purpose of the analysis

whose share in world hi-tech trade increased from 2.3 per cent in 2007 to 3.6 per cent in 2011.

An analysis of hi-tech products with export value of more than US$ 10 bn in 2011 reveals that most of these products can be either categorised as electronic products, or medicinal and pharmaceutical products. These two segments accounted for 80 per cent of world hi-tech exports in 2011. Medicinal and pharmaceutical products was also among the segments which exhibited dynamic growth during the period 2007-2011, with items like glycosides (SITC 5416), hormones (SITC 5415) and antibiotics, not put up as medicaments (SITC 5413) being among the top 5 items (excluding residual items, i.e. not elsewhere classified) in terms of growth. Out of the top 10 products in terms of CAGR, 5 products also figure in the list of top 10 items in terms of absolute export values in 2011 *(Table 5)*.

China remained the largest exporter of hi-tech products in the world, with exports aggregating to US$ 517.4 bn in 2011, registering a CAGR of 10.8

Exhibit 3: Changing Share of Major Hi-Tech Exports (SITC 4 Digit Level)

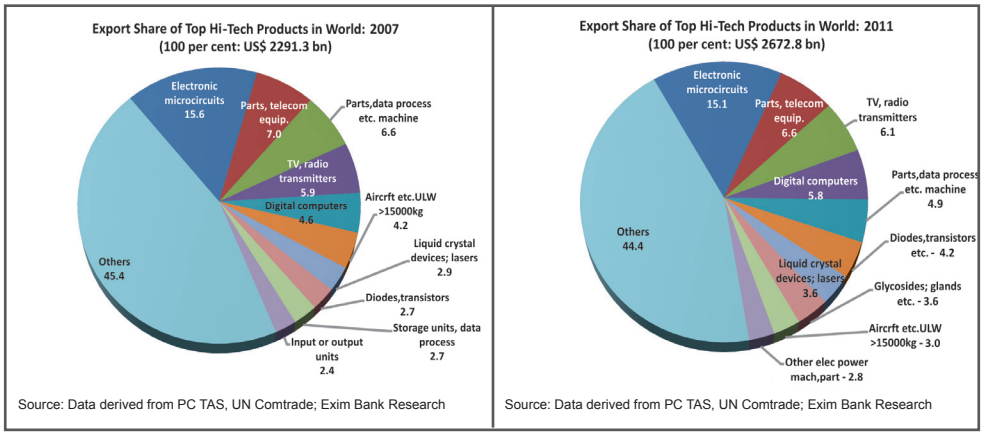


Table 5: Major Hi-Tech Export Items Showing Dynamism In Terms Of CAGR

SITC	PRODUCT NAME	VALUE (US$ BN)					CAGR (%)
		2007	2008	2009	2010	2011	2007-11
5416	Glycosides; glands etc.	52.3	63.3	76.9	85.2	95.5	16.3
7763	Diodes, transistors etc.	62.6	78.6	67.5	112.4	113.2	16.0
5415	Hormones, etc.	8.8	8.2	9.0	10.4	13.1	10.6
7522	Digital computers	106.5	115.2	106.9	138.9	154.7	9.8
5413	Antibiotics, not put up as medicaments	11.2	12.4	12.6	12.5	16.2	9.7
8719	Liquid Crystal Devices,; Lasers (other Than Laser Diodes); Other Optical Appliances And Instruments	67.5	77.0	68.2	92.4	96.9	9.5
8744	Instruments, analysis etc	25.5	28.5	27.5	31.2	36.3	9.2
7712	Electric Power Machinery; Parts Of Electric Power Machinery	53.3	59.8	49.9	67.5	74.0	8.6
5419	Pharmaceutical Goods, Other Than Medicaments	14.0	16.7	16.4	18.3	19.4	8.5
5421	Medicaments, antibiotics	15.5	17.6	18.8	20.2	21.4	8.4
Total Hi-Tech Exports		**2291.3**	**2418.4**	**2104.3**	**2502.1**	**2672.8**	**3.9**

Source: Data derived from PC-TAS, UN Comtrade, 2013, EXIM Bank Research

per cent during the period 2007-2011. The top 20 exporters also comprise many other emerging countries like Malaysia, Mexico, and Russia *(Table 6)*. It may also be noted that while hi-tech exports from China is increasing at a rapid pace, exports from countries like USA, Japan and UK – the traditional hi-tech exporters – have been showing weak and declining growth rates. USA, in fact, witnessed a negative CAGR of 5.0 per cent during the period 2007-2011. However, one country that merits a mention here is Switzerland, whose exports of hi-tech products recorded a significant CAGR of 11 per cent, the highest among the top 20 hi-tech exporters, with exports touching US$ 73.9 bn in 2011.

Comparison of shares of hi-tech exporters in the world, country wise, for the years 2007 and 2011 shows that there has been a slight increase

Table 6: Major Exporters of Hi-Tech Products in World

EXPORTING COUNTRY	VALUES (US$ BN)					CAGR (%)
	2007	2008	2009	2010	2011	2007-11
China	342.7	383.1	344.6	458.5	517.4	10.8
Germany	203.0	220.2	192.0	211.1	235.9	3.8
USA	286.2	289.6	201.7	226.7	233.1	-5.0
Hong Kong	134.4	142.8	132.8	168.7	186.3	8.5
Singapore	115.4	127.5	103.8	135.5	135.4	4.1
South Korea	113.5	113.7	104.1	131.6	129.4	3.3
France	100.8	114.9	102.3	118.4	124.9	5.5
Japan	110.8	112.2	90.6	112.6	115.2	1.0
Taiwan	89.4	89.9	75.0	106.1	114.9	6.5
Netherlands	82.0	70.9	64.1	72.8	80.7	-0.4
Switzerland	48.5	58.8	57.8	62.9	73.9	11.1
United Kingdom	69.1	69.8	63.1	67.3	71.8	1.0
Malaysia	68.6	48.0	55.8	64.4	64.2	-1.6
Belgium	60.9	66.0	64.4	64.4	64.0	1.3
Italy	40.8	43.5	38.1	41.8	47.7	4.0
Mexico	36.2	39.5	35.8	45.4	47.5	7.0
Ireland	42.8	44.7	43.1	41.2	46.7	2.2
Thailand	33.2	32.8	29.8	35.9	34.9	1.3
Canada	39.8	37.2	33.2	33.0	34.8	-3.3
Sweden	25.6	26.9	23.2	26.2	28.2	2.4
Total Hi-Tech Exports	**2291.3**	**2418.4**	**2104.3**	**2502.1**	**2672.8**	**3.9**

Source: Data derived from PC-TAS, UN Comtrade, 2013, EXIM Bank Research

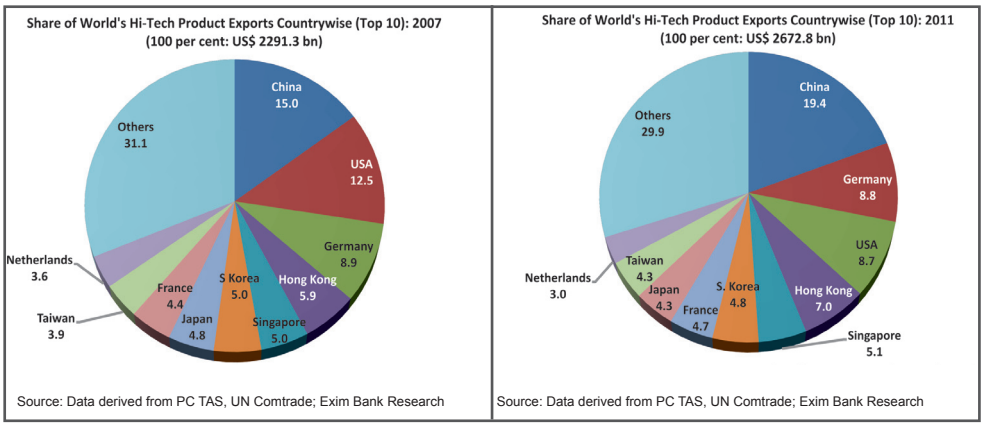
in the cumulative share of the top 10 exporters - from 68.9 per cent in 2007 to 70.1 per cent in 2011. While China continued its dominance in hi-tech exports, its share also witnessed a significant increase, from 15.0 per cent in 2007 to 19.4 per cent in 2011. On the other hand, USA which had a share of 12.5 per cent in 2007 witnessed a considerable decline in the share of global hi-tech exports, to 8.7 per cent in 2011 *(Exhibit 4)*. Amongst the developed countries, France and Switzerland exhibited an increase in share in world exports of hi-tech products between the two analysed periods.

China with a share of 19.3 per cent in global hi-tech exports has been exporting largely electronic products. *(See Annexure-1)*. The key export destination for Chinese hi-tech products remains Hong Kong, USA, Japan, Netherlands, Korea, and Germany (in that order). India was the 9th largest export destination for China. USA and Germany, apart from exporting electronic and computer items, also exported pharmaceutical products.

It is also interesting to note that for most major Asian exporters, the hi-tech base is fairly narrow with the top hi-tech export item accounting for at least one-fifth, and top 5 items together accounting for at least half of the country's total hi-tech exports in 2011. Unlike this, hi-tech export base of western countries like Germany, USA, and France (to a lesser extent), and the Netherlands is reasonably broad-based.

Another interesting point that emerges is for all the top 10 hi-tech exporters, electronic microcircuits (SITC 7764) remains a key item; this item accounts for nearly half of the hi-tech exports of Singapore and Taiwan.

Exhibit 4: Top Ten Hi-Tech Exporters: Inter-Temporal Comparison of Shares



HI-TECHNOLOGY IMPORTS

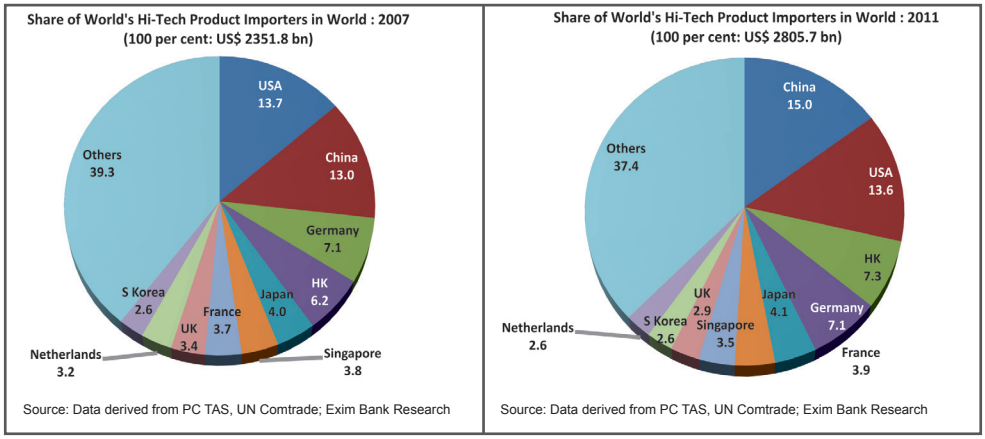
As in the case of exports, China was also the top importer of hi-tech products with imports aggregating to US$ 419.9 billion in 2011 *(Table 7)*. In fact the top five exporters of hi-tech products were also the top five importers, although not in the same order. China's import appetite has visibly moved up with its share having increased from 13 per cent in 2007 to 15 per cent in 2011.

Table 7: Key Importers of Hi-Tech Products in the World

IMPORTER	VALUES (US$ BN)					CAGR (%)
	2007	2008	2009	2010	2011	2007-11
China	305.7	320.1	292.9	381.2	419.9	8.3
USA	323.0	327.2	298.4	350.5	381.3	4.2
Hong Kong	146.1	151.4	143.8	185.3	203.5	8.6
Germany	166.4	177.8	159.2	184.0	198.0	4.4
Japan	93.3	97.2	84.7	105.0	115.8	5.5
France	86.3	92.2	87.2	103.1	110.7	6.4
Singapore	88.2	100.0	79.0	98.0	99.5	3.1
United Kingdom	81.0	77.0	66.0	75.3	80.7	-0.1
South Korea	60.7	63.8	53.8	67.4	73.3	4.8
Netherlands	74.3	67.0	58.2	67.4	73.0	-0.5
Mexico	51.8	61.2	53.4	67.2	70.9	8.2
Italy	51.1	54.8	50.3	63.9	65.8	6.5
Canada	51.9	53.7	48.0	54.9	60.2	3.7
Taiwan	55.2	51.6	41.8	57.2	59.5	1.9
Belgium	59.7	63.6	59.9	58.8	56.6	-1.3
Malaysia	55.1	42.6	41.7	55.0	56.4	0.6
Russia	26.7	33.6	25.3	34.4	40.2	10.8
Spain	45.1	53.2	39.9	39.2	38.7	-3.7
Switzerland	31.0	33.0	30.4	33.6	38.6	5.6
Australia	26.2	28.9	24.2	29.0	35.2	7.7
TOTAL HI-TECH IMPORTS	2351.8	2494.7	2186.2	2629.3	2805.7	4.5

Source: Data derived from PC-TAS, UN Comtrade, 2013, EXIM Bank Research

Exhibit 5: Top Ten Hi-Tech Importers: Inter-Temporal Comparison of Shares



While Germany, USA and Japan have almost maintained the same shares in 2007 and 2011, import share of Hong Kong has witnessed a marginal increase from 6.2 per cent to 7.3 per cent.

The key importing countries across the globe have also imported largely electronic products *(See Annexure 2)*. Major hi-tech import items that are common to more than 5 major importers included: digital computers (SITC 7522); parts and accessories of data processing etc. machines (SITC 7599); and TV, radio transmitters etc. (SITC 7643). Another notable feature is that for all the Asian importers of hi-tech products, among the top ten global importers of hi-tech products, electronic micro circuits (SITC 7764) was the largest import item. Further, this product accounted for a predominant share of total hi-tech imports for all these countries – for Singapore and China, this share was as high as 47.7 per cent and 40.6 per cent, respectively, in 2011. As against this, the import basket of hi-tech products of the western markets was fairly diverse with no single product category accounting for more than 13 per cent share of its total hi-tech imports.

3. HI-TECH TRADE ANALYSIS: INDIA PERSPECTIVE

Hi-tech exports from India have increased by two and half times in value terms, registering a CAGR of 25.7 per cent during the period 2007 and 2011. Notwithstanding this, the country's potential in technology oriented manufacturing exports is yet to witness its full potential. Pharmaceuticals and electronic goods sectors predominate exports of hi-tech products from India, with the share of electronics in hi-tech exports almost doubling between the period 2007 and 2011. While key export destinations of hi-tech items remain largely the developed countries, there is a need to diversify into developing markets which have shown dynamism in import demand.

HI-TECH EXPORTS

Hi-tech exports from India has witnessed a significant CAGR (compounded annual growth rate) of 26.8 per cent during the period 2007-2011, with exports having touched US$ 20.9 bn as compared to US$ 8.1 bn in 2007. In absolute terms, hi-tech exports have increased by more than 2.5 times, during the period 2007 and 2011. While pharmaceutical sector was the leading export item under the hi-tech category in India, its share declined between the period 2007 and 2011, from 55.3 per cent to 45.5 per cent. As against this, electronic goods have emerged as major hi-tech export items increasing their share from 16.8 per cent in 2007 to 30.1 per cent in 2011 *(Exhibit 6)*. Share of electrical products in overall hi-tech exports have, however, subsided from 18 per cent to 9.9 per cent during the analyzed period.

The top 10 products of export[4] in the hi-tech category constituted 44.0 per cent of India's total hi-tech exports during 2011. Among these, most were pharmaceutical products – medicaments containing antibiotics

[4]Does not include products under the residual category of 'n.e.s'

Exhibit 6: Changing Share of Hi-Tech Exports from India: Sectorwise

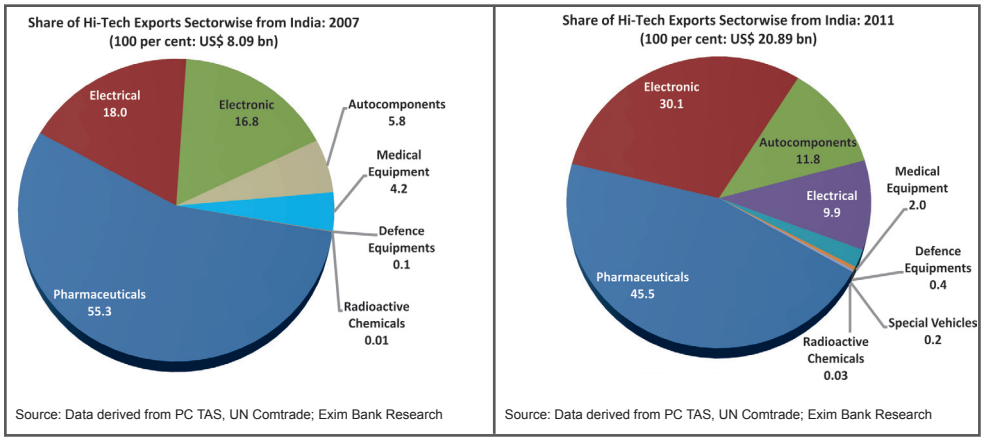


Table 8: Top 5 items of Key Categories of Hi-tech Exports from India

PHARMACEUTICALS (2011)				ELECTRONICS (2011)			
SITC Code	**Product Name**	**Share 2007**	**Share 2011**	**SITC Code**	**Product Name**	**Share 2007**	**Share 2011**
5421	Medicaments, antibiotics	10.9	6.4	7643	TV, radio transmitters etc	1.6	15.7
5413	Antibiotics, not put up as medicaments of group 542	6.3	4.2	7649	Parts, telecommunication, equipment	3.2	5.3
5416	Glycosides; glands etc.	2.5	2.1	7763	Diodes, transistors etc.	3.0	1.7
5422	Medicaments, hormones etc	3.3	1.7	7599	Parts, data processing etc. machinery	2.1	1.4
5414	Vegetable. alkaloids, except group 542	0.7	0.8	7641	Line telephone etc. equipment	0.9	1.0

Source: Data derived from PC-TAS, UN Comtrade, 2013, EXIM Bank Research

or derivatives thereof (SITC 5421); antibiotics, not put up as medicaments of group 542 (SITC 5413)[5]; and glycosides; glands etc (SITC 5416)[6]. Together these items accounted for 12.7 per cent of total hi-tech exports from India. Another category of products that finds frequent mention in the list is electronic products like TV, radio transmitters etc (SITC 7643); parts, telecommunication equipment (SITC 7649); and diodes, transistors etc. (SITC 7763[7]). These items together constituted 22.7 per cent of the hi-tech product exports from India *(Table 8)*.

In terms of CAGR of the top 10 hi-tech products exported from India *(Table 9)*, TV, radio transmitters etc (SITC 7643) exhibited a triple digit growth of 122.9 per cent during 2007 and 2011, with exports having increased from US$ 0.1 bn to US$ 3.3 bn during the analyzed period. Another item in the electronic sector which has shown dynamic growth in exports is parts of telecommunication equipment (SITC 7649), registering a CAGR of 38.4 per cent, to touch US$ 1.1 bn in 2011.

There has been a slight decline in the share of the top 10 hi-tech exports in the country's total hi-tech exports *(Exhibit 7)* - from 45.1 per cent in 2007 to 43.7 per cent in 2011. It is observed that most products witnessed a marginal decline in share amongst key hi-tech export products in 2011 as compared to 2007. Notable increase in share has been in the case of parts of telecommunication equipment (SITC 7649), where share has increased from 3.2 per cent in 2007 to 5.3 per cent in 2011.

As regards markets *(Table 10)*, USA remained the largest export destination for India's hi-tech products in 2011. Exports of hi-tech products

[5]5413 Includes: Penicillins and their derivatives with a penicillanic acid structure; Streptomycins and their derivatives; Tetracyclines and their derivatives; salts thereof

[6]5416 Includes: Glycosides, natural or reproduced by synthesis, and their salts, ethers, esters and other derivatives; Glands and other organs for organotherapeutic uses, dried, whether or not powdered; extracts of glands or other organs or of their secretions for organotherapeutic uses; heparin and its salts; other human or animal substances prepared for therapeutic or prophylactic uses; Antisera and other blood fractions; vaccines; Human blood; animal blood prepared for therapeutic, prophylactic or diagnostic uses; toxins, cultures of micro-organisms (excluding yeasts) and similar products

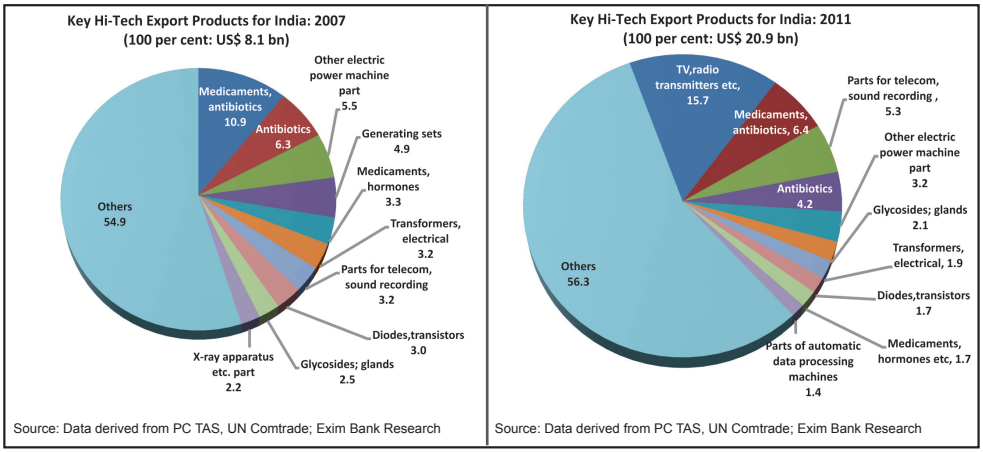
[7]7763 Includes: Diodes, transistors and similar semiconductor devices; photosensitive semiconductor devices (including photovoltaic cells, whether or not assembled in modules or made up into panels); light-emitting diodes

Table 9: Key Hi-Tech Export Items from India

SITC	Product Name	Value (US$ mn)					CAGR (%)
		2007	2008	2009	2010	2011	2007-11
7643	TV, radio transmitters etc	133	199	3485	1514	3285	122.9%
5421	Medicaments, antibiotics	884	1260	838	1050	1328	10.7%
7649	Parts, telecommunication equipment	259	220	338	292	1113	44.0%
5413	Antibiotics, not put up as medicaments of group 542	513	599	638	691	883	14.5%
7712	Other electric power machinery; parts of the electric power machinery of group 77	448	584	454	507	671	10.6%
5416	Glycosides; glands etc	199	129	330	218	436	21.7%
7711	Transformers, electrical	259	421	422	376	403	11.7%
7763	Diodes, transistors etc.	244	561	462	615	360	10.2%
5422	Medicaments containing hormones or other products of subgroup 5415 but not containing antibiotics	267	361	350	260	358	7.6%
7599	Parts, data process etc. machines	168	233	245	233	295	15.1%
Total Hi-Tech Exports		**8098**	**12068**	**14858**	**14652**	**20904**	**26.8%**

Source: Data derived from PC-TAS, EXIM Bank Research

Exhibit 7: Changing Share of Hi-Tech Exports from India: Product-wise



to USA recorded a CAGR of 19.5 per cent, with value of exports touching US$ 3.7 bn in 2011. UAE emerged as the second largest destination for India's hi-tech exports in 2011, at the back of strong demand, with exports to the country registering a significant CAGR of 45.8 per cent. Other major countries to which India is exporting hi-tech products are largely European nations (UK, Netherlands, Germany and France). Nigeria also figured among the list of top 10 hi-tech export destinations for India in 2011, exhibiting the second highest growth rate (after UAE) in terms of CAGR (37.5 per cent).

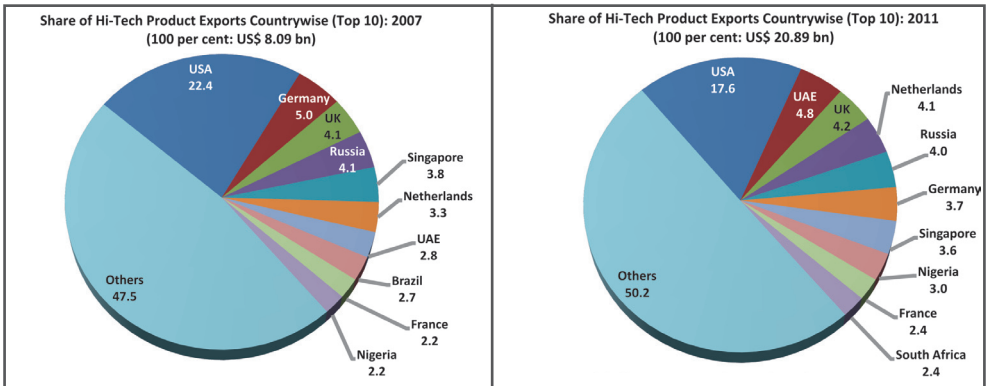
Comparison of share of major hi-tech export markets for India between the years 2007 and 2011 *(Exhibit 8)* shows that there has not been much change

Table 10: Key Export Destinations of Hi-Tech Products from India

Country	Value (US$ mn)					CAGR (2007-11)
	2007	2008	2009	2010	2011	
USA	1807	2238	2415	3361	3681	19.5%
UAE	223	402	611	470	1007	45.8%
UK	333	387	460	623	865	27.0%
Netherlands	260	398	361	421	850	34.5%
Russia	330	446	346	391	828	25.9%
Germany	400	703	697	688	764	17.6%
Singapore	307	599	656	600	759	25.4%
Nigeria	175	250	516	368	626	37.5%
France	176	308	316	405	503	30.0%
South Africa	137	249	366	377	498	38.1%
Total Hi-Tech Exports	**8098**	**12068**	**14858**	**14652**	**20904**	**26.8%**

Source: Data derived from PC-TAS, UN Comtrade, 2013; EXIM Bank Research

Exhibit 8: Changing Share of Hi-Tech Exports from India: Country-wise



as far as the set of top countries are concerned, but the shares of these countries have witnessed a perceptible change. USA continues to be the primary market for India's hi-tech products, though its share in total hi-tech exports from India declined from 22.4 per cent in 2007 to 17.6 per cent in 2011. Some of the new entrants include South Africa, with a share of 2.4 per cent in 2011, which has replaced Brazil, as key export destination for India's hi-tech products, amongst the top 10 distinations

Further, of the key hi-tech products that are being exported from India to USA and UK, a significant portion is constituted by pharmaceutical products *(See Annexure 3)*. On the other hand, TV, radio transmitters (SITC 7643) is the top item of hi-tech exports to most countries including UAE, Russia, Germany, Nigeria, France and South Africa.

HI-TECH IMPORTS

India's hi-tech imports from the world in 2011 touched US$ 33.6 bn, increasing from US$ 23.9 bn in 2007, thereby registering a CAGR of 8.8 per cent. Imports of hi-tech products were predominated by electronic items with the sector's share in India's imports of hi-tech items increasing from 66.4 per cent in 2007 *(Exhibit 9)* to 69.9 per cent in 2011. The other major sector of hi-tech imports was electrical goods sector whose share also witnessed an increase from 8.8 per cent to 11.0 per cent during the analysed period.

The basket of India's hi-tech imports is similar to the country's hi-tech export basket, but for the absence of many pharmaceutical products in the

Exhibit 9: Changing Share of Hi-Tech Imports by India: Sectorwise

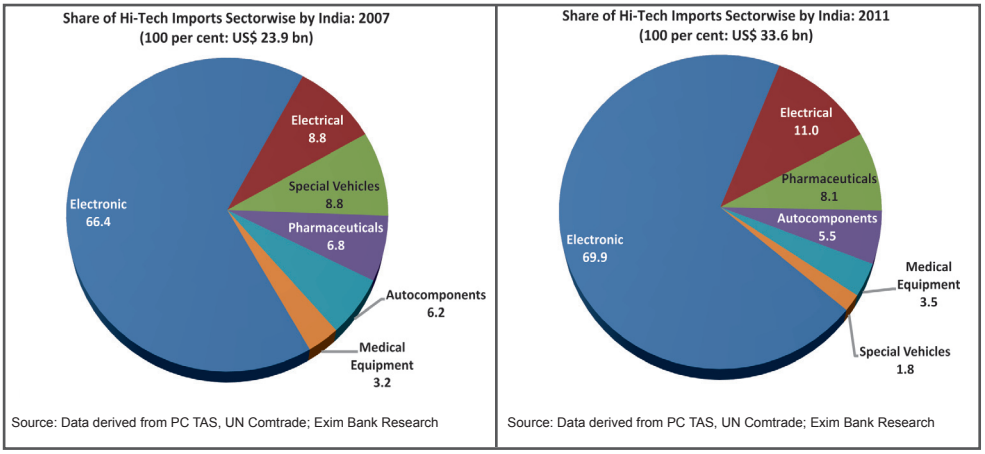


Table 11: Top 5 items of Key Categories of Hi-Tech Imports by India

ELECTRONICS (2011)				ELECTRICALS (2011)			
SITC Code	**Product Name**	**Share 2007**	**Share 2011**	**SITC Code**	**Product Name**	**Share 2007**	**Share 2011**
7643	TV, radio trans-mitters etc	16.7	17.5	7712	Static converters, Ballasts for discharge lamps/tubes	2.7	3.7
7649	Parts, telecom-munication equipment	6.5	11.5	7642	Microphone loudspeak-ers amplifiers	0.6	1.3
7764	Electronic microcircuits	2.7	6.4	7163	Electric motors, genra-tors.AC	0.7	0.8
7599	Parts, data proc. etc. machine	5.5	5.3	7711	Transformers, electrical	0.6	0.7
7763	Diodes, transistors etc.	1.6	5.3	8743	Gas, liquid measuring control instrument	0.6	0.6

country's import basket, unlike in hi-tech exports, where they contributed significantly. The major hi-tech import items in 2011 *(Table 12)* included TV, radio transmitters etc (SITC 7643); parts, telecommunication equipments (SITC 7649); electronic microcircuits (SITC 7764), parts, data processing machines (SITC 7599), diodes, transistors etc. (SITC 7763)[8]; digital computers (SITC 7522); electrical power machinery, parts (SITC 7712)[9]; and antibiotics, not put up as medicaments of group 542 (SITC 5413)[10]. Most of these products also figure among the top hi-tech exports from India, reflecting domestic production capabilities of India.

The demand for these products in the domestic market is significantly higher than the supply, thereby creating the need to import. Products like electronic microcircuits (SITC 7764)[11] and diodes, transistors etc. (SITC 7763) have shown tremendous import growth recording CAGRs of 35.1 per cent and 45.6 per cent, respectively. Consequently, the share of these products in India's imports of hi-tech items has witnessed a significant rise.

With increasing domestic demand and limited domestic capacity to manufacture indigenously, India has the potential to attract investments, including FDI in the electronic microcircuit (SITC 7764) sector and diodes, transistors etc. (SITC 7763). Parts, telecommunication equipments (SITC 7649) also witnessed a significant import growth during the period 2007-2011, at CAGR of 25.4 per cent *(Table 12)*.

India's imports of hi-tech products have primarily been from China, whose share in the country's hi-tech imports increased from 31.6 per cent in 2007 to 39.8 per cent in 2011 (Exhibit 11). While USA managed to remain

[8]7763 Includes: Thermionic, cold cathode or photo-cathode valves and tubes (e.g., vacuum or vapour or gas-filled valves and tubes, mercury arc rectifying valves and tubes, cathode-ray tubes, television camera tubes); diodes, transistors and similar semiconductor devices; photosensitive semiconductor devices; light-emitting diodes; mounted piezoelectric crystals; electronic integrated circuits and microassemblies; parts thereof

[9]7712 Includes: Static converters (e.g., rectifiers); Ballasts for discharge lamps or tubes; Other inductors; Parts of the electric power machinery of group 771

[10] 5413 Includes: Penicillins and their derivatives with a penicillanic acid structure; Streptomycins and their derivatives; Tetracyclines and their derivatives; salts thereof

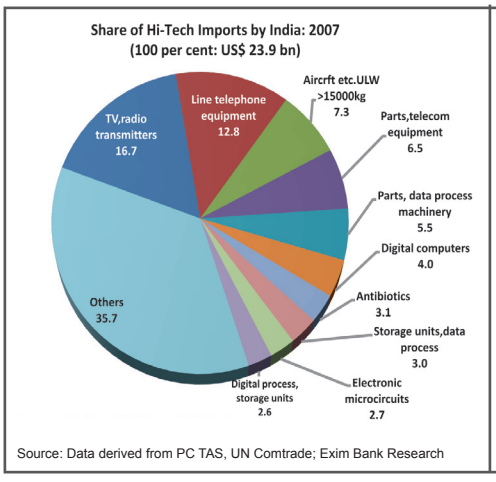
[11] 7764 Includes: Digital monolithic integrated units; Non-digital monolithic integrated units; Hybrid integrated circuits; Other electronic integrated circuits and microassemblies

Table 12: Key Hi-Tech Import Items by India

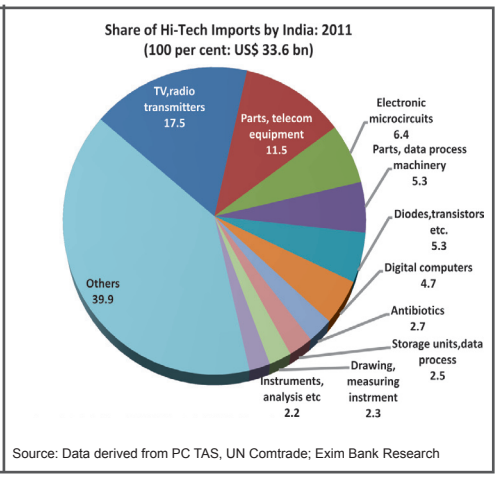
SITC	Product Name	Value (US$ mn)					CAGR
		2007	2008	2009	2010	2011	2007-11
7643	TV, radio transmitters, etc	4006	4144	3416	5430	5888	10.1%
7649	Parts, telecommunication equipments	1560	1327	3602	3846	3857	25.4%
7764	Electronic microcircuits	649	171	1469	1223	2159	35.1%
7599	Parts, data process etc, machinery	1317	1362	1325	1374	1796	8.1%
7763	Diodes, transistors etc.	393	680	741	643	1765	45.6%
7522	Digital computers	957	906	706	1127	1593	13.6%
7712	Other electric power machinery; parts of the electric power machinery	654	773	883	860	1236	17.2%
5413	Antibiotics, not put up as medicaments of group 542	735	754	709	910	900	5.2%
7527	Storage units, data processors	729	774	640	753	856	4.1%
8742	Drawing, measuring instrument	546	702	533	663	787	9.6%
Total Hi-Tech Imports		**23950**	**32291**	**27538**	**29554**	**33599**	**8.8%**

Source: Data derived from PC-TAS (SITC), EXIM Bank Research

Exhibit 10: Changing Share of Hi-Tech Imports by India: Product-wise



Source: Data derived from PC TAS, UN Comtrade; Exim Bank Research



Source: Data derived from PC TAS, UN Comtrade; Exim Bank Research

the second largest source for hi-tech imports in 2011, its share fell down significantly from 17.3 per cent in 2007 to 8.4 per cent in 2011. The other major source country whose share in India's hi-tech imports increased was South Korea – from 3.3 per cent to 5.2 per cent during this period.

In terms of absolute figures, India's imports from China increased from US$ 7.6 bn in 2007 to US$ 13.4 bn in 2011, registering a CAGR of 15.4 per cent *(Table 13)*. Imports from South Korea during the same period increased from US$ 0.7 bn to US$ 1.7 bn, recording a high CAGR of 22.3 per cent. Among the western countries other than USA, India imported hi-tech products mainly from Germany, France, and Switzerland.

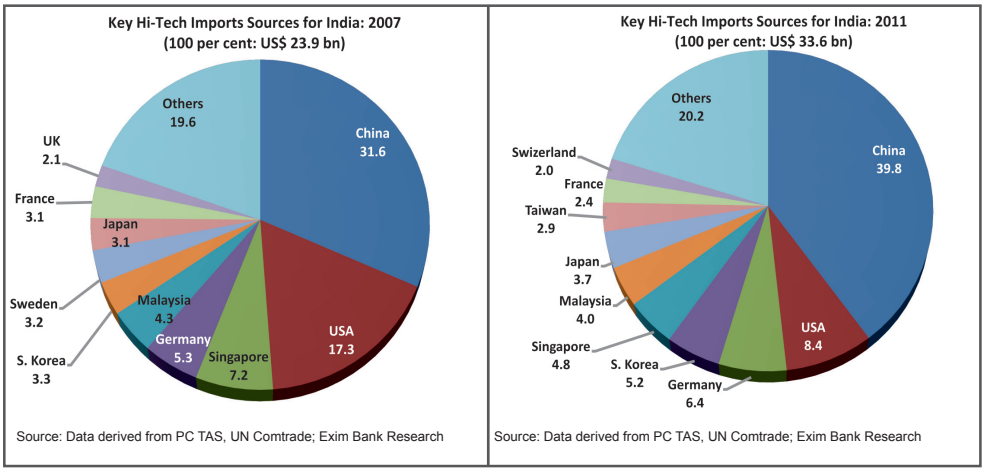
Electronic goods remain the major hi-tech items imported by India from China with all the top 4 items (accounting for 57.8 per cent of total hi-tech imports from China) belonging to this sector *(See Annexure 4)*.

Table 13: Key Source Countries for India's Hi-Tech Imports (US$ mn)

Source	2007	2008	2009	2010	2011	CAGR 2007-11)
China	7557	7432	8962	11629	13379	15.4%
USA	4131	9300	3050	3247	2822	-9.1%
Germany	1257	1788	2630	1612	2163	14.5%
South Korea	785	1166	1169	1644	1755	22.3%
Singapore	1720	1398	1556	1431	1601	-1.8%
Malaysia	1024	789	712	842	1357	7.3%
Japan	747	757	960	902	1236	13.4%
Taiwan	304	430	488	576	975	33.8%
France	745	3654	2086	1469	809	2.1%
Switzerland	415	513	543	631	688	13.5%
Total Hi-Tech Imports	**23950**	**32291**	**27538**	**29554**	**33599**	**8.8%**

Source: Data derived from PC-TAS (SITC), EXIM Bank Research

Exhibit 11: Changing Share of Key Source Countries in Hi-Tech Imports by India



Imports of parts, telecommunication equipment (SITC 7649) from China increased significantly with its share increasing from 2.4 per cent to 6.3 per cent. TV, radio transmitters (SITC 7643) and parts, telecommunication equipment (STC 7649) figured among the top hi-tech items imported from most of the import source countries.

It is interesting to note that TV, radio transmitters was also the major hi-tech exports items for India, as also the item that figured the maximum times among India's top hi-tech export destinations, although most of those destinations were different from the import sources as mentioned in *Annexure 4*.

4. PRODUCT & MARKET IDENTIFICATION OF HI-TECH MANUFACTURING

This chapter undertakes a granular analysis of identifying hi-tech products that have potential for exports from India by narrowing the SITC classification to SITC-5 digits. An attempt has been made to map the global demand for such products with India's exports with a view to outlining a market specific approach for exporters. Also analyzed are India's current export markets and the key competitors which India faces in these markets. While India needs to further consolidate its share in the major markets, there are countries which have witnessed dynamic import growths where India already has a presence but at peripheral levels. These markets are the potential growth drivers for India's hi-tech exports and need to be suitably targeted. India's capacity to serve abroad gets further strengthened given the shift and renewed focus on the manufacturing activity in the country. With domestic firms' gradually developing capability in serving the overseas end-user industries, there is a need to diversify into these hi-tech product lines with a view to tap the global markets.

PRODUCT IDENTIFICATION

Objective:

- To identify and categorize the hi-tech products where India could focus on, to realize potentially higher values, especially when considering that the country already possesses manufacturing capabilities for these products.
- The idea is to construct a product market matrix for hi-tech products in demand along with the key demand centers (importers), and the key exporters to these regions (India's competitors).

Methodology:

- The 3-digit SITC (17 products) hi-tech products have been disaggregated at a granular level into 5-digit SITC[12] (219 products).

[12]Out of 199 products in 5 digits, 6 products have been analyzed at 4 digits since they cannot be further disaggregated. These are SITC: 7521, 7522, 7523, 7526, 7527, 7529

Number of Products at 5-digit SITC

All Hi-tech Products	No. of products exported by India	219
	No. of products imported globally	233
Excluding residual category (i.e. not elsewhere specified)	No. of products exported by India	197
	No. of products imported globally	211

- The trend in India's exports and world imports of these products have been analysed[13]. This includes:
  - Identification of products in which India's export was at least US$ 2 mn in 2011. This filteration has been done to arrive at a proxy indication of India's manufacturing capabilities for these products. There were 136 products whose exports from India was more than US$ 2 mn in 2011.
  - Analysis of trends in world imports for these products using annual average growth rates (AAGR) over the five year period between 2007-2011. This has been undertaken to help in identification of products exhibiting dynamic global demand.
  - Analysis of trends in exports of these products from India during the 2007-2011 period.
  - Based on the aforementioned analysis, products have been categorised into four segments, viz. *'Product Champions', 'Underachievers', 'Growth in Declining World Markets'* and *'Losers in Declining Markets'*. The characteristics of products classified under each of these 4 categories are presented in Table 14.

[13]the residual category, viz. not elsewhere specified, has not been taken into consideration

Table 14: Product Growth Matrix Description

CATEGORY	INDIA'S EXPORTS	WORLD IMPORTS
PRODUCT CHAMPIONS (have maximum potential)	AAGR of India's exports of these products is > AAGR of world imports of these products (i.e. share of India in these products in the world market has increased over the period)	AAGR of World imports of these products is > AAGR of World's total imports (i.e. share of these products in overall world imports has increased over the period)
UNDERACHIEVERS (need to recover lost ground from competing suppliers and increase exports)	AAGR of India's exports of these products is < AAGRs of world imports of these products (i.e. share of India in these products in the world market has declined over the period)	AAGR of World imports of these products is > AAGR of World's total imports (i.e. share of these products in overall world imports has increased over the period)
GROWTH IN DECLINING WORLD MARKET	AAGR of India's exports of these products is > AAGR of world imports of these products (i.e. India's market share in these products has increased over the period)	AAGR of World imports of these products is < AAGR of World's total imports (i.e. share of these products in overall world imports has declined over the period)
LOSERS IN DECLINING WORLD MARKET	AAGR of India's exports of these products is < AAGR of world imports of these products (i.e. India's market share in these products has declined over the period)	AAGR of World imports of these products is < AAGR of World's total imports (i.e. share of these products in overall world imports has declined over the period)

INFERENCES:

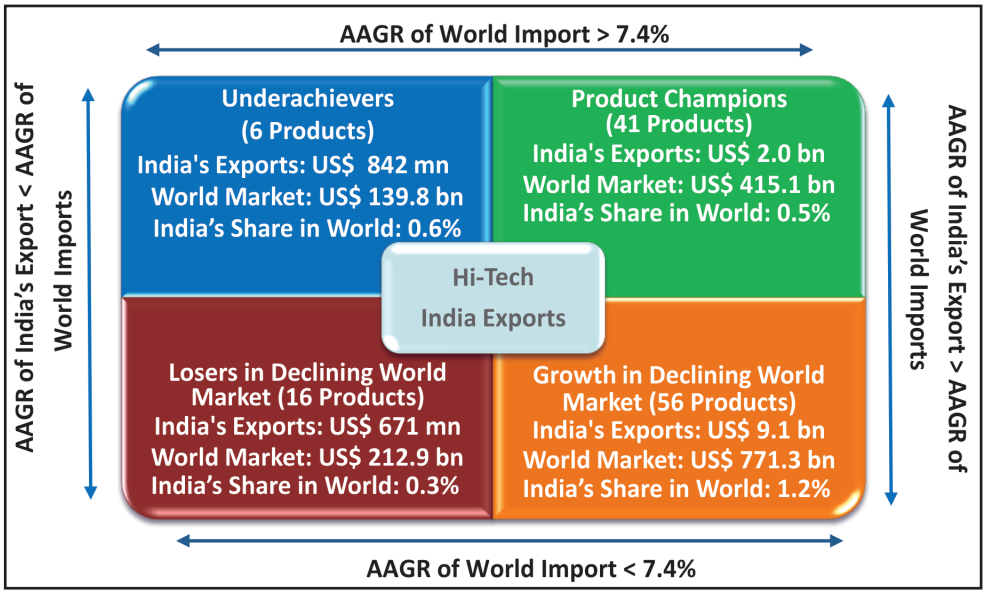
Following the methodology as outlined in Table 14, a total of 197 products have been shortlisted for categorisation of which 119[14] products have been identified (Exhibit 12).

- Of these, 41 hi-tech products have been identified under the category 'Product Champions'. The world market for these 41 products in 2011 amounted to US$ 415.1 bn while India's exports aggregated to US$ 2.0 bn.

- 6 products have been categorised as 'Underachievers' implying India has lost out shares in these dynamic products to other competing countries. The world market for these 6 products aggregated to US$ 139.8 bn in 2011 with India's exports amounting to US$ 842 mn.

[14]Products having description "nes" has not been considered for categorization

Exhibit 12: India's Hi-Tech Product Growth Matrix: 2011



- There are 56 products which have registered 'Growth in Declining World Markets'. The total world market for these products in 2011 amounted to US$ 777.3 bn with India's exports aggregating to US$ 9.1 bn.

- Finally, the last quadrant includes 16 declining products in which India has lost out market shares. World market for these products amounted to US$ 212.9 bn in 2011 with India's exports aggregating to US$ 671 mn.

'Product Champions'

41 hi-tech products have been identified as Product Champions. The constitution of the 41 products identified as Product Champions is illustrated in *Table 15*. The cumulative value of India's exports of products under this category amounted to US$ 2.0 bn in 2011. These products have gained share in global import basket during the 2007-2011 period by increasing at a pace higher than total world imports, which averaged 7.4 per cent during this period.

The aggregate value of the top 5 hi-tech export products from India under Product Champions category amounted to US$ 1.3 bn. However, from a global perspective, imports of top 5 items under Product Champions category amounted to US$ 287.3 bn with India's share in them totalling

6.1 per cent. The total share of these identified products in world imports in 2011 stood at 69.2 per cent.

Out of 41 identified product champions, there are 5 products where India's AAGR in exports have increased by triple digits. The combined exports of these increased from just US$ 13 mn in 2007 to US$ 144 mn in 2011. These products include - helicopters, ultra low weight less than equal to 2000 kg (SITC 79211); aircraft launchers etc. parts (SITC 79283); other engines and motors (SITC 71893); vitamin A, etc. unmixed (SITC 54112); and medicaments containing insulin, not put up in measured doses or in forms or packing for retail sale (SITC 54221).

India's net trade deficit in these 41 products amounted to US$ 2.8 bn in 2011. The top 5 products with the highest trade deficit and where the import-export ratio was also significantly high include digital computers (SITC 7522); other control etc instrument (SITC 87465); microtome; parts of instruments for physical or chemical analysis (SITC 87449); and parts, checking instrument (SITC 87426); and Chromatographs etc. instrument (SITC 87442). These 5 items together contributed to a trade deficit of US$ 2.3 bn out of the total trade deficit of US$ 2.8 bn, of the identified 41 product champions. Given that the total exports of these 5 products from India aggregated to US$ 168 mn in 2011, it is apparent that India does have manufacturing capabilities of these hi-tech products. Anecdotal evidence would suggest that creating capacities for manufacturing these products could help push India into the big league for export of hi-tech products having maximum potential.

Given the focus needs to be primarily on hi-tech products which figure under the 'Product Champions' category, a further analysis of this categorization has been undertaken to identify India's competitors in the major markets for such products. Within this category, the products considered are based on two approaches – one set includes the top Product Champions in terms of world market in 2011; the second set includes the top Product Champions (exhibiting more than US$ 100 mn exports) in terms of India's exports in 2011. These have been presented in *Tables 16* and *17*.

The top 5 products in terms of world import market under the Product Champions *(Table 16)* category include digital computers (SITC 7522); antisera, etc. vaccines (SITC 54163); other regulating or controlling instruments and apparatus (SITC 87465); electric motors AC (SITC 87465); antibiotics, not put up as medicaments of group 542 (SITC

Table 15: Product Champions under SITC 5 digit category

SITC Code	Product Description	India's Exports (US$ mn)		AAGR	World Imports (US$ mn)		AAGR	Share catered to by India		India's Imports (US$ mn)	Import-Export Ratio
		2007	2011		2007	2011		2007	2011	2011	2011
7522	Digital automatic data-processing machines, containing in the same housing at least a central processing unit and an input and output unit, whether or not combined	22	66	35.4%	94582	148078	13.2%	0.02%	0.04%	1593	24.1
87465	Other regulating or controlling instruments and apparatus	25	66	29.5%	18671	24271	8.4%	0.13%	0.27%	392	5.9
87449	Microtomes; parts and accessories of the articles of subgroup 874.4	7	14	37.0%	6903	9587	9.0%	0.10%	0.15%	197	14.1
87426	Parts and accessories for the articles of heading 874.25	7	15	74.5%	5712	7378	9.4%	0.12%	0.20%	169	11.3
87442	Chromatographs and electrophoresis instruments	1	7	74.6%	1730	2506	10.0%	0.06%	0.28%	131	18.7
71631	Electric motors AC	78	110	10.6%	15797	20191	7.8%	0.49%	0.54%	227	2.1
71893	Other engines and motors	5	31	133.5%	4167	5787	10.8%	0.12%	0.54%	136	4.4
77125	Other inductors	6	27	46.1%	7272	9916	9.9%	0.08%	0.27%	113	4.2
87445	Other instruments and apparatus using optical radiations	1	4	62.5%	4106	6319	11.7%	0.02%	0.06%	64	16.0
79211	Helicopters of an unladen weight not exceeding 2,000 kg	1	6	841.8%	1610	1389	24.4%	0.06%	0.43%	57	9.5

SITC Code	Product Description	India's Exports (US$ mn)		AAGR	World Imports (US$ mn)		AAGR	Share catered to by India		India's Imports (US$ mn)	Import-Export Ratio
		2007	2011		2007	2011		2007	2011	2011	2011
54159	Oth.hormone.etc.ex.gr542	8	15	17.9%	3301	4870	13.0%	0.24%	0.31%	60	4.0
87441	Gas or smoke analysis apparatus	3	6	47.9%	2419	3307	9.0%	0.12%	0.18%	51	8.5
77688	Parts, diodes etc. crystal	9	10	20.1%	5635	9909	16.9%	0.16%	0.10%	54	5.4
87477	Other instruments and apparatus, specially designed for telecom	2	10	76.1%	3348	5054	14.0%	0.06%	0.20%	51	5.1
77635	Thyristors, diacs and triacs (excluding photosensitive devices)	1	2	66.7%	1179	1520	7.4%	0.08%	0.13%	43	21.5
54151	Insulin and its salts	2	9	97.5%	831	1185	13.6%	0.24%	0.76%	48	5.3
87131	Non-optical microscopes	1	2	37.5%	884	1367	13.9%	0.11%	0.15%	33	16.5
87435	Instruments and apparatus for measuring or checking the pressure of liquids or gases.	10	17	15.2%	4721	5976	7.7%	0.21%	0.28%	44	2.6
87455	Hydrometers, barometers etc	4	6	13.8%	2491	3269	7.6%	0.16%	0.18%	32	5.3
54133	Tetracyclines & their derivatives; salts thereof	1	2	37.5%	438	662	11.6%	0.23%	0.30%	28	14.0
54163	Antisera and other blood fractions; vaccines	152	375	69.4%	47375	80597	14.2%	0.32%	0.47%	394	1.1
54141	Alkaloids of opium and their derivatives; salts thereof	7	13	84.5%	351	589	14.0%	1.99%	2.21%	32	2.5
87473	Cathode-ray oscilloscopes and cathode-ray oscillographs	1	2	25.0%	632	862	11.8%	0.16%	0.23%	19	9.5

SITC Code	Product Description	India's Exports (US$ mn)		AAGR	World Imports (US$ mn)		AAGR	Share catered to by India		India's Imports (US$ mn)	Import-Export Ratio
		2007	2011		2007	2011		2007	2011	2011	2011
54223	Medicaments containing insulin, put up in measured doses or in forms or packings for retail sale	40	86	25.0%	5849	8872	11.0%	0.68%	0.97%	98	1.1
87456	Parts, hydrometers, etc.	2	3	16.7%	681	1024	12.2%	0.29%	0.29%	13	4.3
71891	Linear-acting hydraulic power engines and motors (cylinders)	3	5	52.1%	3001	4482	13.8%	0.10%	0.11%	13	2.6
54112	Vitamins A & their derivatives, unmixed	2	4	126.8%	412	546	8.4%	0.49%	0.73%	10	2.5
71819	Parts, including regulators, of hydraulic turbines and water-wheels	4	34	84.1%	695	1164	14.6%	0.58%	2.92%	36	1.1
54164	Human blood; animal blood prepared for therapeutic, prophylactic or diagnostic uses; toxins, cultures of micro-organisms (excluding yeasts) and similar products	9	30	39.8%	3395	8984	28.7%	0.27%	0.33%	30	1.0
71811	Hydraulic turbines and water-wheels	2	4	24.2%	377	436	9.9%	0.53%	0.92%	4	1.0
54224	Medicaments containing insulin, not put up in measured doses or in forms or packings for retail sale	1	5	66.7%	3968	6855	15.5%	0.03%	0.07%	2	0.4
79291	Propellers & rotors & parts thereof	2	6	60.4%	853	1092	8.8%	0.23%	0.55%	2	0.3

SITC Code	Product Description	India's Exports (US$ mn)		AAGR	World Imports (US$ mn)		AAGR	Share catered to by India		India's Imports (US$ mn)	Import-Export Ratio
		2007	2011		2007	2011		2007	2011	2011	2011
54117	Intermixtures of provitamins & vitamins (including natural concentrates), whether/not in any solvent	2	14	75.8%	527	754	9.7%	0.38%	1.86%	4	0.3
54142	Alkaloids of cinchona and their derivatives; salts thereof	9	18	48.6%	36	77	22.8%	25.00%	23.38%	8	0.4
89191	Parts & accessories of revolvers	2	14	84.2%	93	168	18.9%	2.15%	8.33%	0	0.0
54147	Nicotine and its salts	11	54	57.8%	844	761	44.6%	1.30%	7.10%	12	0.2
54199	Other pharmaceutical goods	38	81	21.1%	6012	8640	9.7%	0.63%	0.94%	36	0.4
79283	Aircraft launching gear; deck-arrestor or similar gear; ground flying trainers; parts of the foregoing	1	98	592.5%	1004	1195	8.6%	0.10%	8.20%	36	0.4
54116	Other vitamins and their derivatives, unmixed	36	80	26.4%	944	1225	7.8%	3.81%	6.53%	13	0.2
54139	Other antibiotics	228	673	31.9%	9003	14202	12.5%	2.53%	4.74%	589	0.9
54221	Medicaments containing insulin, not put up in measured doses/in forms/packings for retail sale.	4	5	116.7%	72	68	8.7%	5.56%	7.35%		
	TOTAL PRODUCT CHAMPIONS	**750**	**2029**		**271921**	**415134**				**4875**	**2.4**

Source: Data derived from PC-TAS, UN Comtrade; EXIM Bank Research

Table 16: The Top Global Importers under 'Product Champion' Category and their Major Suppliers

SITC	Product	Importers	Value (US$ mn)		Major Supplier Countries with Whom India Competes for Market Share
			2007	2011	
7522	Digital Computers	USA	28239	45786	China, Mexico, Taiwan, South Korea, Japan, Malaysia
		Germany	9516	9788	China, Czech Rep, Ireland, USA, Japan, Netherlands
		Netherlands	4159	8637	China, Germany, Belgium, Ireland, Singapore, Malaysia
		Japan	4105	8451	China, South Korea, USA, Taiwan, Indonesia, Germany
		United Kingdom	5678	6289	China, Netherlands, Germany, USA, Japan, Singapore
		WORLD	**94582**	**148078**	
54163	Antisera, etc., vaccines	Germany	9428	16567	USA, Netherlands, Switzerland, Belgium, Ireland, Austria
		USA	4912	6537	Switzerland, Belgium, Denmark, Germany, Canada, Italy
		Belgium	2637	6292	Singapore, Ireland, France, USA, Switzerland, Germany
		United Kingdom	2777	5405	USA, Netherlands, Germany, Belgium, Switzerland, Ireland
		Switzerland	3602	5280	USA, Germany, Italy, Belgium, Japan, Netherlands
		WORLD	**47375**	**80597**	
87465	Other regulating or controlling instruments and apparatus	China	1741	2366	Japan, Germany, USA, South Korea, France, Finland
		USA	2985	2553	Mexico, Germany, Japan, Canada, UK, China
		Germany	1788	1802	Hungary, France, USA, UK, Spain, Philippines
		France	803	972	Germany, Hungary, USA, Poland, Spain, UK
		Canada	1119	982	USA, Mexico, Japan, Germany, China, Sweden
		WORLD	**18671**	**24271**	

SITC	Product	Importers	Value (US$ mn)		Major Supplier Countries with Whom India Competes for Market Share
			2007	2011	
71631	Electric motors AC	USA	2946	3173	Mexico, China, Brazil, Germany, Japan, Taiwan
		Germany	1567	1783	France, Italy, Czech Republic, China, Finland, Austria
		China	969	1234	Germany, Japan, USA, Canada, UK
		Italy	1008	1113	Germany, China, Czech Republic, France, Poland, Hungary
		France	489	566	Germany, Italy, China, Tunisia, Hungary, Finland
		WORLD	15797	20191	
54139	Antibiotics, not put up as medicaments of group 542	Panama	10	337	Singapore, USA, Costa Rica
		Italy	1721	1489	Switzerland, Ireland, Belgium, Netherlands, China, UK
		Germany	835	738	Switzerland, China, France, Italy, Austria
		USA	715	936	Switzerland, China, Italy, Denmark, Croatia
		France	293	316	USA, China, Ireland, Japan, Italy, Netherlands
		WORLD	**9003**	**14202**	
77125	Other inductors	China	1730	1871	Japan, Taiwan, Philippines, South Korea, Vietnam
		Hong Kong	883	969	China, Japan, Philippines, USA, Vietnam, Singapore
		Germany	520	562	China, Czech Republic, Japan, Poland, Tunisia, Hungary
		USA	458	446	China, Mexico, Japan, Canada, Germany, Malaysia
		Japan	392	411	China, Philippines, Vietnam, Thailand, Malaysia, USA
		WORLD	**7272**	**9916**	

Source: Data derived from PC-TAS, UN Comtrade; EXIM Bank Research

54139); and other inductors (SITC 77125). Together, the world import market for these products amounted to US$ 297 bn in 2011. The major importers of these products in 2011 included USA, China, and Germany. China, Germany, USA, Switzerland and Japan were the major supplying countries. Other major exporters for these products included 3 Asian countries, viz. Malaysia, Singapore, South Korea and Taiwan.

In terms of India's top exports under the Product Champion category, the products include, antibiotics, not put up as medicaments (SITC 54139); antisera, etc., vaccines (SITC 54163); and electric motors, AC (SITC 71631). Cumulative exports of these products in 2011 aggregated to US$ 1.16 bn out of the total exports of US$ 2.0 bn under this category. The major markets for India for these products include both developed and developing countries, although India's competitors in its major markets are largely developed countries, with only China being a notable exception (apart from Malaysia and Mexico in a select few countries). In some of the key markets India has made significant inroads – like UK, Turkey, and China for Antibiotics, not put up as medicaments (SITC 54139), and Tanzania, and Kenya, for Antisera, etc., vaccines (SITC 54163) *(Table 17)*.

'Underachievers'

In the Underachievers category, 6 hi-tech export products have been identified *(Table 18)*. The cumulative value of India's exports of products under this category declined from US$ 916 mn in 2007 to US$ 842 mn in 2011. On the other hand, the world import market for these 6 products has nearly doubled from US$ 73.1 bn to US$ 139.8 bn during the same period. For these 6 products, the world market has grown significantly faster than the average (AAGR) for all products during the 2007-2011 periods. Though there has been a significant increase in India's exports across the 6 identified products [except parts and accessories for the machines and appliances of heading 874.53 (SITC 87454) and other generating sets (SITC 71652) which exhibited declines], but it failed to match the pace of growth of world import demand for these products. Further, for 5 products in this category, India's imports were higher than exports implying that the country has a trade deficit in these identified products. While manufacturing capabilities exist in India, the fact that the country is importing and that these imports have increased during the 2007-2011 period is indicative of shortage of manufacturing capacities within the domestic shores.

Table 17: India's Top Exports under 'Product Champion' Category, Key Destinations and Competitors

SITC	PRODUCT NAME	EXPORT DESTINATION (US$ mn)		IMPORT FROM WORLD (US$ mn)	INDIA'S SHARE IN IMPORTS	MAJOR EXPORTERS TO INDIA'S KEY MARKETS / INDIA'S COMPETITORS IN THE MARKETS
54139	Antibiotics, Not Put Up As Medicaments	**WORLD**	**670**	**14111**	**4.7**	
		China	62	437	14.2	Ireland, Japan, India, Italy, Switzerland
		Turkey	47	181	26.0	India, China, Italy, South Korea, Spain, Denmark
		USA	47	912	5.2	Switzerland, China, Italy, India, Denmark
		Italy	30	1658	1.8	Switzerland, Ireland, Belgium, Netherlands, China
		UK	29	178	16.3	USA, India, Netherlands, China, Germany
54163	Antisera, etc., vaccines	**WORLD**	**364**	**80485**	**0.5**	
		Nigeria	34	NA	NA	China, Germany, Philippines, S. Korea, Taiwan
		Congo	17	NA	NA	China, Germany, Spain, Netherlands, Taiwan
		Tanzania	16	30.9	51.8	China, Malaysia, Taiwan, Japan, USA
		Kenya	15	34	44.1	China, Germany, Taiwan, Belgium, Austria
		Philippines	14	123	13.8	China, Singapore, Japan, Malaysia, Taiwan
71631	Electric motors AC	**WORLD**	**110**	**20191**	**0.01**	
		USA	35	3549	0.01	Mexico, China, Brazil, Germany, Japan
		Saudi Arabia	22	148	0.15	Germany, China, USA, India, Mexico, UK
		Bahrain	7	17	0.41	Spain, South Korea, China, Mexico, Germany
		Germany	5	1984	--	France, Italy, Czech Rep., China, Finland

Source: Data derived from PC-TAS, UN Comtrade; EXIM Bank Research

Table 18: 'Underachievers' under SITC 5 digit category

SITC Code	Product Description	India's Exports (US$ mn)		AAGR	World Imports (US$ mn)		AAGR	Share catered to by India		India's Imports (US$ mn)	Import-Export Ratio
		2007	2011		2007	2011		2007	2011	2011	2011
77121	Static converters	338	437	10.3%	36073	51017	10.6%	0.9%	0.9%	805	1.8
54161	Glycosides, natural or reproduced by synthesis, and their salts, ethers and other derivatives	10	11	17.3%	431	820	18.7%	2.3%	1.3%	31	2.8
77637	Photosensitive devices	213	328	30.3%	26021	73295	35.3%	0.8%	0.4%	1333	4.1
87471	Instruments and apparatus for measuring or detecting ionizing radiations	7	8	4.8%	730	1056	10.4%	1.0%	0.8%	8	1.0
87454	Parts and accessories for the machines and appliances of heading 874.53	5	3	-7.1%	346	446	8.0%	1.4%	0.7%	9	3.0
71652	Other generating sets	343	55	-18.8%	9476	13217	9.8%	3.6%	0.4%	92	1.7
	TOTAL UNDERACHIEVERS	**916**	**842**		**73077**	**139851**				**2278**	**2.7**

Source: Data derived from PC-TAS, UN Comtrade; EXIM Bank Research

'Growth in Declining World Market'

56 hi-tech export products have been identified under the category 'Growth in Declining World Market' *(Table 19)*. These are products for which import demand has not kept up pace with the world average import demand, although India's exports have registered growth higher than the growth in world demand. The ironical part is that India's hi-tech exports (with value of at least US$ 2 million in 2011) during the 2007-2011 period under this category has nearly quadrupled – from US$ 2.6 bn in 2007 to US$ 9.1 bn in 2011. This is an area of concern as it is reflective of the country targeting a wrong set of hi-tech exports, i.e. products whose demand has been going downwards. In fact, the top 5 exported products from India in this category constitute nearly one-third of India's overall hi-tech exports. These products include, transmission apparatus incorporating reception apparatus (SITC 76432); other parts of aeroplanes or helicopters (SITC 79295); medicaments containing other antibiotics, put up in measured doses or in forms or packings for retail sale (SITC 54219); Medicaments containing penicillins or derivatives thereof, with a penicillanic acid structure,or streptomycins or their derivatives, put up in measured doses or in forms or packings for retail sale (SITC 54213); and liquid dielectric transformers (SITC 77111).

'Losers in Declining World Market'

16 hi-tech export products have been identified as 'Losers in Declining World Market' *(Table 20)*. The export prospects for these products tend to be bleak – world imports of these hi-tech products have increased at a below-average rate, or actually declined, and the market share of India has also remained stagnant. While the overall exports of India under this category decreased marginally, world imports of these identified products witnessed a marginal increase in demand. India needs to diversify its production away from manufacturing these products and focus on other hi-technology segments, especially items under the Product Champions and Underachievers category.

Table 19: 'Growth in Declining Markets' under SITC 5 digit category

SITC Code	Product Description	India's Exports (US$ mn)		AAGR	World Imports (US$ mn)		AAGR	Share catered to by India		India's Imports (US$ mn)	Import-Export Ratio
		2007	2011		2007	2011		2007	2011	2011	2011
89111	Tanks and other armoured fighting vehicles, motorized, whether or not fitted with weapons, and parts of such vehicles	1	48	1947.1%	2046	2174	2.9%	0.0%	2.2%	0	0.0
87193	Other optical devices, appliances and instruments	1	4	550.2%	61951	65697	3.5%	0.0%	0.0%	272	68.0
76432	Transmission apparatus incorporating reception apparatus	115	3277	496.6%	141311	180268	7.1%	0.1%	1.8%	5875	1.8
87479	Parts and accessories for the instruments and apparatus of subgroup 874.7	5	20	144.0%	4926	5497	5.9%	0.1%	0.4%	58	2.9
7526	Input or output units for automatic data-processing machines, whether or not presented with the rest of a system and whether or not containing storage units in the same housing	12	18	125.9%	41227	31421	-5.1%	0.0%	0.1%	729	40.5
54143	Caffeine and its salts	3	31	131.9%	185	229	5.5%	1.6%	13.5%	2	0.1
76411	Telephone sets	17	203	100.8%	11142	8008	-7.0%	0.2%	2.5%	99	0.5
7523	Digital processing units, whether or not presented with the rest of a system, which may contain in the same housing one or two of the following types of unit: storage units, input units, output units	13	107	102.5%	55645	62081	3.6%	0.0%	0.2%	683	6.4

SITC Code	Product Description	India's Exports (US$ mn)		AAGR	World Imports (US$ mn)		AAGR	Share catered to by India		India's Imports (US$ mn)	Import-Export Ratio
		2007	2011		2007	2011		2007	2011	2011	2011
77411	Electrocardiographs	3	9	99.2%	621	689	3.3%	0.5%	1.3%	3	0.3
88111	Photographic (other than cinematographic) cameras	1	4	75.0%	1648	690	-18.4%	0.1%	0.6%	24	6.0
79295	Other parts of aeroplanes or helicopters	289	1838	92.4%	49364	52983	2.0%	0.6%	3.5%	880	0.5
87443	Spectrometers, spectrophotometers and spectrographs using optical radiations (UV, visible, IR)	1	5	87.9%	2831	3242	4.3%	0.0%	0.2%	115	23.0
75995	Parts and accessories (other than covers, carrying cases and the like) suitable for use solely or principally with the machines of subgroup 751.2	4	6	77.3%	2284	1900	-3.5%	0.2%	0.3%	7	1.2
54153	Adrenal cortical hormones and their derivatives	5	42	77.1%	3520	3995	3.9%	0.1%	1.1%	64	1.5
77631	Diodes, other than photosensitive or light-emitting diodes	1	5	70.8%	9834	11290	5.2%	0.0%	0.0%	157	31.4
77123	Ballasts for discharge lamps or tubes	9	45	68.9%	3661	3878	3.9%	0.2%	1.2%	36	0.8
54211	Medicaments containing penicillins or derivatives thereof, with a penicillanic acid structure,or streptomycins or their derivatives, not put up in measured doses or in forms or packings for retail sale	16	43	40.3%	1634	172	-24.2%	1.0%	25.0%	3	0.1

SITC Code	Product Description	India's Exports (US$ mn)		AAGR	World Imports (US$ mn)		AAGR	Share catered to by India		India's Imports (US$ mn)	Import-Export Ratio
		2007	2011		2007	2011		2007	2011	2011	2011
88115	Parts and accessories for photographic flashlight apparatus	2	9	61.3%	353	358	0.9%	0.6%	2.5%	5	0.6
87413	Surveying (including photogrammetrical surveying), hydrographic, oceanographic, hydrological, meteorological or geophysical instruments and appliances (excluding compasses); rangefinders	20	39	63.2%	5308	5927	3.7%	0.4%	0.7%	83	2.1
87478	Other instruments and apparatus for measuring or checking electrical quantities	4	10	63.0%	8847	8255	3.7%	0.0%	0.1%	83	8.3
77689	Parts of the articles of subgroup 776.4	5	13	49.6%	36391	24626	-6.2%	0.0%	0.1%	72	5.5
87463	Pressure regulators and controllers (manostats)	1	2	60.4%	787	871	5.2%	0.1%	0.2%	10	5.0
75993	Parts and accessories (other than covers, carrying cases and the like) suitable for use solely or principally with the machines of subgroup 751.9	31	121	54.1%	2926	3027	1.9%	1.1%	4.0%	69	0.6
54145	Theophylline and aminophylline (theophylline-ethylenediamine) and their derivatives; salts thereof	1	3	50.0%	85	84	-0.1%	1.2%	3.6%	13	4.3
71651	Electric generating sets with compression-ignition internal combustion piston engines (diesel or semi-diesel engines)	53	130	53.0%	10193	12282	7.1%	0.5%	1.1%	89	0.7
77681	Piezoelectric crystals, mounted	4	16	49.4%	6133	7278	5.3%	0.1%	0.2%	72	4.5
76421	Microphones and stands therefor	2	5	50.0%	1793	2138	5.9%	0.1%	0.2%	15	3.0

SITC Code	Product Description	India's Exports (US$ mn)		AAGR	World Imports (US$ mn)		AAGR	Share catered to by India		India's Imports (US$ mn)	Import-Export Ratio
		2007	2011		2007	2011		2007	2011	2011	2011
76483	Radar apparatus, radio navigational aid apparatus and radio remote control apparatus	3	9	45.7%	16262	17253	1.9%	0.0%	0.1%	40	4.4
77119	Other electrical transformers	23	66	44.1%	9198	10052	3.4%	0.3%	0.7%	137	2.1
87149	Parts And Accessories Of Compound Optical Microscopes.	1	2	37.5%	696	656	-0.2%	0.1%	0.3%	7	3.5
87461	Thermostats	2	7	41.7%	3048	3482	4.3%	0.1%	0.2%	21	3.0
76423	Loudspeakers, not mounted in their enclosures	10	22	34.9%	4572	4907	2.7%	0.2%	0.4%	189	8.6
77629	Parts of the tubes and valves of subgroups 776.1 and 776.2	3	2	8.3%	856	372	-18.1%	0.4%	0.5%	33	16.5
87437	Other instruments and apparatus for measuring liquids or gases	7	19	30.1%	2244	2467	3.7%	0.3%	0.8%	29	1.5
87439	Parts and accessories for the articles of subgroup 874.3	9	27	33.2%	3370	4170	7.2%	0.3%	0.6%	51	1.9
76426	Electric sound amplifier sets	3	4	21.2%	1112	879	-4.7%	0.3%	0.5%	11	2.8
77611	Television picture tubes, cathode-ray (including video monitor cathode-ray tubes), colour	7	2	1.2%	2723	755	-23.9%	0.3%	0.3%	192	96.0
54292	Medicaments containing vitamins or other products of subgroup 541.1, put up in measured doses or in forms or packings for retail sale	150	274	26.9%	3630	3875	2.6%	4.1%	7.1%	9	0.0

SITC Code	Product Description	India's Exports (US$ mn)		AAGR	World Imports (US$ mn)		AAGR	Share catered to by India		India's Imports (US$ mn)	Import-Export Ratio
		2007	2011		2007	2011		2007	2011	2011	2011
54144	Ephedrines and their salts	22	29	12.0%	182	86	-11.8%		33.7%	1	0.0
71632	Generators, alternating current	25	59	27.9%	4244	4941	5.7%	0.6%	1.2%	39	0.7
54213	Medicaments containing penicillins or derivatives thereof, with a penicillanic acid structure, or streptomycins or their derivatives, put up in measured doses or in forms or packings for retail sale	206	376	19.4%	3348	3200	-1.0%	6.2%	11.8%	168	0.4
87422	Drafting tables and machines, whether or not automatic, and other drawing, marking-out or mathematical calculating instruments	2	3	18.8%	359	337	0.1%	0.6%	0.9%	3	1.0
76492	Parts and accessories suitable for use solely or principally with the apparatus and equipment of subgroup 764.2	11	20	17.8%	2643	2420	-0.5%	0.4%	0.8%	29	1.5
54222	Medicaments containing other hormones or other products of subgroup 541.5, not put up in measured doses or in forms or packings for retail sale	188	196	7.2%	898	373	-9.9%		52.5%	8	0.0
87431	Instruments and apparatus for measuring or checking the flow or level of liquids	19	38	22.9%	3621	4626	7.4%	0.5%	0.8%	73	1.9
87414	Parts and accessories for the articles of heading 874.13	15	26	18.5%	2625	2768	3.2%	0.6%	0.9%	35	1.3

SITC Code	Product Description	India's Exports (US$ mn)		AAGR	World Imports (US$ mn)		AAGR	Share catered to by India		India's Imports (US$ mn)	Import-Export Ratio
		2007	2011		2007	2011		2007	2011	2011	2011
77412	Other electrodiagnostic apparatus (including apparatus for functional exploratory examination or for checking physiological parameters)	65	129	22.0%	13731	17583	6.7%	0.5%	0.7%	311	2.4
54229	Medicaments containing other hormones or other products of subgroup 541.5, put up in measured doses or in forms or packings for retail sale	34	67	19.3%	15493	19134	5.6%	0.2%	0.4%	46	0.7
54219	Medicaments containing other antibiotics, put up in measured doses or in forms or packings for retail sale	570	872	18.0%	12669	15084	4.5%	4.5%	5.8%	20	0.0
77421	Apparatus based on the use of X-rays, whether or not for medical, surgical, dental or veterinary uses (including radiography or radiotherapy apparatus)	64	98	18.9%	9436	11510	5.7%	0.7%	0.9%	201	2.1
75997	Parts and accessories (other than covers, carrying cases and the like) suitable for use solely or principally with the machines of subgroups 752	123	160	7.4%	151531	121699	-4.4%	0.1%	0.1%	1698	10.6
77129	Parts of the electric power machinery of group 771	95	163	16.8%	8828	10589	5.9%	1.1%	1.5%	283	1.7

SITC Code	Product Description	India's Exports (US$ mn)		AAGR	World Imports (US$ mn)		AAGR	Share catered to by India		India's Imports (US$ mn)	Import-Export Ratio
		2007	2011		2007	2011		2007	2011	2011	2011
54212	Medicaments containing other antibiotics, not put up in measured doses or in forms or packings for retail sale	92	36	-0.4%	1213	792	-7.2%	7.6%	4.5%	1	0.0
77111	Liquid dielectric transformers	236	337	11.9%	5399	6487	6.1%	4.4%	5.2%	93	0.3
54113	Vitamins B and their derivatives, unmixed	9	9	0.3%	1330	1076	-3.9%	0.7%	0.8%	40	4.4
87469	Parts and accessories for automatic regulating or controlling instruments and apparatus	21	29	9.9%	5440	6676	7.3%	0.4%	0.4%	126	4.3
	TOTAL GROWTH IN DECLINING MARKETS	**2634**	**9134**		**757347**	**777309**				**13412**	**1.5**

Source: Data derived from PC-TAS, UN Comtrade; EXIM Bank Research

Table 20: 'Losers in Declining Markets' under SITC 5 digit category

SITC Code	Product Description	India's Exports (US$ mn)		AAGR	World Imports (US$ mn)		AAGR	Share catered to by India		India's Imports (US$ mn)	Import-Export Ratio
		2007	2011		2007	2011		2007	2011	2011	2011
77429	Other apparatus based on the use of alpha, beta or gamma radiations, whether or not for medical, surgical, dental or veterinary uses	51	36	5.2%	5700	7019	5.6%	0.9%	0.5%	131	3.6
87453	Machines and appliances for testing the hardness, strength, compressibility, elasticity or other mechanical properties of materials (e.g., metals, wood, textiles, paper, plastics)	14	16	4.7%	1456	1722	5.9%	1.0%	0.9%	88	5.5
87452	Instruments, apparatus or models, designed for demonstrational purposes (e.g., for education or exhibition), unsuitable for other uses	23	27	5.8%	1860	2374	7.1%	1.2%	1.1%	27	1.0
7527	Storage units, whether or not presented with the rest of a system	104	106	1.1%	72851	83089	3.9%	0.1%	0.1%	856	8.1

SITC Code	Product Description	India's Exports (US$ mn)		AAGR	World Imports (US$ mn)		AAGR	Share catered to by India		India's Imports (US$ mn)	Import-Export Ratio
		2007	2011		2007	2011		2007	2011	2011	2011
76431	Transmission apparatus	18	8	-7.0%	4921	3974	-4.1%	0.4%	0.2%	13	1.6
76493	Parts and accessories suitable for use solely or principally with the apparatus and equipment of groups 761 and 762 and subgroups 764.3 and 764.8	193	146	-2.0%	76066	76221	1.4%	0.3%	0.2%	1021	7.0
54232	Medicaments containing alkaloids or derivatives thereof but not containing hormones, other products of subgroup 541.5, or antibiotics - .put up in measured doses or in forms or packings for retail sale	40	42	1.4%	4673	5769	5.8%	0.9%	0.7%	2	0.0
76425	Audio-frequency electric amplifiers	18	16	-1.9%	2419	2569	2.9%	0.7%	0.6%	19	1.2
77633	Transistors (excluding photosensitive transistors) with a dissipation rate of one watt or more	4	4	2.1%	11738	14099	7.2%	0.0%	0.0%	192	48.0
87475	Other instruments and apparatus, for measuring or checking voltage, current, resistance or power, without a recording device	16	12	-2.7%	2084	2151	2.8%	0.8%	0.6%	63	5.3

SITC Code	Product Description	India's Exports (US$ mn)		AAGR	World Imports (US$ mn)		AAGR	Share catered to by India		India's Imports (US$ mn)	Import-Export Ratio
		2007	2011		2007	2011		2007	2011	2011	2011
54131	Penicillins and their derivatives with a penicillanic acid structure; salts thereof	283	206	-7.6%	2083	1914	-1.8%	13.6%	10.8%	273	1.3
87411	Direction-finding compasses; other navigational instruments and appliances	6	3	-4.2%	4886	5318	2.3%	0.1%	0.1%	14	4.7
77639	Other semiconductor devices	22	20	-0.2%	2898	3255	6.6%	0.8%	0.6%	19	1.0
75991	Parts and accessories (other than covers, carrying cases and the like) suitable for use solely or principally with the machines of subgroups 751.1	9	3	-12.5%	937	840	-1.1%	1.0%	0.4%	4	1.3
77423	X-ray tubes	47	24	-11.0%	1380	1577	3.5%	3.4%	1.5%	20	0.8
77422	Apparatus based on the use of alpha, beta or gamma radiations, whether or not for medical, surgical, dental or veterinary uses (including radiography or radiotherapy apparatus)	16	2	-34.3%	780	1005	7.1%	2.1%	0.2%	37	18.5
	TOTAL LOSERS IN DECLINING MARKET	**864**	**671**		**196732**	**212896**				**2779**	**4.1**

Source: Data derived from PC-TAS, UN Comtrade database; EXIM Bank Research

5. STRATEGIES FOR INCREASING TECHNOLOGY BASED EXPORTS

This chapter articulates few strategies in order to enhance India's export of hi-tech products. Capability and capacity to produce technology oriented items will enhance India's manufacturing prowess in the international arena and facilitate earning of foreign exchange. Suggested strategies include enhancing capacities in select product lines for which global demand is vibrant. This could be done through both fiscal and financial incentives while at the same time creating an economic environment that attracts investments, particularly FDI, in such hi-tech product lines.

India's development story, post liberalization, has been one driven by the services sector, with the manufacturing sector playing only a second fiddle, mirrored in its stagnating contribution to the country's economic output. That this may not be a sustainable developmental model has been taken cognizance of by the government, which has now set a target of 25 per cent contribution by the manufacturing sector to India's GDP by 2022. Focus on hi-tech manufacturing products, especially in terms of their international competitiveness, needs to be an integral component of achieving this target. An important facet of most hi-tech products is that significant part of these are traded globally as finished goods (i.e. trade intensity – meaning export as a ratio of gross output – for these are very high), unlike other sectors where international trade is predominantly in intermediate goods (i.e. trade intensity is low). While sectors like automotive and pharmaceuticals are relatively well developed in India from a competitiveness viewpoint, the need therefore, is to also focus on other hi-tech sectors like electronics and technology oriented capital goods, so as to enhance growth in value added exports.

Technology oriented manufacturing not only induces higher returns but also strengthens other forms of industries while creating capabilities to deepen manufacturing. Depth in manufacturing

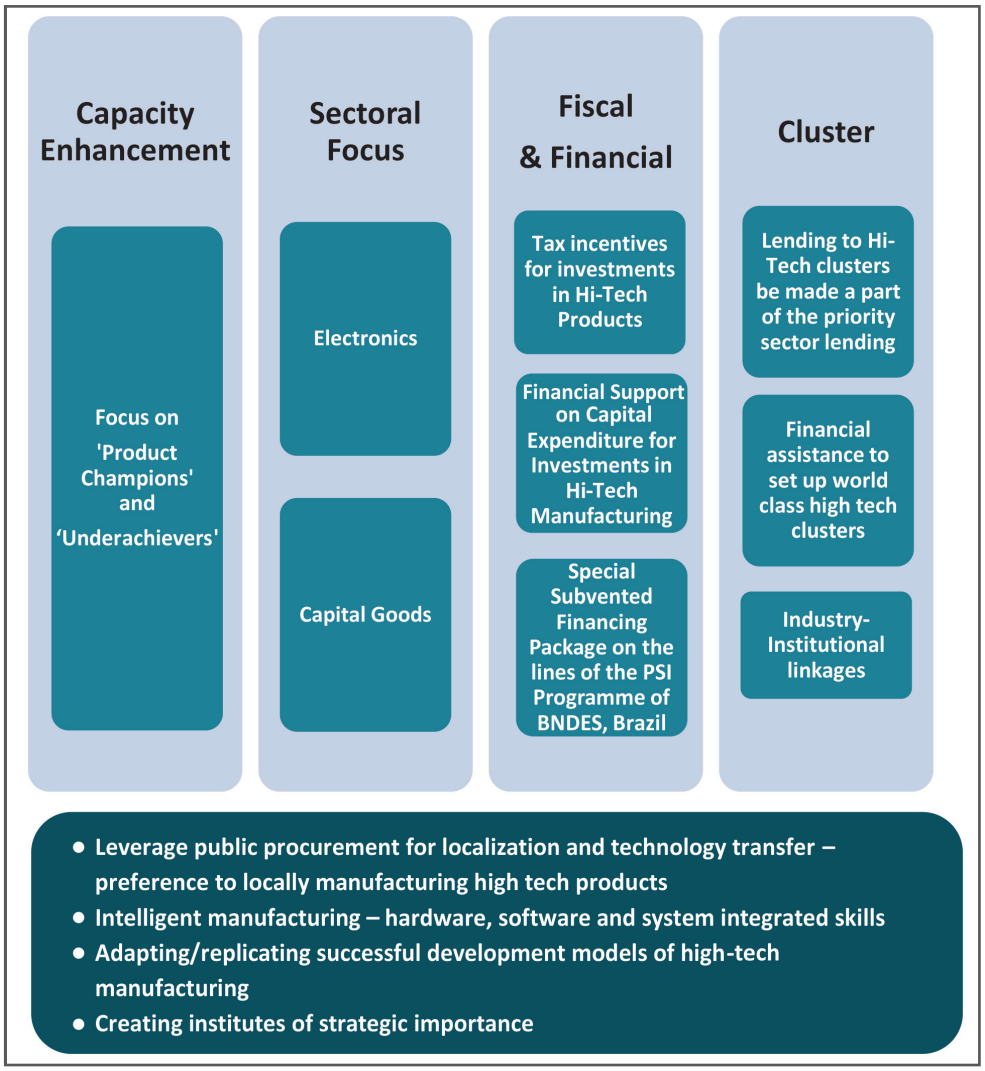
and the technology embedded therein is extremely important for a country to sustain its competitive advantage in a global economy. It is not only important from the point of view of greater value addition, but is also required to attract new industries, while simultaneously maintaining competitive advantage of existing industries. Technological depth also ensures self-reliance in strategically important sectors and ensures a healthy trade balance. Thus, economic growth policy must place more emphasis on increasing multifactor productivity, which is the driver of value-added production. Achieving this goal requires coordinated advances in science, technology, innovation, and diffusion of the same. This strategy requires investments in multiple drivers, technology, education, capital formation, and industry infrastructure.

CAPACITY ENHANCEMENT

Analysis in the previous chapter revealed 41 hi-tech products which were classified as 'Product Champions' and 6 as 'Underachievers'. In order to give a special thrust to hi-tech exports, the prime objective would be to create avenues which result in enhancing exports of products identified under these categories, and thereby reduce the country's mounting trade deficit. The cumulative value of India's exports of products under the Product Champions category amounted to US$ 2.0 bn (9.5 per cent of total hi-tech exports from India in 2011) while cumulative net trade deficit for the same set of products aggregated to US$ 2.8 bn in 2011. The top 5 products with the highest trade deficit included digital computers (SITC 7522); other control etc instrument (SITC 87465); microtome; parts of instruments for physical or chemical analysis (SITC 87449); and parts, checking instrument (SITC 87426); and chromatographs etc. instrument (SITC 87442). These 5 items together contributed to a trade deficit of US$ 2.3 bn out of the total trade deficit of US$ 2.8 bn of the identified 41 product champions. Given that the total exports of these 5 products from India aggregated to US$ 168 mn in 2011, it is apparent that India does have manufacturing capabilities of these hi-tech products. Anecdotal evidence would suggest that creating capacities for manufacturing these products could help push India into the big league for export of hi-tech products having maximum potential.

In the 'Underachievers' category, 6 hi-tech export products have been identified. The cumulative value of India's exports of products under this category amounted to US$ 842 million in 2011, while the world import market for these 6 products stood at US$ 139.8 bn during the same period. Though for

Exhibit 13: Strategies for Enhancing Hi-Tech Manufacturing and Exports



Source: EXIM Bank Research

these products, the world market has grown significantly faster than the average for all products (in the world) put together during the 2007-2011 period, India seems to be losing out market share to competing countries in these dynamic products. Further, for 5 products in this category, India's imports were higher than exports resulting in a cumulative trade deficit of US$ 1.4 bn. While manufacturing capabilities exist in India, the fact that the country is importing significant volume and that these imports have increased during the 2007-2011 period is indicative of shortage of manufacturing capacities.

The Government could consider building up capacity in these identified products under Product Champions and Underachievers by creating an enabling environment that promotes investments, especially foreign investments, in these product lines, and businesses and industry may focus on these products to enhance their revenues both by catering to domestic and overseas markets.

SECTORAL FOCUS: HI-TECH PRODUCTS

Electronics

The share of hi-tech exports in the electronics sector has increased from 18 per cent in 2007 to 30.1 per cent in 2011, with total exports amounting to US$ 6.3 bn in 2011. At the same time imports of hi-tech electronic items by India have increased from 66.4 per cent in 2007 to 69.9 per cent in 2011. It may however be noted that India's share in exports of hi-tech electronics to world have witnessed an increase from 0.1 per cent to 0.4 per cent during the analysed period. Given the increasing propensity of India's exports of hi-tech electronics, and the significant import appetite globally, impetus on increasing production of electronics becomes a win-win situation, both to satiate domestic demand and earn foreign exchange through exports.

While the Government of India already has in place a number of fiscal incentives which envisages enhancing production of electronics, it could also learn from the examples of the successful development of this industry in other countries.

For example, Taiwan fashioned a system that offered incentives to firms that succeeded in raising their productivity or their export levels, and penalised firms that did not achieve such goals by withdrawing the tax credits and other financial incentives. In this way, Taiwan's leadership maintained a tight focus on policy goals and on performance towards those goals rather than allowing

incentive programs to become mere rent-seeking systems. Institutions in Taiwan were fashioned to encourage performance-oriented behaviour. Institutional learning took place, from country to country and within countries, as the institutions created adapted to new circumstances and acquired new experiences.

The key lesson of Taiwan's success in electronics lies in the way Taiwanese firms managed to integrate themselves into existing value chains, whether as OEM contractors in the early consumer electronics sector, or again as OEM contractors in the IT sector, or as assembly and test houses for integrated circuit (IC) products, and then as wafer foundries offering contract fabrication services to established IC firms. For every step in the industry-building process, Taiwan's firms developed measures to complement the strategies being pursued by established firms overseas.

India could perhaps follow a similar pattern of inculcating the successful experiences from abroad while creating a niche for itself in the electronics industry.

Capital Goods

Capital Goods are considered as a strategic sector and development of domestic capabilities is essential from a national self-reliance and security perspective. Capital goods sector has a multiplier effect and has bearing on the growth of the user industries, as it provides critical inputs, i.e., machinery and equipments to the remaining sectors covered under the manufacturing activity.

The sector primarily comprises machinery, nuclear reactors, boilers, electrical, electronic equipments, etc. Although exports of capital goods from India increased from US$ 8.7 bn in 2007 to US$ 14.9 bn in 2011, its share in world exports remained marginal at 0.6 per cent as in 2011. Imports, on the other hand, were at staggering US$ 44.5 bn in 2011, with the country accounting for a share of 2 per cent in world capital goods imports.

Given the huge demand, there is an urgent need to capitalise upon the domestic market and encourage import substitution. Hi-technology oriented capital goods are a huge opportunity for India to focus upon, not just for the domestic market but also to tap the overseas markets. This would entail acquisition of technology know-how, especially from overseas firms through knowledge sharing, joint ventures, acquisitions, and investments, both inward as well as outward.

POLICY INCENTIVES TO ENCOURAGE PRIVATE SECTOR INVESTMENTS AND FDI IN HI-TECH MANUFACTURING

One of the major reasons cited for low volume of hi-tech goods production is low greenfield FDI inflows, and limited focus on R&D by Indian companies. Indian investment in R&D is largely government driven. Indian firms need to be encouraged to invest in R&D which will make them technologically strong while at the same time incentivise their entry into technologically advanced product lines. Corporate sector investment in R&D is less than 1 percent of turnover in India as compared to about 5% in several developed countries. India is ranked at 64th position in global innovation index, with countries like South Korea (ranked 21), Malaysia (32), China (34), South Africa (54) and Thailand (57) being placed well above in global rankings.

Proactive policies are required that incentivise industry efforts to invest in innovation and develop hi-tech products. One important way to achieve this is through financial and fiscal incentives.

Countries such as Japan and South Korea are looking out for alternative investment destinations, instead of China, because of geopolitical reasons. Since hi-tech manufacturing is also high value added, they are not constrained by logistics and wage rates as compared to low-tech or mid-tech goods. Hence, there has to be a pull factor to attract investments into this sector. Government of India has announced Delhi-Mumbai Industrial Corridor to develop industrialization in the identified corridor. These two factors could be leveraged to encourage investments in these sectors through fiscal and financial incentives. Three such policy mechanisms are outlined below:-

A Special Subvented Financing Package

Countries like Brazil have been providing special financing package under its investment support programme, viz. PSI Programme (Programa BNDES de Sustenção do Investimento) which subsidizes the interest rate of loans from the state development bank, BNDES, to purchase capital goods and support export and technological innovation.

The PSI Program, which began in 2009, has a credit authorization of R$277 bn (approx. US$ 120 bn), of which R$149 bn (approx. US$ 65 bn) had been disbursed as of August 31, 2012. In April 2012, the BNDES PSI Program was extended for another year, up to December

2013, with reduced fees, increased loan maturities and maximum levels of borrower contributions as part of the new measures announced by the Brazilian Government to encourage investments and to protect the national industry. An important aspect was the creation of a PSI sub-program – PSI Transforming Projects – aimed at supporting the technological sophistication of the Brazilian industrial sector. The BNDES PSI Transforming Projects would provide lending at significantly low rates of 5% p.a. (about 350 bps lower than the prevailing benchmark Selic rate – equivalent to Indian Repo rate) and with loan terms up to 144 months, to finance investments that create technological and production capacity in knowledge and engineering-intensive sectors. The focus is on the production of goods that are not yet manufactured in Brazil and that may lead to production linkages and gains in productivity and quality.

The Government of India / RBI could also consider setting up a similar credit facility exclusively for investments in hi-tech industries, so as to level the playing field and augment the country's export competitiveness for such products. Such mechanism, if considered for implementation should provide low cost funds cheaper than the cost of ECB financing, as also the ECA financing and pave the way for India to either move into hi-tech products which are currently not being manufactured, or enhance their competitiveness in such products where it is competing with other global players. The BNDES model could be studied in detail and adapted in the Indian context so as to draw out the modalities of this proposal including the purpose, scope and coverage.

Tax Incentives for Investments in Hi-Technology Products

By reducing the cost of R&D, fiscal reliefs raise the net present value of prospective research projects. Fiscal measures allow markets – rather than governments – to determine the allocation of R&D investments across sectors, firms and projects.

China presents an interesting case of provider of fiscal incentives to attract investments in hi-tech sectors. Under its Enterprise Income Tax (EIT) Law that took effect in 2008, enterprises qualifying for the High-New Technology Enterprises (HNTE) Status regime are entitled to a preferential EIT rate of 15 per cent, rather than being subject to the normal rate of 25 per cent. The Chinese government provides a list of eight state encouraged industries that are considered in awarding HNTE

status, viz. Electronic Information Technology; Biological and New Medical Technology; Aviation and Space Technology; New Materials Technology; New Energy and Energy Conservation Technology; High Technology Service Industry; Resources and Environmental Technology; and Transformation of Traditional Industries through High New Technology. HNTE status needs to be applied for and renewed every 3 years. The criteria and procedures that govern qualification for (and maintenance of) HNTE status are detailed and objective some of which include the following:

- At least 30 per cent of the employees must be technical personnel holding college diplomas or higher degrees. Further, R&D personnel who are included in this highly educated technical personnel base must represent more than 10 per cent of the total workforce.
- The ratio of qualifying R&D expenditure to sales revenues for the three most recent financial years must reach a specified percentage of the total revenues (3 per cent to 6 per cent depending on the amount of revenues of the enterprise).
- The ratio of qualifying R&D expenditure actually carried out in China must be at least 60 per cent of the total qualifying R&D cost for the past three financial years, or for the actual years of operation, if fewer.
- Income generated from high-new tech products and services must be more than 60%of the total revenue of the enterprise.

The reduced rate of 15 per cent also applies to qualified Technology Advanced Service Enterprises in designated cities with over 50 per cent revenue derived from providing qualified technology advanced services outsourced by foreign entities. Qualified activities include development of new technology, new products, and new production techniques. Qualifying expenditures include staff costs, direct costs, supplies, depreciation and amortization, design costs, equipment installation costs, intangible asset amortization, and contracted R&D costs.

India also provides certain fiscal incentives for R&D expenses which is mostly sector neutral. This includes a 100% deduction for R&D expenses (other than land) that satisfy a set of basic criteria, and a super deduction of up to 200 per cent of qualifying R&D

expenses and research activities (150 per cent super deduction in the case of China). However, with a focus on promoting hi-tech manufacturing and exports, India could as well take a cue from the Chinese HNTE system and adopt suitable policy incentives. A key mechanism of this policy incentive would be preferential corporate income tax treatment for units manufacturing hi-tech products and meeting certain pre-defined criteria as in the case of the Chinese HNTE.

Financial Support on Capital Expenditure for Investments in Hi-Tech Manufacturing

The Government of India announced a package of incentives in July 2012 for one of the hi-tech sectors, viz. the Electronic System Design and Manufacturing (ESDM) sector within Electronics Manufacturing Clusters (EMC), under the Modified Special Incentive Package Scheme (M-SIPS). The objective was to increase investments in this sector, while at the same time offset the key infrastructure bottlenecks, high transaction costs and inadequate base of supply chain (components and accessories). This scheme provides for a 25 per cent subsidy on capital investments in new ventures and a 50 per cent grant for common facilities for units located in an area (viz. EMC), in addition to reimbursement of central taxes and duties. The benefits of M-SIPS are available for a period of 10 years after the initial investment. The Government could consider extending such special incentives for investments across all notified hi-tech manufactured products which would catalyse investments (both domestic and FDI) in hi-tech manufacturing.

The enabling provisions as highlighted above would help promote greenfield FDI inflows into hi-tech manufacturing sector, facilitating technology transfer and capacity development in domestic manufacturing. There would also be spin-off benefits of such package of incentives as outlined above, viz. creation of ancillary segments supplying to the large hi-tech manufacturing units, as was the case in the auto-component sector where larger mother units created a ready demand for development of OEM auto ancillary supplier. While in the short term, there could be a marginal fiscal impact on the government, but over a longer term horizon, this could potentially benefit if the units are profitable through job creation, investments and eventually revenues (through both direct and indirect taxes).

CLUSTER DEVELOPMENT APPROACH

Industrial clusters have been proven to be having several advantages in promoting the growth of a particular sector or industry. It is recognized that enterprises can achieve high levels of competitiveness if they work in a cluster environment ensuring complementarities, common facilities, collective activities including collective sourcing and marketing. Since quite a few firms in the hi-tech sector are SMEs, they would also benefit from working in a cluster. For instance, in the capital goods segment, currently there are only a limited number of Common Facility Centres, which can offer heavy and high precision machining services to users on a chargeable basis and are equipped with advanced testing equipments. As a result, a lot of players have to invest independently in testing and machining facilities, raising overall manufacturing costs. Clusters can be useful in such situations by increasing supply chain responsiveness because of manufacturing consolidation near the suppliers. The development and upgrading of clusters is an important agenda for governments, companies, and other stakeholders. In order for India to build a robust technology orientated manufacturing sector, concerted efforts have to be made by the policy makers for nurturing clusters that can build around the strengths of the eco-system in the cluster.

Financial Assistance to set up World Class Hi-Tech Clusters

The National Manufacturing Policy has proposed the creation of massive National Investment and Manufacturing Zones (NIMZ) which are being conceived as industrial greenfield townships to promote world-class manufacturing activities. A critical advantage the NIMZs can deliver is the clustering of small and large manufacturers (essentially customers and suppliers among themselves). Operating in close proximity, these companies will be able to leverage synergies as individual component manufacturers and can come together to build high value goods. NIMZs have the potential to foster a collaborative working model across different players along the value chain. Such an approach helps reduce costs, lead times, achieve economies of scale, exchange technology and gain expertise. In the development of such NIMZ, the Government could prioritise those zones which have been notified for hi-tech manufacturing.

While the setting up of NIMZ would be a longer-term option, the Government, in the near-term, could consider broadening the scope of the

Electronics Manufacturing Clusters to include select identified hi-tech products thereby driving innovation and developing an entrepreneurial ecosystem. Under the EMC scheme, which supports setting up of both greenfield and brownfield clusters, financial assistance in the form of grants would be provided to a Special Purpose Vehicle (SPV) promoted by private companies, industry associations, financial institutions, R&D institutions, State or Local governments or their agencies and units within the EMC. For Greenfield EMCs, the assistance would be up to 50 per cent of the project cost (subject to a ceiling of ₹ 50 crore for every 100 acres of land) while for brownfield EMCs, assistance would be up to 75 per cent of the project cost (subject to a ceiling of ₹ 50 crore). There is a need to expand the scope of the EMC scheme, in toto, to all hi-tech manufacturing clusters. This would help flow of both domestic and global investments for the development of world-class infrastructure specifically targeted towards attracting investments in the hi-tech sector.

Mitigating Financial Bottlenecks: Include Lending to Hi-Tech Clusters as part of Priority Sector

Over the years, the Indian financial system has played a crucial role in terms of directed resource mobilization in favour of sectors of strategic importance to the country, borne out by various policies, chief among them being Priority Sector Lending. At present, domestic commercial banks are required to achieve a priority sector target of 40 per cent of Adjusted Net Bank Credit[15] (ANBC), and the foreign banks are required to achieve 32 per cent of ANBC[16]. Within the overall priority sector lending target, sub-targets are set for domestic commercial banks to lend a minimum of 18 per cent to agriculture, and 10 per cent to weaker sections. Though Micro and Small Enterprises (MSE) sector is also included under the priority sector for domestic commercial banks there is no sub-target set. Given the Government's strong focus on hi-tech manufacturing, one of the policy options could be to include lending to notified hi-tech clusters and the units operating therein as a part of the overall priority sector lending. Depending upon the thrust of the Government to make India a key manufacturing hub of hi-tech products, RBI could also consider putting sub-targets for lending to hi-tech industries clusters at 10 per cent of ANBC.

Institutional linkages quintessential for Technology Clusters

Empirical studies across geographies have established the fact that technical universities are an integral component

[15] Foreign banks with 20 and above branches
[16] Foreign banks with less than 20 branches

for building a successful cluster. In India, this causal relationship has been rather non-existent with hardly any concrete intervention of institutes or technical universities in clusters. As against this, in USA, if Stanford University and University of California at Berkeley are disconnected from the Silicon Valley, this region would fast deteriorate as a technology cluster. That would be unlikely in the case of say Indian Institute of Science, Bangalore or Indian Institute of Technology, New Delhi, if removed or shifted from the respective cities – the technology companies present in the nearby clusters would still continue to perform without any significant adverse impact. While the Government does not need to intervene directly, it can surely facilitate policies to create an enabling environment for strong industry-academia linkages wherein institutions are motivated and encouraged to share common platforms with clusters for knowledge sharing and research. It is pertinent to mention here that one of the main features of the EMC scheme for EMSD sector is that the SPV should consider including an academic/ research institution to be part of the SPV. While it is commendable that the Government has taken cognizance of the significance of academic-industry linkages, it is not mandatory for the SPV to include an academic/ research institution. This could be made compulsory as an adjunct while widening the scope of EMC to cover all hi-tech manufacturing clusters. It may be worthwhile to mention here that for reinvigorating its manufacturing sector, USA has allocated US$ 500 million to six universities to initiate the Advanced Manufacturing Partnership program between industry and institutions. The partnership includes 11 manufacturing companies including Ford Motor Co., Caterpillar Inc., Procter & Gamble Co., and Northrop Grumman Corp., and Dow Chemical Co., among others.

OTHER MEASURES

Leverage Public Procurement for Localization and Technology Transfer

India represents one of the fastest growing markets in the world. Local demand provides a unique opportunity for hi-technology manufacturers to scale up, especially considering the country's ever increasing trade deficit in this segment. The government needs to ensure an environment that promotes investments in local manufacturing and enables the domestic players to compete on a level playing field. Various measures taken for creating global giants in countries such as China and South Korea could be considered for implementaiton by suitably adapting them to the Indian context.

China has been extremely successful in building a world class manufacturing

sector. Chinese value addition in manufacturing has shown a dramatic rise in the last decade, and is now approaching that of USA. Acquisition of technology and building self sufficiency in capital goods has played a major role in this rise. This has been accomplished through proactive policies, prominent amongst them being a strong procurement policy favouring goods produced within the country. China's public procurement policies clearly lay down a preference for domestic goods with extensive controls over purchase of imported products (requiring several approvals and special procedures). The Chinese government's procurement law spells out that the government shall procure goods, construction and services goods from outside only in the event that "the goods, construction or services needed are not available within the territory of the People's Republic of China, or though available, cannot be acquired on reasonable commercial terms", or "where the items to be procured are for use abroad". There is also a clearly stated preference for domestic innovation. Such policies have led to localisation of several hi-tech and capital goods products. Foreign players eager to capture the Chinese market setup production facilities in China to locally manufacture the goods. At the same time manufacturers are also encouraged to think of ways in which they can acquire technology. India should also learn from such experiences and wherever feasible, public procurement should have preference for local manufacturers producing hi-tech products.

Promotion of Intelligent Manufacturing

Significant engineering skills, with the combination of hardware, software and system integration skills are required in the evolution stage of advanced technology products. This niche area is called intelligent manufacturing. These are usually hi-tech products which provide high value addition but low volumes in highly quality conscious capital goods sector. India has a competitive advantage in this sector where a large proportion of value addition is through software and system integration. According to a Strategy Paper on 'Doubling Exports in Next Three Years (2011-12 to 2013-14)', prepared by the Ministry of Commerce, Government of India, establishing joint ventures with Chinese companies, which have manufacturing strengths and substantial market share in third world countries, would help in increasing hi-tech exports in the short term to developing countries in Africa and the Middle East.

Adapting and Replicating Successful Development Models of Hi-Tech Manufacturing

Analysis of hi-tech zones like Chengdu (China) and Colorado (USA) reveals that these regions, despite being land-locked (away from ports by about 800 kms) have been able to develop successful hi-tech manufacturing industries. These have, over the years, increased their exports significantly, provided additional employment and generated higher tax revenues than neighbouring regions that have not adopted a hi-tech manufacturing strategy. These two examples indicate that hi-tech manufacturing is region-neutral and does not require large land area. Suitable geographies may be identified in various states to develop high tech zones. A conscious attempt is required to be made to attract foreign and domestic investment in these sectors by offering special incentives as is being offered by other countries, some of which have been highlighted earlier.

Creating Institutes of Strategic Importance

India could consider building institutes of strategic importance which are focussed on developing and implementing innovative ideas related to hi-tech products. These institutes could help ensure technological competence, while allowing India to leapfrog its global competitors in the medium to long term. The National Innovation Council could perhaps take a lead in this initiative. USA, for example, while being aware of the power of manufacturing, has invested in the development of National Manufacturing Innovation Institutes. One such institute that is already up and running is the National Additive Manufacturing Innovation Institute (NAMII) in Youngstown, Ohio. NAMII is a public-private partnership initiative with member organizations from industry, academia and government all collaborating for a singular, shared vision. NAMII's goal is to transition additive manufacturing technology to the mainstream U.S. manufacturing sector and create an adaptive workforce capable of not only meeting industry needs but also increasing domestic manufacturing competitiveness. India too needs to establish institutes of such magnitude which can help the country create niche hi-tech products that could potentially earn greater levels of foreign exchange through exports.

Annexuer 1: Top 5 Hi-Tech Products Being Exported By Top 10 Exporters

EXPORTER	SITC	PRODUCT NAME	VALUES (US$ bn)				
			2007	2008	2009	2010	2011
CHINA	7522	Digital Computers	66.7	75.0	73.5	100.7	110.0
	7643	TV, radio transmitters etc.	36.1	38.9	39.8	47.1	63.3
	7649	Parts And Accessories Suitable For Use Solely Or Principally With The Apparatus Of Telecommunications And Sound Recording And Reproducing Equipment	36.8	41.7	35.4	47.1	54.5
	7763	Diodes, transistors etc.	8.8	15.7	14.3	30.2	33.6
	7764	Electronic microcircuits	24.2	25.1	24.0	30.0	33.4
CHINA Total			**342.7**	**383.1**	**344.6**	**458.5**	**517.4**
GERMANY	7924	Airplanes And Other Aircraft, Mechanically Propelled (other Than Helicopters), Of An Unladen Weight Exceeding 15,000 Kg	18.5	20.0	22.0	22.1	26.9
	5416	Glycosides; glands etc.	8.8	11.7	12.6	15.8	17.6
	7764	Electronic microcircuits	13.8	13.1	8.6	10.4	10.8
	7763	Diodes, transistors etc.	5.4	8.1	5.8	9.8	9.4
	7712	Other electric power machine, part	5.4	6.7	5.4	7.8	8.9
GERMANY Total			**203.0**	**220.2**	**192.0**	**211.1**	**235.9**
USA	7764	Electronic microcircuits	39.7	39.7	29.2	36.3	34.6
	7599	Parts And Accessories For Use Solely Or Principally With Office Machines (except Photo- Or Thermo-copy) And Automatic Data Processing Machines, Etc	15.7	15.1	12.8	14.1	14.9
	5416	Glycosides; glands etc.	9.7	12.1	14.3	14.1	11.3
	7649	Parts And Accessories Suitable For Use Solely Or Principally With The Apparatus Of Telecommunications And Sound Recording And Reproducing Equipment	10.9	10.9	9.4	9.2	9.2
	7643	TV, radio transmitters etc	6.3	6.9	6.2	7.5	8.9
USA Total			**286.2**	**289.6**	**201.7**	**226.7**	**233.1**
HONG KONG	7764	Electronic microcircuits	39.5	43.2	44.7	53.7	58.1
	7649	Parts And Accessories Suitable For Use Solely Or Principally With The Apparatus Of Telecommunications And Sound Recording And Reproducing Equipment	29.3	31.1	27.2	33.7	37.1

EXPORTER	SITC	PRODUCT NAME	VALUES (US$ bn)				
	7599	Parts And Accessories For Use Solely Or Principally With Office Machines (except Photo- Or Thermo-copy) And Automatic Data Processing Machines, Etc	19.5	19.2	16.2	21.1	22.6
	7643	TV, radio transmitters etc	3.8	4.9	5.2	6.9	10.5
	7527	Storage Units, Whether Or Not Presented With The Rest Of The System For Data Processing	4.0	5.2	5.1	7.3	9.4
HONG KONG Total			**134.4**	**142.8**	**132.8**	**168.7**	**186.3**
SINGAPORE	7764	Electronic microcircuits	56.2	56.9	50.7	69.3	70.5
	7599	Parts And Accessories For Use Solely Or Principally With Office Machines (except Photo- Or Thermo-copy) And Automatic Data Processing Machines, Etc	1.9	14.8	8.9	11.3	10.5
	7768	Piezoelectric Crystals, Mounted, And Parts, Of Thermionic, Cold Cathode Or Photo-cathode Valves And Tubes, Diodes, Transistors, Etc.	9.9	11.1	7.3	11.6	7.9
	7763	Diodes, transistors etc.	3.9	4.5	3.7	5.4	4.9
	7643	TV, radio transmitters etc	7.5	5.3	3.3	3.5	4.7
SINGAPORE Total			**115.4**	**127.5**	**103.8**	**135.5**	**135.4**
KOREA REP.	7764	Electronic microcircuits	30.1	25.6	24.2	37.7	39.5
	8719	Liquid crystal devices lasers	19.6	23.1	23.4	30.1	27.7
	7649	Parts And Accessories Suitable For Use Solely Or Principally With The Apparatus Of Telecommunications And Sound Recording And Reproducing Equipment	16.0	17.6	16.1	17.6	18.0
	7643	TV, radio transmitters etc	18.7	22.1	18.1	15.3	15.1
	7599	Parts And Accessories For Use Solely Or Principally With Office Machines (except Photo- Or Thermo-copy) And Automatic Data Processing Machines, Etc	8.6	6.2	5.1	8.0	5.1
KOREA REP. Total			**113.5**	**113.7**	**104.1**	**131.6**	**129.4**
FRANCE	7924	Airplanes And Other Aircraft, Mechanically Propelled (other Than Helicopters), Of An Unladen Weight Exceeding 15,000 Kg	20.7	25.1	24.0	35.8	38.8
	7764	Electronic microcircuits	6.6	6.3	4.8	7.2	8.4
	5416	Glycosides; glands etc.	3.0	3.3	4.3	5.3	5.2
	5422	Medicaments, hormones etc	3.0	4.1	4.2	4.3	3.7
	5251	Radio-active chemicals	2.8	4.5	3.2	3.2	2.8

EXPORTER	SITC	PRODUCT NAME	VALUES (US$ bn)				
FRANCE Total			**100.8**	**114.9**	**102.3**	**118.4**	**124.9**
JAPAN	7764	Electronic microcircuits	30.1	28.8	24.4	31.3	29.2
	7763	Diodes, transistors etc.	8.7	9.3	7.2	10.1	10.1
	8719	Liquid crystal devices lasers	3.1	3.8	3.9	6.6	8.6
	7649	Parts And Accessories Suitable For Use Solely Or Principally With The Apparatus Of Telecommunications And Sound Recording And Reproducing Equipment	14.7	14.6	9.7	9.6	7.9
	8746	Automatic control instrument	3.6	3.8	3.2	4.8	5.3
JAPAN Total			**110.8**	**112.2**	**90.6**	**112.6**	**115.2**
TAIWAN	7764	Electronic microcircuits	41.6	40.1	37.0	49.7	55.1
	8719	Liquid crystal devices lasers	15.9	17.3	12.0	17.9	17.2
	7643	TV, radio transmitters etc	3.6	4.7	4.0	7.7	10.7
	7763	Diodes, transistors etc.	4.9	6.5	5.9	10.1	9.7
	7599	Parts And Accessories For Use Solely Or Principally With Office Machines (except Photo- Or Thermo-copy) And Automatic Data Processing Machines, Etc	9.4	7.6	6.0	7.7	6.1
TAIWAN Total			**89.4**	**89.9**	**75.0**	**106.1**	**114.9**
NETHERLANDS	7599	Parts And Accessories For Use Solely Or Principally With Office Machines (except Photo- Or Thermo-copy) And Automatic Data Processing Machines, Etc	10.8	9.6	8.0	8.6	10.3
	7522	Digital computers	2.9	2.7	3.8	6.8	7.0
	7527	Storage Units, Whether Or Not Presented With The Rest Of The System For Data Processing	5.4	4.7	4.0	4.1	4.2
	7649	Parts And Accessories Suitable For Use Solely Or Principally With The Apparatus Of Telecommunications And Sound Recording And Reproducing Equipment	3.2	4.0	3.3	3.4	3.6
	7764	Electronic microcircuits	7.5	4.7	3.5	3.9	3.5
NETHERLANDS Total			**82.0**	**70.9**	**64.1**	**72.8**	**80.7**
HI TECH WORLD EXPORTS			**2291.3**	**2418.4**	**2104.3**	**2502.1**	**2672.8**

Source: Data derived from PC-TAS, UN Comtrade, 2013, EXIM Bank Research

Annexure 2: Major Hi-Tech Products Being Imported By Top Importers

IMPORTER	SITC	PRODUCT NAME	VALUE (US$ bn)				
			2007	2008	2009	2010	2011
CHINA	**7764**	**Electronic microcircuits**	**127.9**	**129.5**	**120.2**	**157.3**	**170.6**
	8719	Liquid Crystal Devices; Lasers (other Than Laser Diodes) Other Optical Appliances And Instruments	45.3	48.5	38.3	51.5	53.1
	7649	Parts And Accessories Suitable For Use Solely Or Principally With The Apparatus Of Telecommunications And Sound Recording And Reproducing Equipment	24.7	25.0	22.7	26.7	34.1
	7527	Storage Units, Whether Or Not Presented With The Rest Of The System For Data Processing	14.9	17.3	16.7	20.8	22.4
	7599	Parts And Accessories For Use Solely Or Principally With Office Machines (except Photo- Or Thermo-copy) And Automatic Data Processing Machines, Etc	17.5	15.6	13.7	19.3	17.5
CHINA Total			**305.7**	**320.1**	**292.9**	**381.2**	**419.9**
USA	7643	Transmission Apparatus For Radiotelephony, Telegraphy, Broadcasting Or Television, Whether Or Not Including Reception, Sound Recording, Etc. Apparatus	30.8	35.1	37.1	41.2	46.7
	7522	Digital computers	28.2	29.3	28.4	36.3	45.8
	7764	Electronic microcircuits	21.2	19.8	16.5	21.8	27.5
	7523	Digital Processing Units Whether Or Not Presented With The Rest Of The System Which May Contain Storage Units, Input Units Or Output Units	11.3	10.1	11.5	17.9	18.7
	7599	Parts And Accessories For Use Solely Or Principally With Office Machines (except Photo- Or Thermo-copy) And Automatic Data Processing Machines, Etc	22.7	19.3	19.0	23.4	16.7
USA Total			**323.0**	**327.2**	**298.4**	**350.5**	**381.3**
HONG KONG	7764	Electronic microcircuits	51.1	51.8	53.4	68.0	70.4
	7649	Parts And Accessories Suitable For Use Solely Or Principally With The Apparatus Of Telecommunications And Sound Recording And Reproducing Equipment	22.5	24.8	22.3	29.0	31.2

IMPORTER	SITC	PRODUCT NAME	VALUE (US$ bn)				
			2007	2008	2009	2010	2011
	7599	Parts And Accessories For Use Solely Or Principally With Office Machines (except Photo- Or Thermo-copy) And Automatic Data Processing Machines, Etc	18.6	17.7	16.2	20.5	20.3
	7643	Transmission Apparatus For Radiotelephony, Telegraphy, Broadcasting Or Television, Whether Or Not Including Reception, Sound Recording, Etc. Apparatus	9.5	8.8	8.9	10.9	16.6
	7527	Storage Units, Whether Or Not Presented With The Rest Of The System For Data Processing	5.6	7.1	6.9	8.4	10.0
HONG KONG Total			**146.1**	**151.4**	**143.8**	**185.3**	**203.5**
GERMANY	5416	Glycosides; glands etc.	9.9	11.7	12.4	14.4	17.5
	7763	Diodes, Transistors And Similar Semiconductor Devices; Photosensitive Semiconductor Devices; Light Emitting Diodes	6.6	10.1	10.7	17.8	15.6
	7924	Airplanes And Other Aircraft, Mechanically Propelled (other Than Helicopters), Of An Unladen Weight Exceeding 15,000 Kg	9.5	12.3	13.9	15.8	15.6
	7764	Electronic microcircuits	14.8	13.4	8.9	12.6	13.1
	7522	Digital computers	9.5	10.2	7.5	10.4	9.8
GERMANY Total			**166.4**	**177.8**	**159.2**	**184.0**	**198.0**
JAPAN	7764	Electronic microcircuits	21.3	20.6	16.2	20.3	17.9
	7643	Transmission Apparatus For Radiotelephony, Telegraphy, Broadcasting Or Television, Whether Or Not Including Reception, Sound Recording, Etc. Apparatus	1.7	2.2	3.1	5.1	9.2
	7522	Digital computers	4.1	5.0	4.5	6.3	8.5
	7649	Parts And Accessories Suitable For Use Solely Or Principally With The Apparatus Of Telecommunications And Sound Recording And Reproducing Equipment	8.9	9.9	7.8	9.0	8.4
	5416	Glycosides; glands etc.	1.4	2.0	2.7	3.8	5.0
JAPAN Total			**93.3**	**97.2**	**84.7**	**105.0**	**115.8**

IMPORTER	SITC	PRODUCT NAME	VALUE (US$ bn)				
			2007	2008	2009	2010	2011
FRANCE	7924	Airplanes And Other Aircraft, Mechanically Propelled (other Than Helicopters), Of An Unladen Weight Exceeding 15,000 Kg	2.9	2.0	3.2	11.2	13.4
	7643	Transmission Apparatus For Radiotelephony, Telegraphy, Broadcasting Or Television, Whether Or Not Including Reception, Sound Recording, Etc. Apparatus	4.3	4.9	5.0	5.8	5.9
	7764	Electronic microcircuits	5.2	4.8	3.5	5.6	5.4
	5416	Glycosides; glands etc.	1.9	2.5	3.8	4.6	5.4
	7522	Digital computers	3.9	4.3	3.2	3.8	4.8
FRANCE Total			**86.3**	**92.2**	**87.2**	**103.1**	**110.7**
SINGAPORE	7764	Electronic microcircuits	44.7	42.9	35.6	49.5	47.3
	7599	Parts And Accessories For Use Solely Or Principally With Office Machines (except Photo- Or Thermo-copy) And Automatic Data Processing Machines, Etc	1.4	11.9	6.9	7.8	6.8
	7643	Transmission Apparatus For Radiotelephony, Telegraphy, Broadcasting Or Television, Whether Or Not Including Reception, Sound Recording, Etc. Apparatus	6.9	5.7	3.9	4.8	6.5
	7768	Piezoelectric Crystals, Mounted, And Parts, Of Thermionic, Cold Cathode Or Photocathode Valves And Tubes, Diodes, Transistors, Etc.	3.2	5.4	3.5	4.2	4.6
	7763	Diodes, Transistors And Similar Semiconductor Devices; Photosensitive Semiconductor Devices; Light Emitting Diodes	3.8	3.8	2.7	3.9	3.8
SINGAPORE Total			**88.2**	**100.0**	**79.0**	**98.0**	**99.5**
UK	7643	Transmission Apparatus For Radiotelephony, Telegraphy, Broadcasting Or Television, Whether Or Not Including Reception, Sound Recording, Etc. Apparatus	6.7	6.5	6.7	8.6	9.6
	7522	Digital computers	5.7	6.0	5.0	6.1	6.3
	5416	Glycosides; glands etc.	3.1	3.3	3.9	4.5	5.7

IMPORTER	SITC	PRODUCT NAME	VALUE (US$ bn)				
			2007	2008	2009	2010	2011
	7599	Parts And Accessories For Use Solely Or Principally With Office Machines (except Photo- Or Thermo-copy) And Automatic Data Processing Machines, Etc	7.6	6.3	4.2	4.0	3.3
	7523	Digital Processng Units Whether Or Not Presented With The Rest Of The System Which May Contain Storage Units, Input Units Or Output Units	4.5	3.9	3.2	3.4	3.2
UK Total			**81.0**	**77.0**	**66.0**	**75.3**	**80.7**
SOUTH KOREA	7764	Electronic microcircuits	25.3	25.9	21.6	23.8	25.4
	7763	Diodes, Transistors And Similar Semiconductor Devices; Photosensitive Semiconductor Devices; Light Emitting Diodes	2.5	3.3	3.1	4.2	4.3
	7649	Parts And Accessories Suitable For Use Solely Or Principally With The Apparatus Of Telecommunications And Sound Recording And Reproducing Equipment	3.2	4.2	3.5	3.6	4.0
	8719	Liquid Crystal Devices; Lasers (other Than Laser Diodes) Other Optical Appliances And Instruments	1.5	1.9	1.7	2.9	3.2
	7924	Airplanes And Other Aircraft, Mechanically Propelled (other Than Helicopters), Of An Unladen Weight Exceeding 15,000 Kg	1.8	1.1	0.6	1.7	2.8
SOUTH KOREA Total			**60.7**	**63.8**	**53.8**	**67.4**	**73.3**
NETHERLANDS	7599	Parts And Accessories For Use Solely Or Principally With Office Machines (except Photo- Or Thermo-copy) And Automatic Data Processing Machines, Etc	9.9	10.2	8.1	8.9	9.3
	7522	Digital computers	4.2	3.8	3.7	8.4	8.6
	7527	Storage Units, Whether Or Not Presented With The Rest Of The System For Data Processing	4.4	4.9	4.0	4.2	4.0
	7649	Parts, telecommunication equipment	3.6	3.6	3.1	3.5	3.7
	7763	Diodes, Transistors And Similar Semiconductor Devices; Photosensitive Semiconductor Devices; Light Emitting Diodes	0.8	0.9	1.3	2.7	2.9
NETHERLANDS Total			**74.3**	**67.0**	**58.2**	**67.4**	**73.0**
TOTAL HI-TECH IMPORTS			**2351.8**	**2494.7**	**2186.2**	**2629.3**	**2805.7**

Source: Data derived from PC-TAS, UN Comtrade, 2013, EXIM Bank Research

Annexure 3: Key Hi-Tech Products Being Exported by India to Key Export Destinations (US$ mn)

Export Destination	SITC Code	Top 5 products being Exported from India	2007	2008	2009	2010	2011
USA	5421	Medicaments, antibiotics	299	245	219	220	361
	7712	Other electric power machinery; parts of the electric power machinery of group 771	169	193	135	132	175
	7649	Parts, telecommunication equipment	83	38	49	54	109
	5422	Medicaments, hormones etc	61	105	116	79	80
	7599	Parts ,data proc. etc.mch	43	66	70	50	72
USA Total			**1807**	**2238**	**2415**	**3361**	**3681**
UAE	7643	TV, radio transmitters etc	30	36	320	207	540
	7649	Parts, telecommunication equipment	35	42	46	20	113
	7523	Digital processing units, whether or not presented with the rest of a system, which may contain in the same housing one or two of the following types of unit: storage units, input units, output units	0	0	0	19	92
	7641	Line telephone etc. equipment	6	14	20	29	36
	7712	Other electric power machinery; parts of the electric power machinery of group 771	15	28	21	17	22
UAE Total			**223**	**402**	**611**	**470**	**1007**
UK	5421	Medicaments, antibiotics	22	20	35	26	36
	7643	TV, radio transmitters etc	3	1	4	21	35
	5413	Antibiotics, not put up as medicaments of group 542	4	2	6	15	31
	7711	Transformers, electrical	20	15	12	18	16
	7163	Electric motors, genrators.AC	1	1	3	9	13
UK Total			**333**	**387**	**460**	**623**	**865**
NETHERLANDS	7649	Parts, telecommunication equipment	9	22	40	41	394
	7712	Other electric power machinery; parts of the electric power machinery of group 771	101	130	76	83	85

Export Destination	SITC Code	Top 5 products being Exported from India	2007	2008	2009	2010	2011
	7763	Diodes, transistors etc.	3	8	15	81	85
	7527	Storage units, data proc.	30	44	61	45	27
	5421	Medicaments, antibiotics	12	14	15	27	24
Netherlands Total			**260**	**398**	**361**	**421**	**850**
Russia	7643	TV, radio transmitters etc	1	1	15	48	159
	5421	Medicaments, antibiotics	36	63	40	39	120
	5422	Medicaments, hormones etc	28	22	16	25	37
Russia Total			**330**	**446**	**346**	**391**	**828**
Germany	7643	TV, radio transmitters etc	3	4	4	18	97
	7649	Parts, telecommunication equipment	24	34	25	14	44
	7763	Diodes, transistors etc.	75	197	244	167	39
	7712	Other electric power machinery; parts of the electric power machinery of group 771	13	22	11	26	31
	5421	Medicaments, antibiotics	26	15	6	13	29
Germany Total			**400**	**703**	**697**	**688**	**764**
Singapore	8911	Armoured fighting vehicles and arms of war[1]	0	32	0	0	48
	7599	Parts, data processing etc .machinery	31	37	43	58	45
	7742	X-ray apparatus etc. part	32	48	37	99	44
	7643	TV, radio transmitters etc	18	35	206	35	35
	7712	Other electric power machinery; parts of the electric power machinery of group 771	28	35	29	37	34
Singapore Total			**307**	**599**	**656**	**600**	**759**
Nigeria	7643	TV, radio transmitters etc	0	1	265	98	244
	7711	Transformers, electrical	11	20	46	51	66
	5421	Medicaments, antibiotics	39	44	29	45	41
	5416	Glycosides; glands etc.	6	6	21	10	34

Export Destination	SITC Code	Top 5 products being Exported from India	2007	2008	2009	2010	2011
	5413	Antibiotics, not put up as medicaments of group 542	8	21	10	14	17
Nigeria Total			175	250	516	368	626
France	7643	TV, radio transmitters etc	6	4	8	17	55
	7712	Other electric power machinery; parts of the electric power machinery of group 771	1	3	5	28	34
	5421	Medicaments, antibiotics	8	16	23	24	34
	7924	Aircraft etc.ULW >15000kg	0	0	0	0	16
	7599	Parts, data processing etc .machinery	1	2	3	1	10
France Total			176	308	316	405	503
South Africa	7643	TV, radio transmitters etc	1	2	148	82	112
	5421	Medicaments, antibiotics	25	52	39	54	75
	5419	Pharm. goods, exc. Medicaments	1	1	1	10	11
	5422	Medicaments, hormones etc	7	6	8	8	10
	7763	Diodes, transistors etc.	0	0	0	7	10
South Africa Total			137	249	366	377	498
China	7649	Parts, telecommunication equipment	9	4	62	32	132
	5413	Antibiotics, except	29	40	31	43	62
	7599	Parts, data proc. etc.mch	7	15	21	18	50
	7742	X-ray apparatus etc. part	17	22	17	29	40
	7712	Other electric power machinery; parts of the electric power machinery of group 771	8	12	12	19	25
China Total			158	174	314	297	483
Total Hi-Tech Exports			8098	12068	14858	14652	20904

Source: Data derived from PC-TAS, UN Comtrade, 2013; EXIM Bank Research

Annexure 4: Key Hi-Tech Products Being Imported By India from Its Major Sources (US$ mn)

Import Source	SITC Code	Top 5 products being Imported by India	2007	2008	2009	2010	2011
CHINA	7643	TV, radio transmitters, etc	2634	2678	2526	4136	3645
	7649	Parts, telecommunication equipment	571	468	1630	1656	2104
	7522	Digital computers	441	539	566	955	1159
	7599	Parts, data process etc, machinery	478	517	524	536	822
	5413	Antibiotics, not put up as medicaments of group 542	566	562	525	713	650
CHINA Total			**7557**	**7432**	**8962**	**11629**	**13379**
USA	7649	Parts, telecommunication equipment	130	110	156	163	186
	8744	Instruments, analysis etc	137	155	148	178	174
	7643	TV, radio transmitters etc	49	25	11	25	165
	7923	Aircraft, ULW 2001-15000kg	80	6458	654	376	162
	7763	Diodes, transistors etc.	34	29	47	61	144
USA Total			**4131**	**9300**	**3050**	**3247**	**2822**
GERMANY	7712	Other electric power machinery; parts of the electric power machinery of group 771	67	114	182	104	188
	8742	Drawing, measuring instrument	110	139	117	117	147
	7643	TV, radio transmitters etc	12	5	3	9	131
	7649	Parts, telecommunication equipment	53	32	60	58	114
	7764	Electronic micro circuits	14	3	17	25	111
GERMANY Total			**1257**	**1788**	**2630**	**1612**	**2163**
KOREA REP.	7643	TV, radio transmitters etc	240	563	391	405	451
	7649	Parts, telecommunication equipment	112	113	237	449	328

Import Source	SITC Code	Top 5 products being Imported by India	2007	2008	2009	2010	2011
	7764	Electronic microcircuits	80	30	149	198	298
	8746	Automatic control instrument	56	94	82	87	83
	8719	LCD, lasers etc.	0	3	40	79	56
KOREA REP. Total			**785**	**1166**	**1169**	**1644**	**1755**
SINGAPORE	7764	Electronic microcircuits	166	44	308	215	373
	7523	Digital processing units, whether or not presented with the rest of a system, which may contain in the same housing one or two of the following types of unit: storage units, input units, output units	181	163	163	205	187
	7522	Digital computers	220	114	60	85	89
	7599	Parts, data process etc, machinery	183	171	122	144	86
	7649	Parts, telecommunication equipment	62	48	182	124	80
SINGAPORE Total			**1720**	**1398**	**1556**	**1431**	**1601**
MALAYSIA	7599	Parts, data process etc, machinery	269	322	277	303	411
	7763	Diodes, transistors etc.	9	10	11	40	199
	7764	Electronic microcircuits	34	7	42	50	91
	7649	Parts, telecommunication equipment	27	24	86	104	89
	7761	TV picture tubes, CRT, etc	35	54	72	106	65
MALAYSIA Total			**1024**	**789**	**712**	**842**	**1357**
JAPAN	7763	Diodes, transistors etc.	39	66	60	57	156
	8742	Drawing, measuring instrument	51	80	62	91	121
	7764	Electronic microcircuits	49	11	155	101	96
	8744	Instruments, analysis etc	48	58	63	72	80
	7643	TV, radio transmitters etc	96	113	72	9	71

Import Source	SITC Code	Top 5 products being Imported by India	2007	2008	2009	2010	2011
JAPAN Total			**747**	**757**	**960**	**902**	**1236**
TAIWAN	7764	Electronic microcircuits	43	8	67	114	280
	7763	Diodes, transistors etc.	46	139	127	69	218
	7643	TV, radio transmitters etc	28	70	25	57	151
	7649	Parts, telecommunication equipment	30	53	86	134	86
	7599	Parts, data process etc, machinery	53	36	53	55	61
TAIWAN Total			**304**	**430**	**488**	**576**	**975**
FRANCE	7924	Aircrftetc.ULW>15000kg	208	0	100	122	90
	7921	Helicopters	27	2	2	121	64
	7923	Aircraft, ULW 2001-15000kg	0	2866	1421	694	48
FRANCE Total			**745**	**3654**	**2086**	**1469**	**809**
Total Hi-Tech Imports			**23950**	**32291**	**27538**	**29554**	**33599**

Source: Data derived from PC-TAS (SITC), EXIM Bank Research

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156. Exports of Services and Offshore Outsourcing: An Empirical Investigation in the Indian Context
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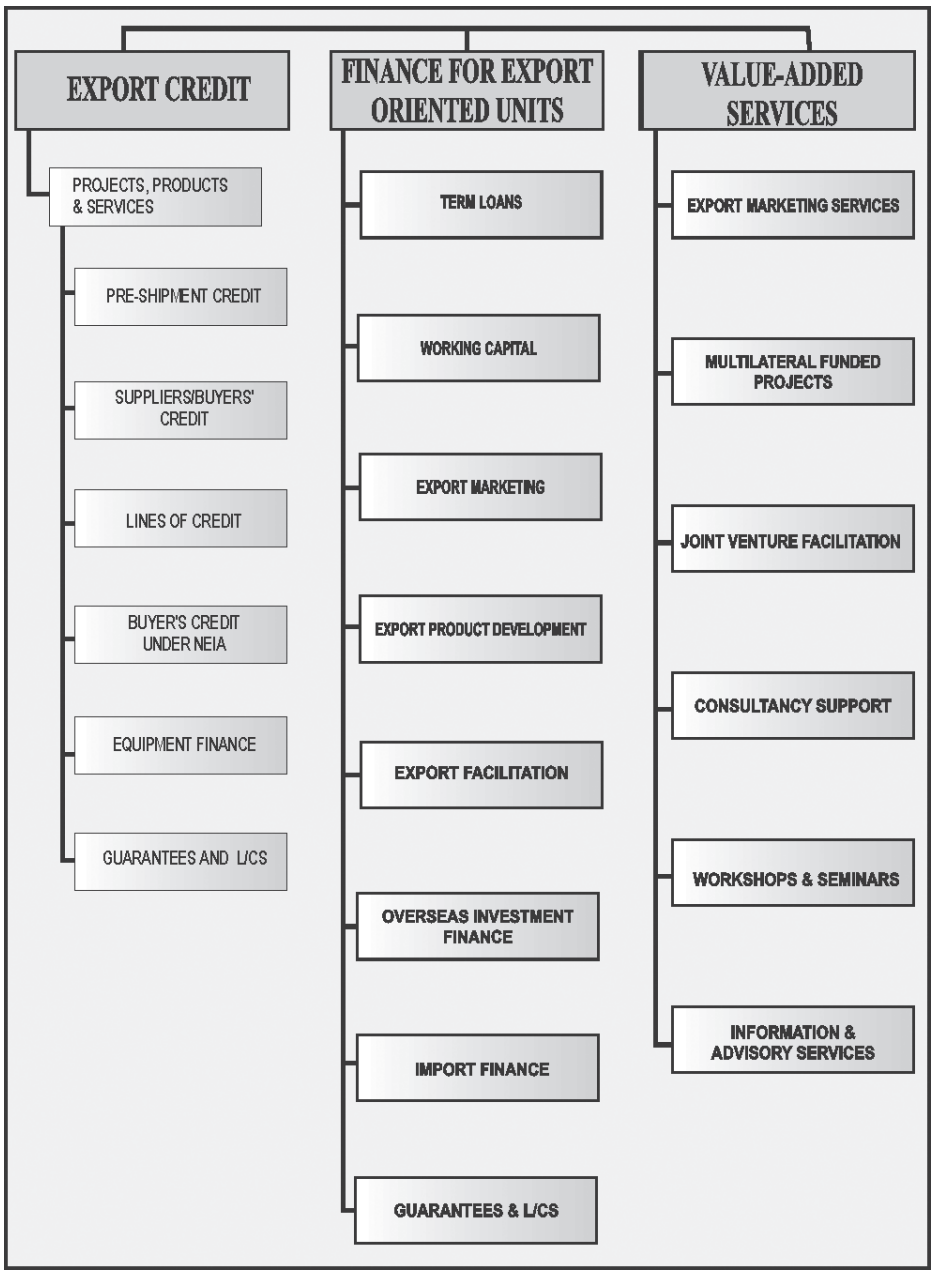
161. India's Trade and Investment Relations with Cambodia, Lao PDR, Myanmar, Vietnam (CLMV): Enhancing Economic Cooperation
162. Indian Horticulture-Imperatives to Enhance Trade from India
163. India's Trade and Investment Relations with Gulf Cooperation Council (GCC): Strengthening Economic Ties

EXIM BANK'S MAJOR PROGRAMMES

Bank's Major Programmes



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