IT Hardware & Electronics: Productivity & Efficiency Benchmarking

In this section various parameters that are critical to achieve competitiveness in the manufacturing sector have been studied along with the progression of India vis-à-vis competing countries on the competitiveness protocol.

Most of the Indian firms are still in the Stage I of the competence protocol and targeting basic conveniences & cleaning up of operations to achieve competitiveness in IT Hardware & Electronic industry. Their efforts are made towards cost reduction (raw-material & logistics being the most prominent) and increasing labour productivity. Some of the aspects in Stage 1 like energy conservation, clean & safe working environment, etc. are still to be looked up as measures for competitiveness.

Amongst the competing countries, China has already crossed the first stage of basic clean-up of operations by managing backward linkages effectively. Mexico has managed to fare well in the next stage as well with optimized capacity utilization and system improvements. The Taiwan & Singapore counterparts have already crossed second stage and their current focus is on total improvement in systems & business processes by achieving total quality enrichment and enhanced value addition.

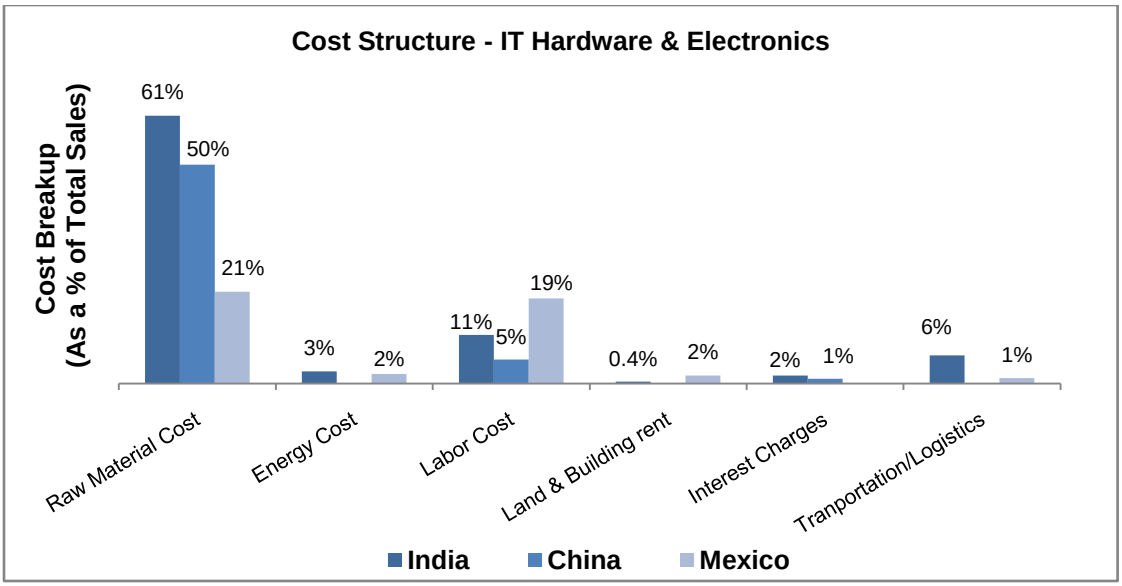
Detailed benchmarking results are formulated below:

Cost Structure

Cost structure encompasses all the expenses that a firm must take into account when manufacturing & selling a product. Various types of costs that are benchmarked in this section are: Raw material costs, labour costs (including wages), Energy costs, Interest charges, and distribution expenses (including transportation & logistics etc.)

Margins can be improved either by increasing sales prices, or by reducing costs. As prices in real terms for many of the industry's staple products have eroded over many years, the focus has long been on reducing costs. Cost reduction is one of the important parameter to achieve first stage of competence, i.e. targeting basic inconveniences, cleaning up of operations. India has not been able to manage costs well especially raw-materials and logistics cost which have made its enterprises less competitive against competing countries.

Competing countries' (China & Mexico) competitive advantage vis-à-vis India in terms of costs is presented in the charts below:



Source: Enterprise Surveys (http://www.enterprisesurveys.org), The World Bank, D&B Analysis

Mexico has huge advantage in terms of raw material costs, with India & China having comparable costs. Energy costs in India are higher than Mexico, but these are governed more by government action than by market forces. China scores over both India & Mexico in labour costs. Transportation/logistics costs in India are much higher than that of Mexico.

Raw-material costs in India are higher than competing countries and have been the biggest source of disadvantage for Indian firms in Electronic components and Communication & Broadcast Equipment industry. The most critical raw raw-materials i.e. semi-conductors and PCB components are not available in India and hence need to be imported. Currently, there are no operational wafer fabrication units in the country and semiconductor manufacturing is limited to three government companies (Bharat Electronics Ltd, Society for Integrated Circuit Technology and Applied Research, and Semi-Conductor Laboratory).

Further, other critical raw-materials like precious metals, gold &palladium alloys, metals like 99.99% pure aluminium foil, cathode foil, anode foil, electronic chemicals, Putin rubber, high garden tissue paper, tin coated copper leads, copper coated steel wires, single core high temperature cables, etc. have to be imported from countries like Germany, USA, Japan, China, etc. which increases the costs by almost 10%.

China's advantage in electronic components & communication & broadcast equipment lies in its local manufacturing capabilities of semi-conductors and other PCB components. Chinese government has given utmost priority to semiconductor manufacturing and design, which has provided a major boost to the industry. The China Semiconductor Industry Association (CSIA) estimated that China made an investment of as much as RMB300 billion in the Integrated Circuit industry for development from 2006 to 2010. This allowed home grown IC makers to double their market share. Under the 11th 5 year programme (2006-2010), China established a fund of at least RMB150 million each year to support the home grown IC industry's research and development, offering more favourable tax policies and founding a national technical support centre.

In comparison to other countries, Chinese labour rates are extremely attractive for investors. Chinese wages (Including hourly wage rates and benefits) are about 10 percent of salaries in the US and Western

Europe and 50 percent of the average wages in Mexico. There is still a large supply of low-cost labour throughout the country, and manufacturers in major cities (Shanghai, for example) are supported by government efforts to keep wages low by bringing additional workers to urban areas. Nevertheless, as more and more companies purchase supplies from China, there has been wage inflation in some large cities. As a result, labour-intensive supplier relationships, such as some automotive OEM programs, are moving inland, where wages remain lower. Honda, for example, is establishing its manufacturing centre, automotive assembly, and supporting component operations in Dongfeng, in central China. Moving inland, though, makes shipment scheduling more difficult and often more costly, because of poor roads and the lack of developed logistics infrastructures.

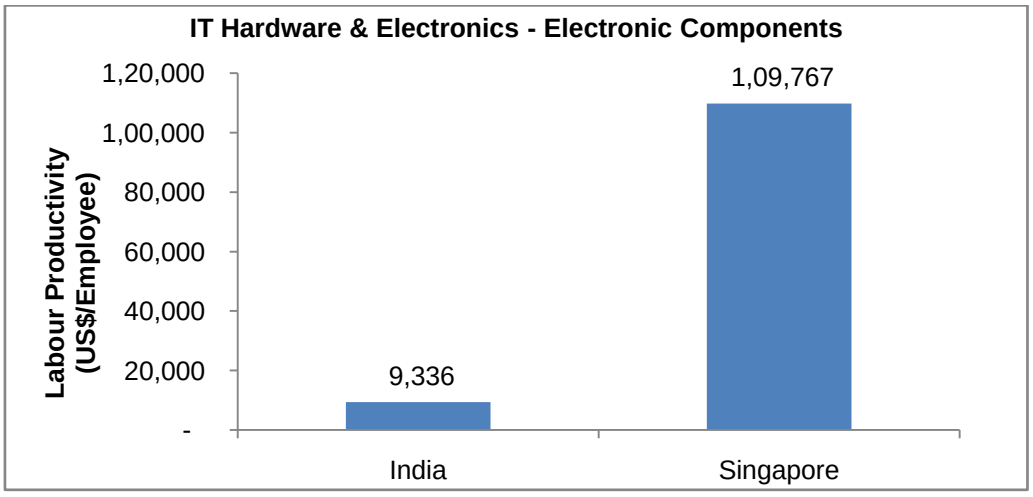
However, logistics cost in India and China especially in key markets like the US and Europe are less competitive than Mexico. Procurement from China and India naturally increases transportation cost over more local sourcing arrangements. In China & India, a product must go from the factory to the port, onto a ship, and then to the US or another major market, where it is unloaded and trucked to its destination. The cost of ocean transport from China& India to the United States is US$2,500 to US$3,000 per container. For a US$ 12 casting, the total incremental transportation cost is US$1.10, compared with US$0.30 for a typical Mexican supplier shipping to the US.

Productivity

Labour Productivity is the measure taken for benchmarking the productivity of Indian IT Hardware & Electronics industry vis-à-vis competing countries. Labour productivity has been estimated as a ratio of Gross value added (GVA) to the number of workers.

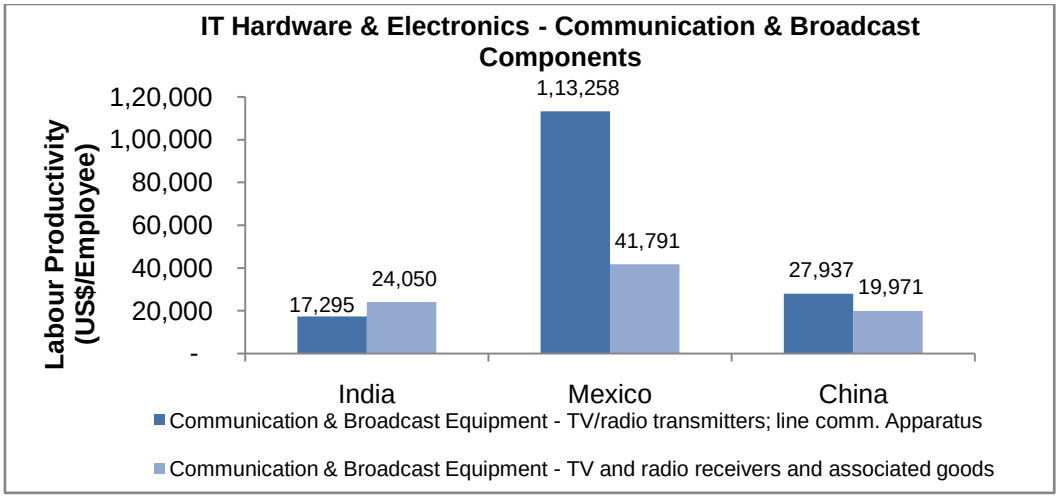
Higher labour productivity of competing countries (Singapore for Electronic components and China & Mexico for Communication & broadcast equipment) is one of the sources of competitive advantage over India, as shown in the charts below:

1. **Electronic Components**



Source: UNIDO

2. **Communication & Broadcast Equipment**



Source: UNIDO

India is lagging behind Singapore by a huge margin in electronics component segment with Singapore managing labour productivity of more than ten times that of India. This is because Singapore is managing a gross value added of almost ten times that of India with almost comparable workforce strength.

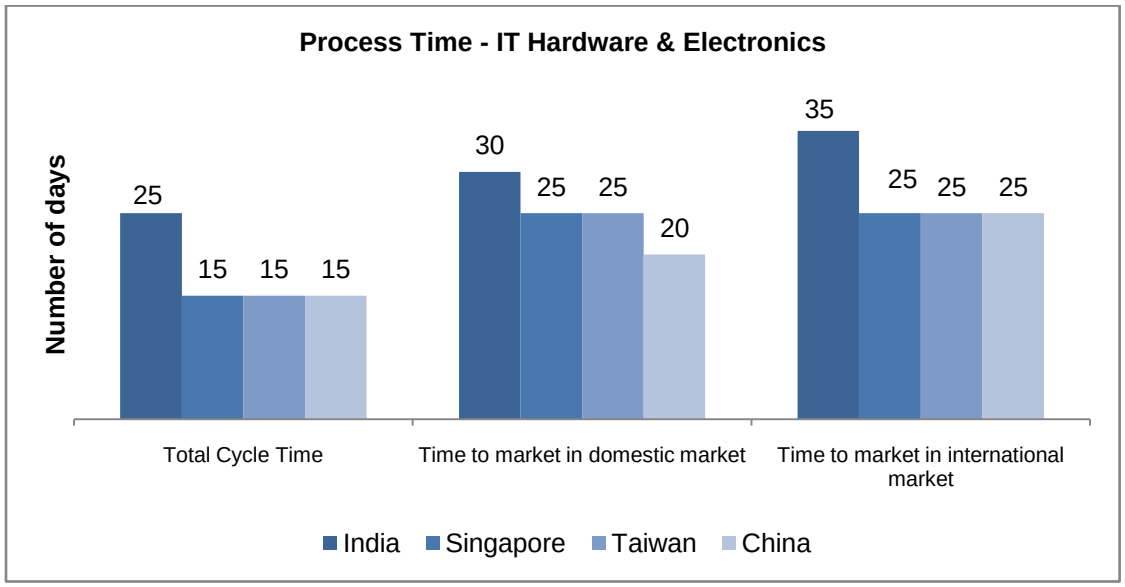
India has slight advantage over China in TV/radio receiver & associated goods manufacturing while the trend is reversed in TV/radio transmitters & line communication apparatus manufacturing. Mexico has clear advantage over both the competing countries in both the categories, with significant advantage in transmitter and line apparatus category achieved because of higher GVA.

India lags behind the competing countries in labour productivity because of very strict labour laws as compares to countries like China & Singapore, which impacts overall labour productivity. Chinese & Singaporean labour policies are perceived as more employer friendly than India's labour policies. As a result, there are reported issues of long absenteeism from work, lower levels of efficiency in work, and other issues which impact overall productivity of the labour force in India. Another reason for lower labour productivity in Indian electronic components industry & communication & broadcast equipment as compared to countries like China & Singapore is absence of enterprises having in-house residential facilities for labours. It has been proven, especially in China that companies having in-house residential & hostel facilities for labours have been able to achieve higher productivity. Further, there is a dearth of required skills in Indian industry. There is acute shortage of people trained on CNC machines. Further, overall knowledge of precision components and assembly is lacking in Indian IT Hardware & Electronics industry.

Further, India lags behind competing countries in terms of overall value added in electronic components and communication equipment industry. Initially, most of the Indian core components & equipment companies operated as resellers for foreign companies. Current scenario is more skewed towards companies who are primarily into assembling. The inverted duty structure which allows duty free imports of finished products while levying duty on raw-materials further hinders the growth of value addition by Indian enterprises as most of the demand is fulfilled by imported finished products.

Process Time

Process time is a very important parameter for competitiveness as it is indicative of the overall time a firm uses for production and reach to the target market. Countries which are able to achieve faster turnaround time and have quicker time to market generally enjoy competitive advantage in the market. Various parameters which are considered for comparison in this section are: Average cycle time, time to market and Average stock in hand (average inventory held by a firm in terms of number of production days).



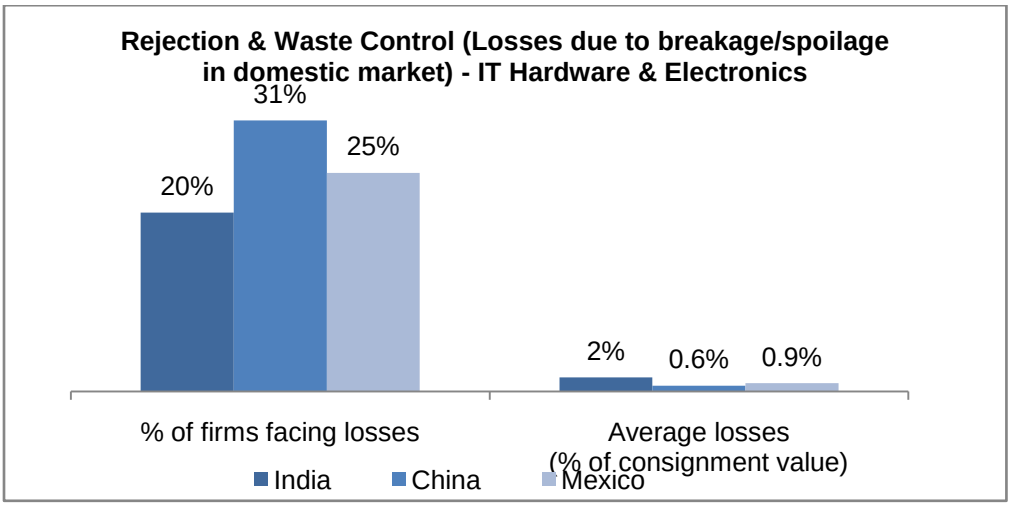
Source: D&B Analysis

As evident from the above graph, India has highest process time as compared to China, Singapore & Taiwan. The primary reason for the same is high dependence on imports of critical raw-materials and components mentioned in the previous section. More than 50% of raw-materials are imported. This often leads to delays in production cycles. Further, machineries are also imported from countries like China, Taiwan and Germany whose technicians/engineers for repair are not available in India hence they need to be called from China & Taiwan. This adds to costs pressure as well as impacts the production cycle of Indian enterprises. Spare parts of these machineries also have very limited availability in India.

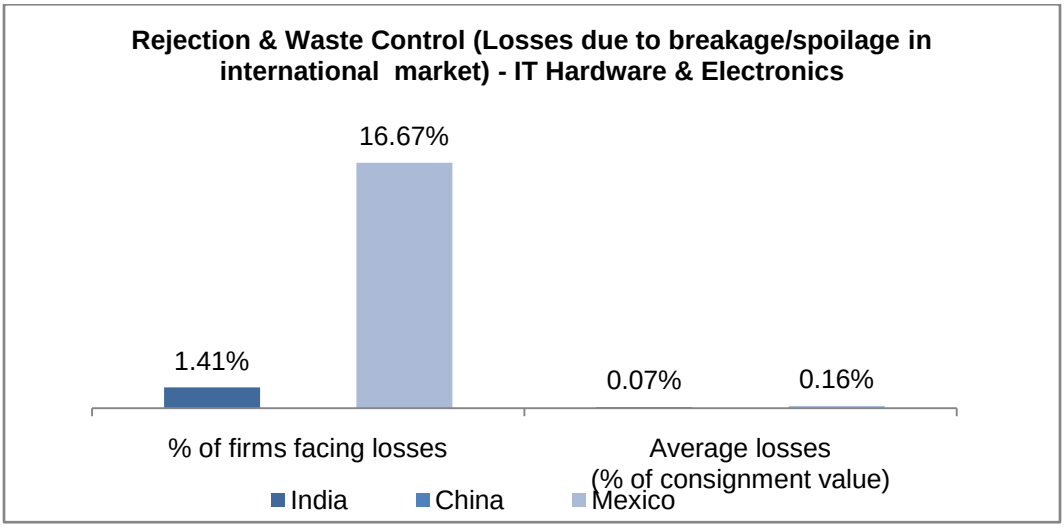
Further, time to market in both Indian and international markets is higher in India because most of the manufacturing regions like Delhi/NCR, Pune and Bangalore etc. are all land locked regions. Therefore, delivery time from factories to ports further adds to overall time-to-market in international market. Another reason for higher time to market is the composition of Indian electronic components manufacturing. Most of the products are not standard bulk order and require lot of customization, which impacts the production cycle time, contrary to China & Taiwan who manufacture standard products in large quantities.

Rejection & Waste Control

In this section, wastage/losses due to breakage or spoilage have been analysed for India vis-à-vis competing countries. The firms' endeavour is to keep the rejection and waste to the minimum as it is an additional overhead cost. The charts below depict India's comparative advantage against competing countries in rejection & waste control process.



Source: Enterprise Surveys (http://www.enterprisesurveys.org), The World Bank

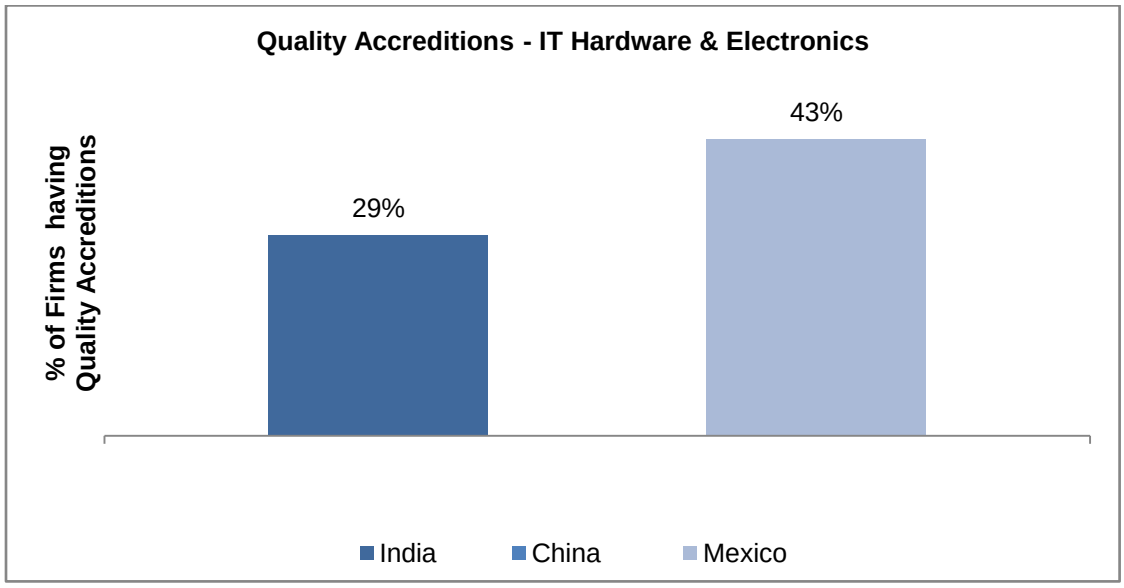


Source: Enterprise Surveys (http://www.enterprisesurveys.org), The World Bank

Though the percentage of firms facing losses due to breakage/spoilage for the finished product in domestic market is lowest in India, but in value terms Indian firms have been suffering higher losses as compared to China & Mexico. When exporting to international markets, a much smaller chunk of Indian firms suffer any losses.

Quality

Quality accreditation is an important parameter for competitive advantage as it enables a firm to increase its market reach. Most of the buyers use quality accreditation as a parameter to evaluate a supplier and in some cases they have a mandate to buy only from firms with desired accreditation. Further, quality accreditation has direct impact on productivity as it would require tightening up of processes and giving away inefficiencies. India's comparison on quality accreditations with competing countries is depicted in the graph below:



Source: Enterprise Surveys (http://www.enterprisesurveys.org), The World Bank

India manufactures high grade components conforming to international standards which are extensively exported to prestigious clients in USA, Europe & Far East. Quality approvals are granted by recognized international agencies (i.e., BVQI, DNV, LRQA, and TUV) and STQC - a govt. body that renders necessary support to Indian companies through its 22 labs located across the country. There are currently more than 95 Indian electronic component companies with ISO-9000 certification and 44 have quality and safety approvals from international agencies like UL (USA), AFNOR (France), VDE (Germany) & CSA (Canada), etc.

However, there are several international standards being followed in markets like EU, China etc. EU follows ROHS directive which is often referred to as "Lead-Free" legislation. In order to comply with the EU ROHS legislation all the substances mentioned in the directive like lead, cadmium, mercury, PBB, etc. must either be removed, or reduced within maximum permitted concentrations, in any products containing electrical or electronic components to be sold within the European Union. However, many companies which operate and manufacture outside Europe eventually sell their goods to the EU countries. Many EU-member states, being massive export markets for India, China, Singapore & Mexico have to make all the products that they export to the EU compliant with the EU ROHS Directive.

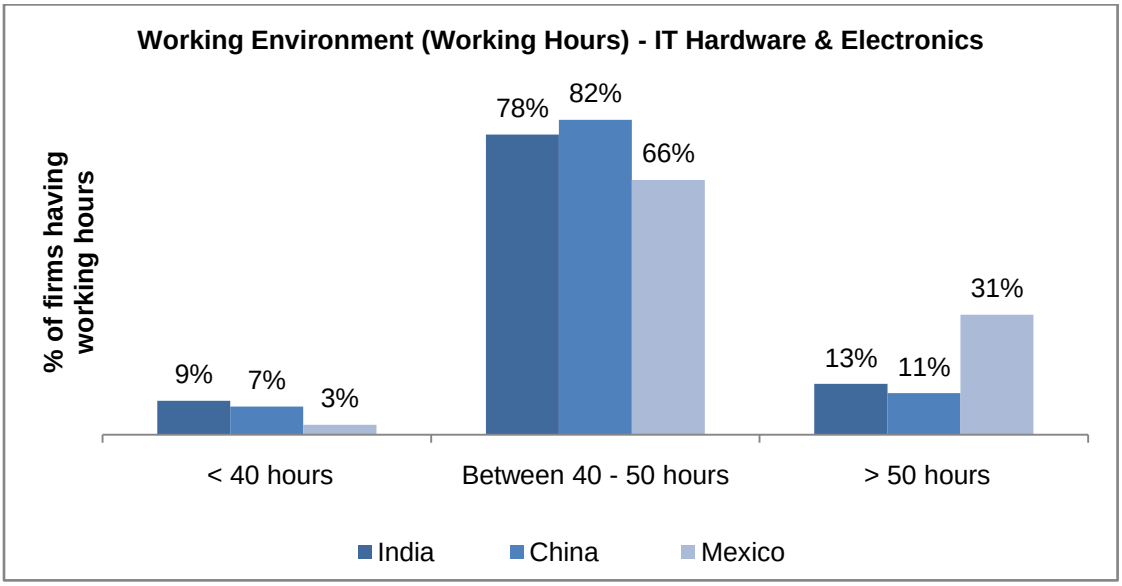
Similarly, China has CCC which means "China Compulsory Certificate", or is abbreviated as "3C". On December 2001, the State General Administration of Quality Supervision, Inspection and Quarantine of

the People's Republic of China issued the regulations for compulsory product certification. The compulsory product certification system began to replace the original quality license system for commodity inspection and safety certification system. It is the statutory compulsory safety certification system to safeguard the consumer's rights and interests and to protect the personal and property safety.

Not all the companies in India are able to comply with the same hence lag behind European & American counterparts in these key markets. Further, there are no standards laid down by Indian government which are acceptable globally.

Working Environment

The work environment has huge effect on the performance of employees which in turn impacts the overall productivity of the firm. The type of work environment in which employees operate determines the way in which such enterprises prosper. In this section, India's work environment has been compared to competing countries (China & Mexico) by evaluating the working hours in firms within these countries:



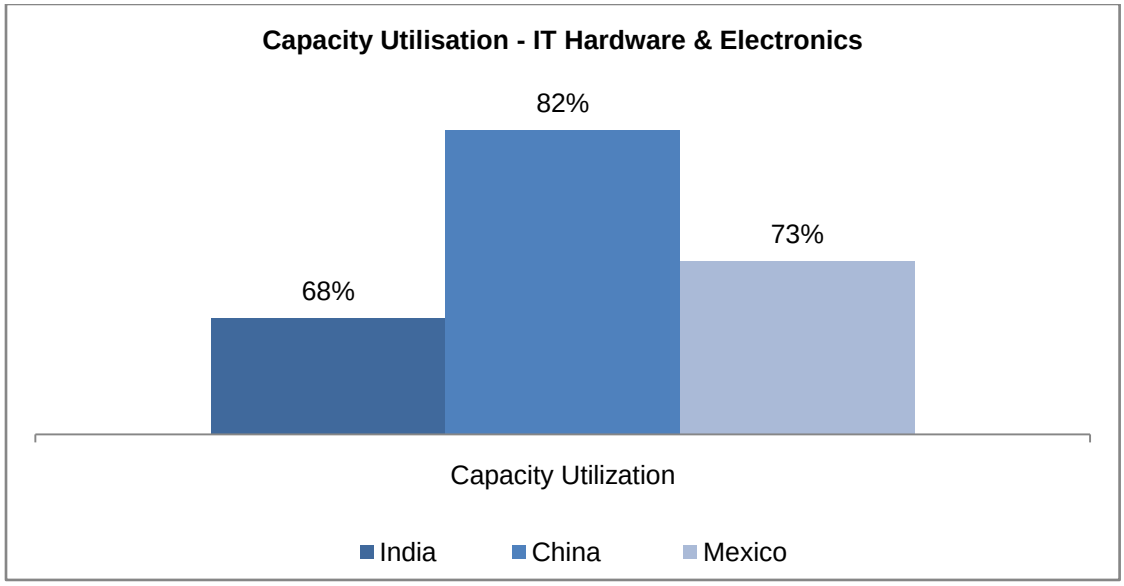
Source: Enterprise Surveys (http://www.enterprisesurveys.org), The World Bank

Most of the countries exhibiting higher productivity have strong labour laws and maintain average working hours of below 50 hours per week. As depicted in the chart above, India & China have comparable chunk of firms having average working hours per week of 50 and below, with Mexico lagging behind with biggest chunk of firms having working hours of more than 50 per week.

Capacity Utilisation

Capacity utilization is a metric used to measure the rate at which potential output levels are being met or used. Displayed as a percentage, capacity utilization levels give insight into the overall slack that exists in the economy or a firm at a given point in time and refers to the extent to which an enterprise or a nation actually uses its installed productive capacity. Thus, it refers to the relationship between actual output that 'is' produced with the installed equipment and the potential output which 'could' be produced with it, if capacity was fully used.

India's comparative disadvantage as compared to competing countries (China & Mexico) in capacity utilization is shown in the graph below:



Source: Enterprise Surveys (http://www.enterprisesurveys.org), The World Bank

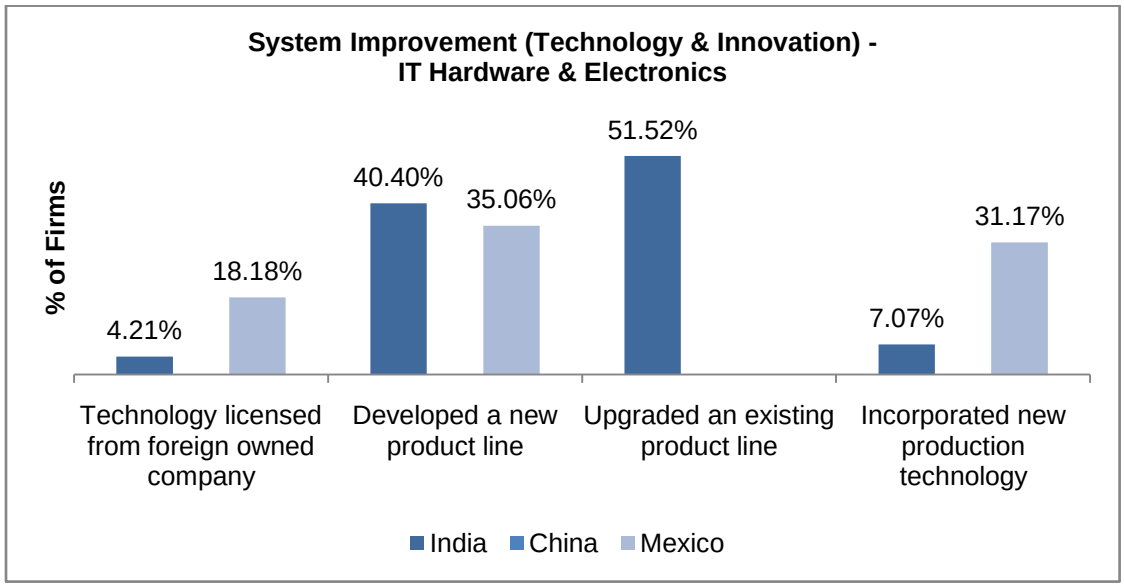
As depicted in the chart above, India is lagging behind all the competing countries in capacity utilization with China emerging as the leader in capacity utilization. This means that Indian firms are not producing to the full potential of installed equipment, thus signifying that for the same run of plant & machinery, Indian firms are producing less than competing countries viz. China & Mexico.

Capacity utilization for Indian electronic components and communication equipment firms is low primarily because of lower order sizes. Unlike China & Taiwan, Indian firms don't manufacture standard products that are produced in bulk; but manufacture specialized products which are highly customized and produced in small batches. Another reason for underutilization of capacity is frequent breakdown of machinery. Average age of machinery used by Indian firms is more than 10 years; hence chances of breakdown are more. Availability of electricians, hydraulic & pneumatic technicians is also an issue which hampers production in case of machine breakdown. Inconsistent power supply, inconsistent raw material supply and labour availability are also attributing to capacity under-utilization of Indian firms.

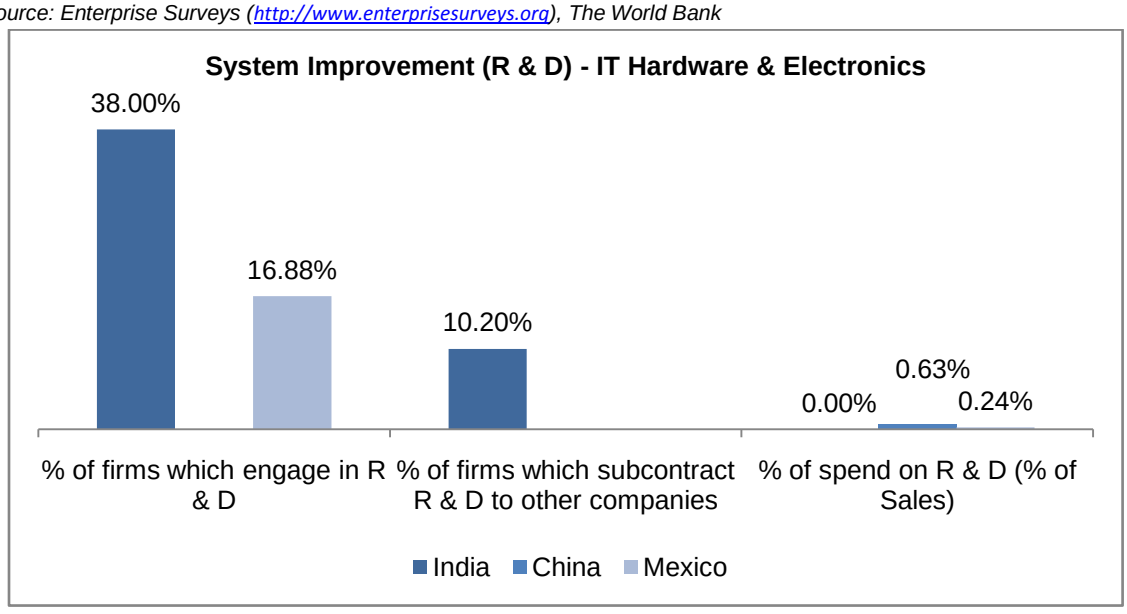
System Improvement

This section examines the extent of innovation and technology being employed by the firms which would lead to overall improvement in production systems and have direct impact on productivity and ensure sustainability of the same in long run. Various parameters that have been compared in this section are: Development/Up gradation in product line or production technology, Investment in research & development and investment in training & development of employees.

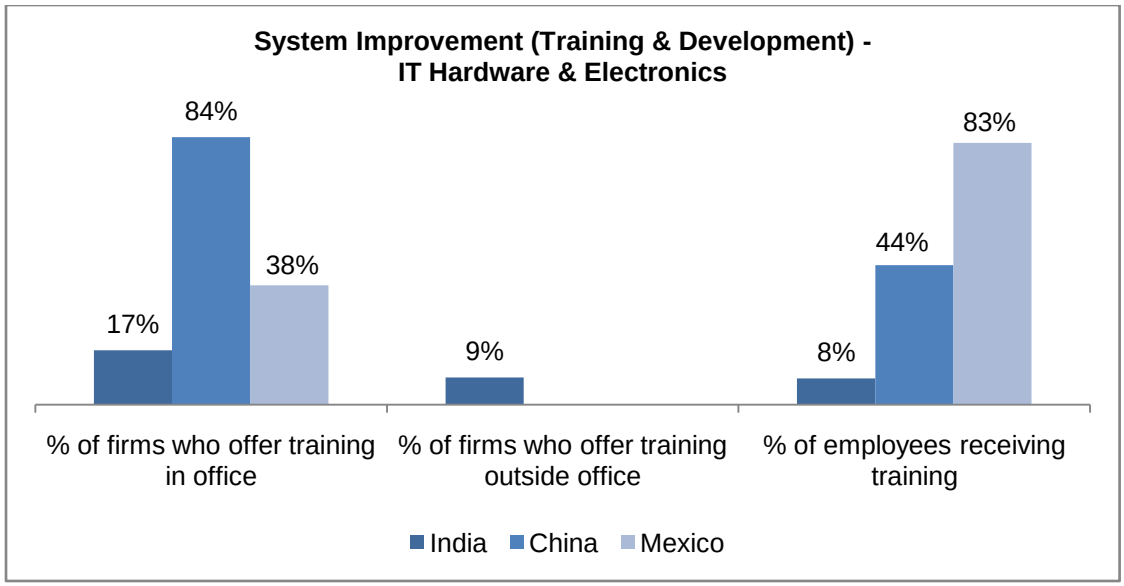
India stands at clear point of disadvantage as compared to competing countries (China & Mexico) because in system improvement efforts as depicted in the charts below:



Source: Enterprise Surveys (http://www.enterprisesurveys.org), The World Bank



Source: Enterprise Surveys (http://www.enterprisesurveys.org), The World Bank



Source: Enterprise Surveys (http://www.enterprisesurveys.org), The World Bank

As evident from the charts above, India is lagging behind Mexico in all the aspects of technology and innovation. Very few firms have been involved in developing & incorporating new product line and production technology which signifies that there is a need for product as well as process innovation in Indian IT Hardware & Electronics industry.

There is very limited innovation and R&D in Indian electronics components and communication equipment sector. Almost all the machinery used in production is imported from companies like China, Taiwan, and Japan etc. Further, there has been very limited research to enhance the user industries base for electronic components in India. In terms of standards or certification marks also India lags way behind European, Chinese & Mexican counterparts. There has been limited research to identify and develop intelligent products that are mass consumed. Further, there has been no significant work and effort that has gone into organized reprocessing of electronic components and communication equipment.

On the other hand, Chinese companies have benefited a lot from their government's emphasis on indigenous innovation, underlined in the latest five-year plan. Chinese authorities view innovation as critical both to the domestic economy's long-term health and to the global competiveness of Chinese companies. China has already created the seeds of 22 Silicon Valley–like innovation hubs within the life sciences and biotech industries. In semiconductors, the government has been consolidating innovation clusters to create centres of manufacturing excellence. Further, support was given to indigenous R&D in communication equipment by providing public funding, research grants and cheap loan from state owned bank. Huge amount of money was spent on research and patenting. As a result China succeeded in defining their own 3G standards (TD-SCDMA) and thus developed their own system for manufacturing of network infrastructure and communication devices and equipment.

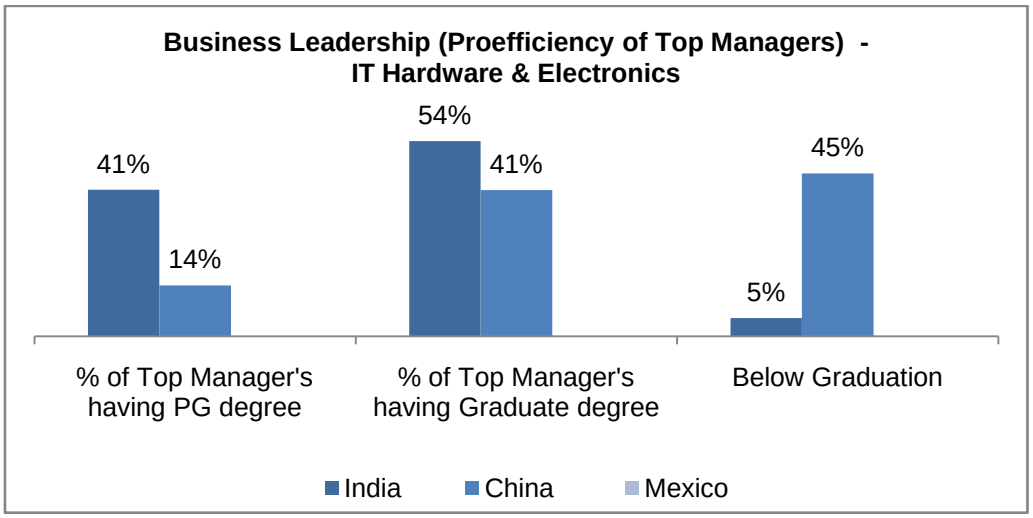
Japan also has invested huge amount in R&D in electronic components and communication equipment sector. The researchers at business enterprises totalled 490,000 persons at the end of March 2010. Approximately 90 percent of them, or 430,000 persons, were in the manufacturing industries; the largest number was in the information and communication electronics equipment industry Japanese

telecommunications equipment producers benefit from their global marketing experience with other types of products. NEC, Fujitsu, Toshiba, and Hitachi produce computer hardware in addition to telecommunications equipment, which provides them a long-term competitive advantage as these industries become increasingly integrated.

The strong growth of Singapore's electronics industry has been possible through industry transformation. Over the years, the electronics industry has transformed to manufacture higher value-added products and focus on R&D. This is illustrated through two main sectors - semiconductors and data storage. Singapore's semiconductor industry posted a nominal growth of 49.8%, outpacing the global semiconductor industry's 32.5% growth in 2010. As a result, Singapore's manufacturing output share of global semiconductor revenues increased from 11.2% in 2009 to 13.5% in 2010. The data storage industry also saw a 25% increase in the volume of hard disk media produced in 2010.Furthermore, leveraging their established base of electronics manufacturing and IC design capabilities, Singapore's electronics industry has ventured into new growth areas such as Bioelectronics, Green Electronics, Printed Electronics and Security. They have made good progress in these areas. For Bioelectronics, Systems on Silicon Manufacturing Co. (SSMC) is producing biometric chips. For Printed Electronics, Nitto Denko recently set up its prototyping centre in A*STAR's Institute of Materials Research and Engineering. Bayer Material Science also set up its functional films R&D centre here. 3M and Quanta recently announced they will manufacture printed electronics products in Singapore. Across multiple new growth areas, Panasonic Electronic Devices Singapore (PEDSG) set up a new R&D centre to develop solutions for medical, energy and environmental applications while spanning Green Electronics and Security. Infineon's Applications Innovation Centre is looking at renewable energy systems and secured wireless applications for the Asian market.

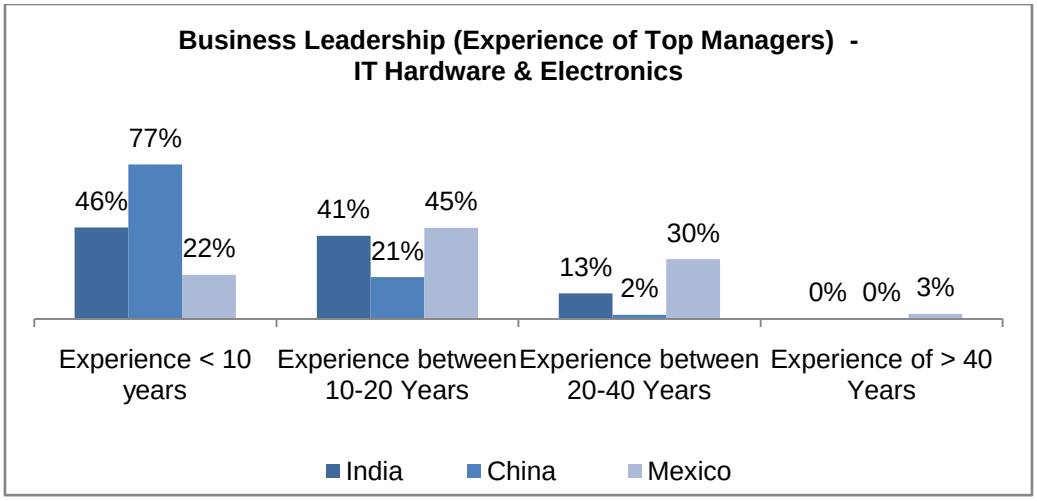
Business Leadership

Effective business leadership is a critical element in any organization and impacts the overall organizational culture and plays a part in productivity of the organization. Various parameters that have been compared in this section to measure business leadership are: Proficiency of top managers (measured by educational capabilities) and Experience of the top management.



Source: Enterprise Surveys (http://www.enterprisesurveys.org), The World Bank

As evident from the chart above, India fares better than the competing countries with respect to percentage of top managers having higher education degrees with almost 95% of the top management beinggraduate and above.



Source: Enterprise Surveys (http://www.enterprisesurveys.org), The World Bank

Mexico has highest percentage of top managers (almost 70%) having more than 10 years of experience while China has highest percentage of inexperienced top management.