CHAPTER 3

Innovation Ecosystem in India and Socio Economic Impact on Progress of Science & Technology

CHAPTER 3

3.1: India's Innovation Potential

3.1.1: India's innovation ecosystem

3.1.1.a. Technically Skilled Workforce

3.1.1.b. Quality of IT, Communication Infrastructure & Broadband penetration

3.1.1.c. SMEs Potential in Developing Electronics Hardware

3.1.1.d. The Research & Development Scenario supporting Incremental Innovations

3.2: India: Major Contributors to Innovation

3.2.1: Large Firms

3.2.2: SMEs

3.2.3: Grass Root Innovators

3.3: Existing Situation With Regard To Protection of Indian Innovations in India

3.3.1. Rejections to Indian Applicants based on low inventive threshold

3.3.2. Survey of Innovations in the areas of Electronics, Engineering, Healthcare, Agriculture, Mobility& Energy

3.3.3: Survey Of Innovators, Associations, Researchers, Educational & Research Institutions, Industry & Associations and Law Firms

The role that knowledge is going to play in the 21st century as an engine for economic growth is beyond doubt. Accumulation of knowledge and its use in an efficient way isn't new to this world. The use of knowledge to steer through globalization and liberalization has been seen as an efficient tool to bring about change. In need of change, economies try to bring in new solutions which serve as a breakthrough in itself or are a part of a bigger solution.

The use of human intellect to come out with creations which hold the key to bring about change, gives rise to Intellectual Property. Intellectual Property represents the creative work of human brain which results from accumulated knowledge. Once an Intellectual work is produced it is protected by Intellectual Property Rights. Intellectual Property Rights namely cover patents, copyrights, related rights, trademarks, geographical indications, plant breeder rights, trade secrets, industrial designs, utility models and IC layout designs.

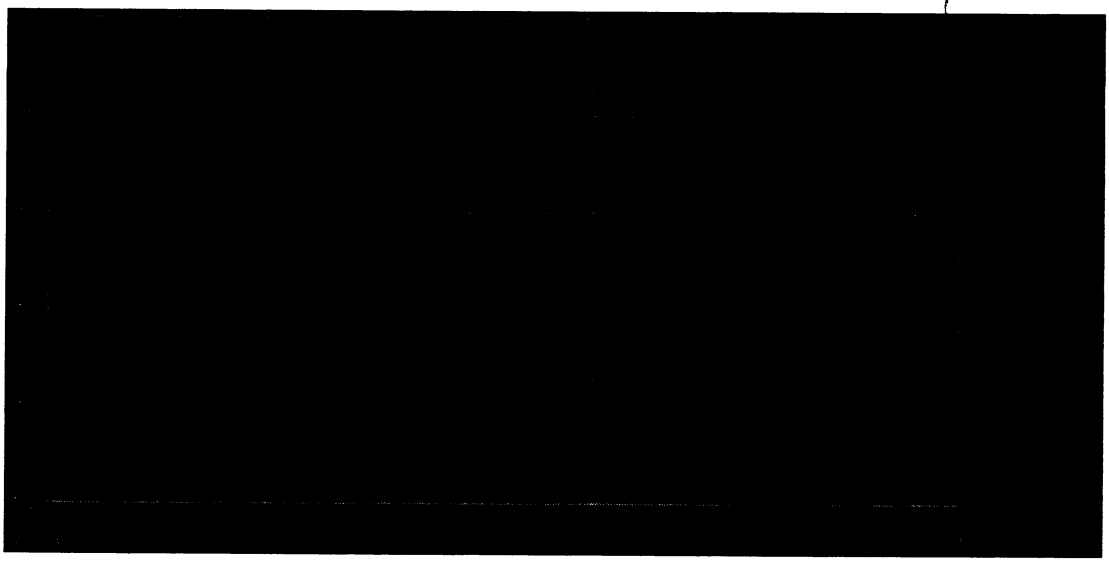
Intellectual property rights play a major role when it comes to balancing the interests of the creator vis-à-vis people at large. Innovation gives an impetus to the economies. Patent system plays an important role in incentivizing an innovation and in economic welfare of the country. According to a recent study, 1% increase in patents can increase GDP of the country by upto 2.8%. Similarly, 1% increase in Intellectual Property can increase GDP of a country by upto 7%[330].

Though industrial sector in India has shown considerable growth in innovating and protecting innovation however world has not been able to feel its positive impact in terms of huge numbers of patent filings & grants and its effective commercialization.

3.1. INDIA's INNOVATION POTENTIAL

An impressive growth has been witnessed in Indian Economy with the "real GDP[331] increase from 2001, which was 3.9%, with a sharp rise in year 2010 of 10.6%, as has been shown below in the graphical representation:

[330] Lack of IP protection may hit Asia's rise, Time of India, 3rd January 2012
[331] http://www.multpl.com/india-gdp



Increase in income, a higher purchasing power, a higher level of education and an ever increasing adaptability towards modern gadgets has led to an overall increase in the aspirations of the common man for a higher standard of living.[332] With the growing pressure on the Indian market to compete with the foreign brands, it is inevitable for Indian government to become more serious about protecting and thereby promoting innovation. The National Knowledge Commission Survey[333] brings out the fact that the Innovation Intensity is rising in India. India's innovation potential is also evident from the fact that over the years the publication of Indian innovations through research papers has significantly increased[334], as shown below:

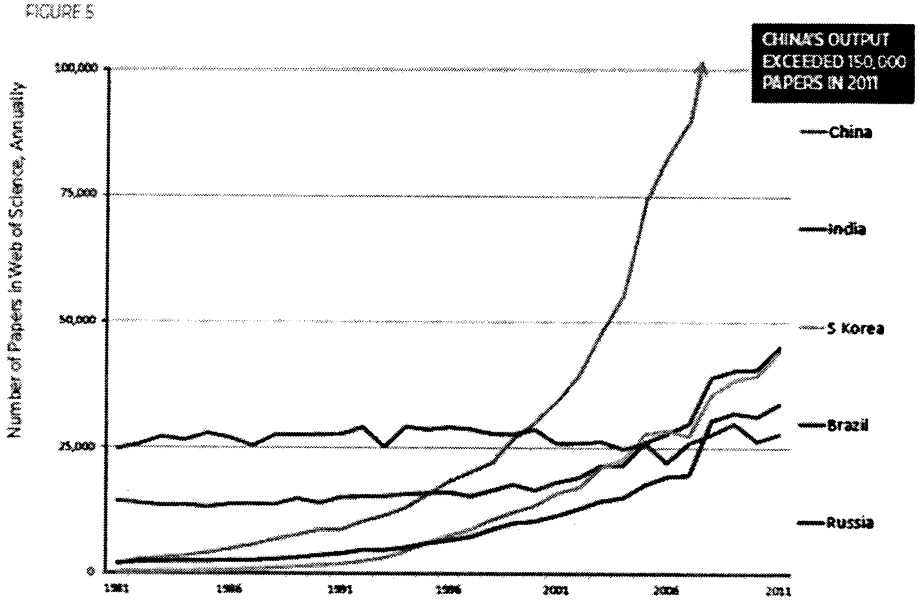
[332] www.enteprenuerswebsite.com

[333] Innovation in India, National Knowledge Commission Report, 2007, Page 9

[334]BUILDING BRICKs Exploring the global research AND INNOVATION impacT of Brazil, Russia, India, China and South Korea FEBRUARY 2013 Jonathan Adams, David Pendlebury, Bob Stembridge (Thomson Reuters) , page no. 10 available at http://sciencewatch.com/sites/sw/files/sw-article/media/grr-brick.pdf

ANNUAL RESEARCH PUBLICATION OUTPUT OF THE FIVE BRICK COUNTRIES

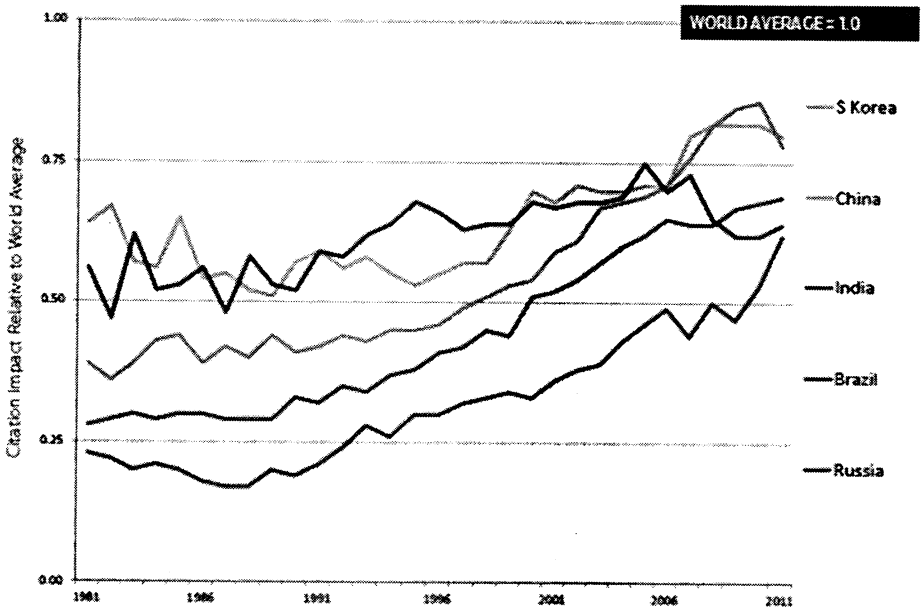
FIGURE 5



Source: Thomson Reuters Web of Knowledge (See also Figure 7 on trajectories of patent output.)

Further, India's innovation has been able to prove its international credibility which is evident from the fact that the number of citations to Indian's published innovations have tremendously increased with an impact factor of approx. 0.68[335], as shown below:

[335] BUILDING BRICKs Exploring the global research AND INNOVATION impact of Brazil, Russia, India, China and South Korea FEBRUARY 2013 Jonathan Adams, David Pendlebury, Bob Stembridge (Thomson Reuters), page no. 13 available at http://sciencewatch.com/sites/sw/files/sw-article/media/grr-brick.pdf



Source: Thomson Reuters Web of Knowledge. Although the average citation impact of much of the research remains below world average (which is set at 1.00), it is evident that the impact trend is generally consistently upwards for all these countries. Several BRICKs show an impact drop in the last few years, but this is a data artifact associated with atypically early citation of papers published in G7 economies.

India is becoming a top global innovator for high tech products and services[336]. The Global Competitiveness Report of World Economic Forum, year 2009-2010, which has surveyed 139 economies, has placed India on rank 33rd[337] in terms of "capacity of Innovation" in the economy ahead of countries like Spain, Italy, Portugal, and Russian Federation. Total R&D spending increased from 4 billion from year 2002 to 8.5 billion in year 2005[338]. NIF has prepared a database which lists 1,40,000 inventions[339].

The aforesaid reveals that there has been tremendous growth in innovation culture in India. With regard to the type of innovation (breakthrough or incremental) it is understood that adaptation and improvement is the road taken by many developed countries in the early stages of their development. The National Knowledge Commission report[340]analyzed the potential of Indian companies in terms of the generating various types of innovations and determined that "while 37% of the Indian companies introduced breakthrough innovations in recent years, no fewer than 76.4% introduced incremental innovations.

---

[336] World Bank Report on "Unleashing India's innovation", page 15

[337] The Global Competitiveness Report, World Economic Forum, Year 2010-2011, Page 183

[338] World Bank Report on "Unleashing India's innovation", 2007, page 50

[339] http://articles.economictimes.indiatimes.com/2011-03-31/news/29366180_1_innovations-chalta-hai-honey-bee-network

[340] Innovation in India, National Knowledge Commission Report, 2007

Since there is huge innovation from SME sector thus commensurate IP filings can really help in enhancing country's GDP. The evident picture of Indian Intellectual Property growth can be witnessed from the latest report, titled "Patent Pending: How Immigrants Are Reinventing the American Economy[341]". The report revealed that Indian Inventors Play Prominent Role as Top U.S. Patent-Production. The report further highlighted that Indians play a crucial role in patent generation in the US with more than one in seven patents having inventor from the India. The report acknowledges that Indian engineers are highly skilled and that are capable enough to contribute to the growth of IP. This report clearly indicates the plenty of intellectual talent is present in India. Although at present Indians are contributing and undertaking research activities in the universities of the US but to harness this talent in India itself, the Indian government has been taking active reforms on administrative, procedural, legislature and enforcement fronts. The current Government's launch of "Make in India" aims to boost low cost-zero defect manufacturing and promote entrepreneurship. Intellectual Property is one of the most important subjects and would even say that it is the force to help India emerge as major power[342]. The Indian government has assured that the spending of GDP on R&D shall be increased from 0.8 percent to 2 percent. Further, the Indian Government stated this decade as the decade of innovation. Ministry of Communication and Information Technology has rolled out a draft framework on enhancing R&D and innovation in ICT sector[343]. Besides, National Manufacturing Commission has also come up with the 12th Five year plan which aims at enhancing IP filings from SME sector.

3.1.1. INDIAN's INNOVATION ECOSYSTEM

3.1.1.a. Technically Skilled Work Force

Innovation Capacity of a country strongly depends upon the skill of the workforce to innovate. Science & Technology graduates of a country are generally considered as an asset for innovation by a country[344].

---

[341] Available at http://www.renewoureconomy.org/sites/all/themes/pnae/patent-pending.pdf, last visited on 4th June 2013

[342] http://www.thehindubusinessline.com/news/education/need-to-create-intellectual-property-with-proprietary-rights-pallam-raju/article4269138.ece, last visited on 18th March 2013

[343] http://pib.nic.in/newsite/erelease.aspx?relid=93145, last visited on 18th March 2013

[344] Creating Roadmap for a Decade of Invention, Stratergy Paper March 2011, Page No. 4: *"The firms shouldhave the capability and capacity to innovate which requires creative organisational structures, technological competencies, systems for skills and training of its workforce, and management geared towards understanding markets and needs."* Available at : http://www.iii.gov.in/images/stories/innovation/Innovation_Strategy.pdf

The following table compares the S&T graduates of India, US and China and the young work force of China and India, the two emerging countries in the world.[345]

Country	**India**	US	China
2000-2001			
S&T Graduates (per 1000 persons)	2262	429	2072
Proportion of Population aged 20-24	2.52%	2.18%	2.00%
2001-2002			
S&T Graduates (per 1000 persons)	2385	455	2172
Proportion of Population aged 20-24	2.58%	2.25%	2.19%
2002-2003			
S&T Graduates (per 1000 persons)	2558	475	2255
Proportion of Population aged 20-24	2.69%	2.40%	2.27%
2003-2004			
S&T Graduates (per 1000 persons)	2623	476	2252
Proportion of Population aged 20-24	2.68%	2.45%	2.26%

[345] The data source for India: Selected Educational Statistics 2000-01, 2001-02, 2002-03 & 2003-04 (An annual publication of the Ministry of Human Resource Development, Govt. of India), Census of India, 2001, Projected population by age and sex for 2006 (on the basis of Census of India, 2001) from Report of the Technical Group on Population Projections (constituted by the National Commission on Population), May 2006. China: China Statistical Yearbook 2005 Chapter 21: Education, Science & Technology 21-7: Number of Graduates by Level and Type of School 21-36: Basic Statistics on Scientific & Technological Activities from National Bureau of Statistics of China Population by five-year age group and sex 2000 & 2005, World Population Prospects: The 2004 Revision Population. US: Educational attainment data from Current Population Survey 2001, 2002, 2003 & 2004, U. S. Census Bureau, Educational attainment data from 2004 American Community , Survey, American FactFinder, U. S. Census Bureau Survey of Graduate Students and Post Doctorates in Science and Engineering, Division of Science Resources Statistics, U. S. National Science Foundation Estimated age-group wise population from U. S. Census Bureau , Age & Sex data from 2004 American Community Survey, American Fact Finder, U. S. Census Bureau.

India is strongly emerging as the threat for other countries in terms of the high scale of engineering graduates churned out each year[346]. The high number of S&T technology graduates in India and the work force between the ages 20-24 strongly suggest the fact that Indians have a huge innovation capability. India already has a number of world class S&T Institutions like IIT's, IISC, IISER etc. which contribute some of the major innovations taking place like the Sakshat Tablet or the Pentium Chip. With the growth of such institutions the numbers of highly trained S&T Graduates have added to India's innovation intensity. A number of private colleges have also come up with quality infrastructure and high motivation to innovate.

Currently, in India we have 3.4 million skilled work force when it comes to those who are technically and vocationally qualified in year 2010[347].

There is a huge supply of skilled workforce from India as shown below[348]:

Table 1.1: India Supply of Technically Qualified Data[349]

India Engineering Graduates	2005-06	2007	2008	2009	2010	Change Over One Year	Change Over Five Years
Total Engineering	323,600	372,400	392,400	451,700	497,475	10.1%	53.7%

[346]The skills 'threat' from China and India, By Louisa Kiwana, Dr. Anil Kumar & Neil Randerson– EngineeringUK , March 2012, available at http://www.engineeringuk.com/_resources/documents/Engineering_Graduates_in_China_and_India_-_EngineeringUK_-_March_2012.pdf: "Coverage of the scale of engineering graduates coming out of China and India has been a cause for concern for some in western countries who fear that they are losing their technological edge due to the millions of globally competitive Chinese and Indian engineering graduates qualifying each year". *"The perceived scale of engineering graduates coming out of China and India has been an increasing cause for concern for western countries who fear that they are losing their technological edge due to the millions of globally competitive Chinese and Indian engineering graduates emerging each year. The genesis of this concern appeared to stem from several reports and articles which stated that in 2004/05 the United States only graduated roughly 70,000 engineers; whilst India graduated 350,000 undergraduates and China 600,000 (Figure 1.0). Fast forward seven years, and these figures are still being used despite, recent studies which have determined that the commonly cited comparisons regarding the number of engineering graduates from China and India have been inaccurate and incomplete"*

[347]The Skill Development Landscape in India and Implementing Quality Skills Training , year 2010 by Federation of IndianChambers of Commerce and Industry, Page no. 11: *"By limiting to this to the technically and vocationally qualified and skilled workforce, primarily comprising of ITI/ITC (1 million), BE (1.7 million), Polytechnics (0.7 million), we can observe that the current pool of skilled talent is around 3.4 million".*

[348]The skills 'threat' from China and India - Fact or fiction, Report of key findings, by Louisa, Louisa Kiwana, Dr. Anil Kumar & Neil Randerson– EngineeringUK, March 2012, Page no. 4, available at http://www.engineeringuk.com/_resources/documents/Engineering_Graduates_in_China_and_India_-_EngineeringUK_-_March_2012.pdf

[349]The skills 'threat' from China and India - Fact or fiction, Report of key findings, by Louisa, Louisa Kiwana, Dr. Anil Kumar & Neil Randerson– EngineeringUK, March 2012 Page no. 4, available at : http://www.engineeringuk.com/_resources/documents/Engineering_Graduates_in_China_and_India_-_EngineeringUK_-_March_2012.pdf

Graduates Output							
(4 Year Course)	201,100	244,500	258,800	312,200	342,705	9.8%	70.4%
(3 Year Course)	122,500	127,900	133,600	139,500	154,770	10.9%	26.3%
Technology Graduate (Computer Science, Electronics, Telecom, etc) Output	190,400	219,000	233,100	268.622	295,846	10.1%	55.4%
Engineering IT Graduates (Degree)	117,400	142,800	153,500	185,515	203,642	9.8%	73.4%
Engineering IT Graduates (Diploma)	73,000	76,200	79,600	83,107	92,204	10.9%	26.3%
Total Output of Technically Qualified Data	514,000	591,400	625,500	720,322	793.321	10.1%	54.3%
Number of Under Graduates who are Globally Employable (25% of the Total Engineering Graduate Output)	80,900	93,100	98,100	112,925	124,369	10.1%	53.7%

Further, India is bound to have exponential growth in terms of skilled workforce by 2022[350]. With the increase in S&T graduates, India is surely looking forward to an innovative future

[350]The Skill Development Landscape in India and Implementing Quality Skills Training, year 2010 by Federation of Indian Chambers of Commerce and Industry, Page no. 11: *"India is expected to be home to a skilled workforce of 500 million by 2022. About 12 million persons are expected to join the workforce every year. This talent pool needs to be adequately skilled. The following sectors are expected to drive the growth of the economy as well as play a significant role in employment: 1. Auto and Auto Components, 2. Building and*

ahead. It is thus high time to develop conducive reduces environment which can not only help them become creative but also can protect their innovations that otherwise cannot be protected under standard patent system due to stringent requirements in terms of having high inventive threshold.

3.1.1.b. Quality of IT, Communication Infrastructure & Broadband penetration

The world economy is slowly and steadily recovering from one of the worst economic crisis in decades[351] and Information & Communication Technology (ICT) is playing an important role in sustainable growth[352], as it has already become an important contributor in the GDP of most of the countries.[353] Thus, ICT is not only important to the developed countries as it enhances and sustains their innovation potential but is also crucial for the developing economies as it increases their efficiency, burden on economy and hence enhances the capability to innovate.

According to the Global Information Technology Report 2009–2010[354], collaboration between INSEAD and World Economic Forum, India has been placed at No. 3 among the Lower Middle Income Group. This was a ranking based on Network Readiness, which had

---

Construction Materials, 3. Building and Construction, 4. Real Estate services, 5. Electronics and IT Hardware, 6. Education and Skill Development Services , 7. Food Processing , 8. Gems and Jewellery, 9. Healthcare , 10. Textiles , 11. Leather and Leather Goods ,12. Organised Retail, 13.Tourism and Hospitality, 14. Transportation and Logistics, 15. Media and Entertainment , 16. BFSI , 17. Chemicals and Pharmaceuticals , 18. Furniture and Furnishings, 19.IT, 20.ITES".

[351]ICT and economic recovery, ITU News, year 2009, available at http://www.itu.int/net/itunews/issues/2009/07/04.aspx: "The financial crisis that erupted a year ago has shaken the global financial sector to its foundations. It has sent many industrialized countries spinning into recession, while slowing the growth of major emerging economies"

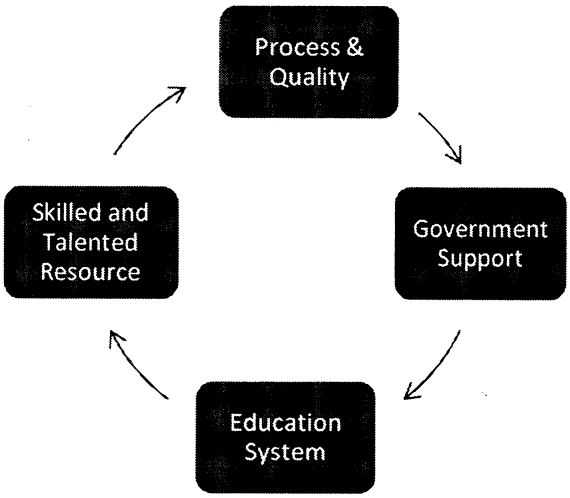
[352]The impact of the crisis on ICTs and their role in the recovery, August 2009, OECD, available at http://www.oecd.org/internet/ieconomy/43404360.pdf: *"Some OECD governments have identified ICTs as an important direct or indirect component of economic stimulus plans. This is based on the rationale that ICTs are a fundamental economic infrastructure and a precondition for competitiveness. The idea is that ICT infrastructure and applications throughout the economy and society induce large benefits through their productivity- and innovation-enhancing features (see above). Figure 24 sets out some of the direct and indirect impacts of ICT-specific and ICT-related economic stimulus measures including adoption and use throughout the economy".*

[353]UGANDA INVESTMENT FORUM 2013, Driving Africa's Growth: The Role Of Information And Communications Technologies (ICT), By Dr. RuhakanaRugunda, Minister of ICT, Sheraton Hotel, Kampala – UGANDA, 11-12 April, 2013, Available At http://www.google.co.in/url?sa=t&rct=j&q=&esrc=s&frm=1&source=web&cd=1&ved=0CCsQFjAA&url=http%3A%2F%2Fwww.cbcglobal.org%2Fimages%2Fuploads%2Flibrary%2FMinister_presentation.ppt&ei=VY3FUevLAonrrAeywoGwAg&usg=AFQjCNHlPydPH8uqJQq2MbwJzASDH_JNBQ&sig2=W8Z7hfjyWLsJU5ThqZ4fdg, slide no. 7: "Leveraging on ICT has helped many resource-poor countries to build competitive economies (S. Korea, Singapore, Mauritius etc); ICT can help developing economies to leapfrog stages of development ; Research has showed a strong positive relationship between investment in ICT and growth in GDP"

[354]Global Information Technology Report 2009–2010: ICT for Sustainability available at http://www3.weforum.org/docs/WEF_GITR_Report_2010.pdf

also a factor of innovation incorporated within it. This report has clearly shown India as one of those country's that is spearheading in the field of Information and Communication Technology development.

India in the recent years has emerged as the best offshore IT outsourcing destination. This may be attributed to the following reasons[355], as shown in the graphical representation:



[355] Article on "India Vs China – the Outsourcing war" by Flexsin Technologies Limited page 3. "*India is considered to be the best offshore IT outsourcing destination because of the following reasons:*
Process and Quality: According to NASSCOM, India would soon have the highest number of ISO-9000 software companies in the world. These companies ensure on-time delivery and quality output.
Government Support: The Indian Government has formulated policies and laws to ensure growth of the ITES-BPO sector in India.
Skilled and Talented Resource: India has highly talented and qualified resource in IT. As far as English competence is concerned, India has an edge over China. More white collared IT and service outsourcing jobs are being moved to India while China is capturing the low and medium-tech industries.
Education System: The education standard is at par with global standards". Available at: http://www.flexsin.com/IT-Outsourcing-Comparative-analysis.pdf

Global Offshore market Share[356]

The software industry, which is sub-set of the IT industry[357] is highly dependent on the enablers mentioned above, and is growing at a steady high rate. But still the major orientation of the companies is towards off-shoring the solutions instead of catering the domestic market, which is one of the hurdles in the innovation in this field[358].

Table below shows demand for domestic software and exports from India with amount in Crores (Rs):[359]

Financial Year	2005-06	2006-07	2007-08	2008-09	2009-10
Software for exports	104,100	141,100	164,400	216,190	237,000
Domestic Software	29,600	37,000	47,010	59,000	67,800

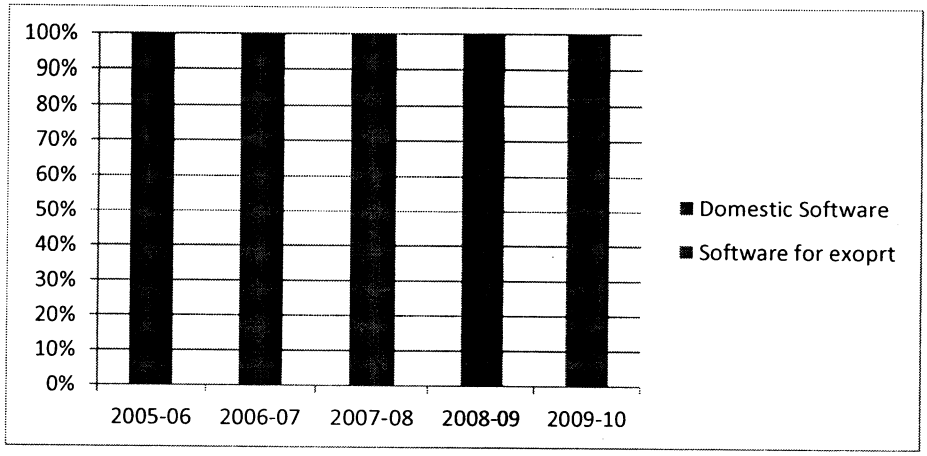
The same has been shown by way of graphical representation below highlighting the facts in %age.

[356]Article on "India Vs China – the Outsourcing war" by Flexin Technologies Limited, Page No. 4 available at : http://www.flexsin.com/IT-Outsourcing-Comparative-analysis.pdf

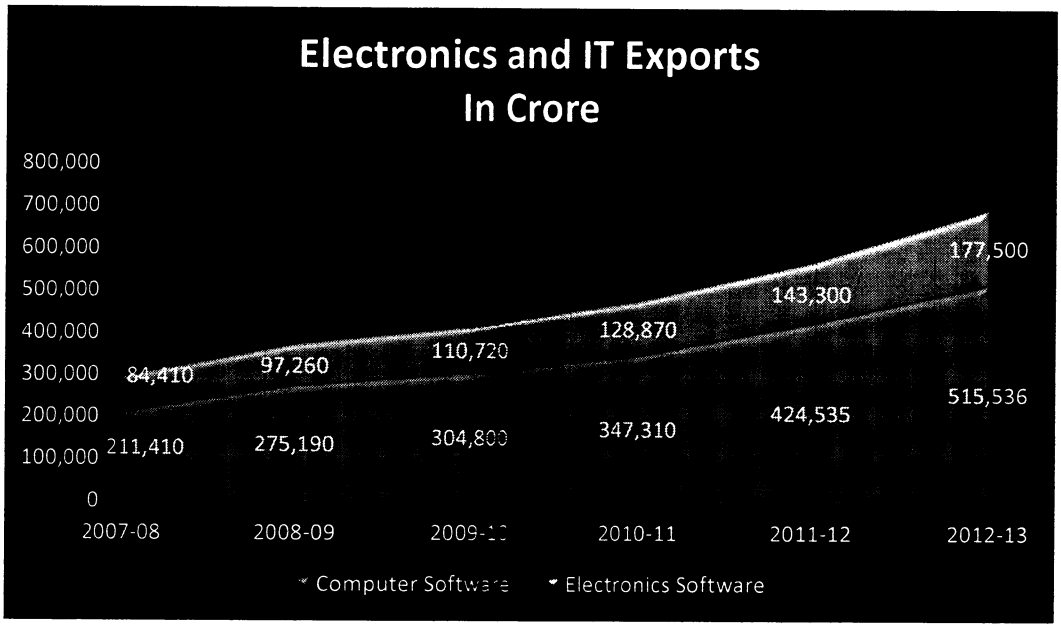
[357]Information Technology Industry: Past, Present and Future and a tool for National Development by Somesh K. Mathur, 2010, Page No. 2, Available at : http://perso.univ-rennes1.fr/eric.darmon/floss/papers/MATHUR.pdf

[358]China 20320, Building a modern, harmonious and high Income Society, Report by World Bank Development Centre, 2012, Available at : http://documents.worldbank.org/curated/en/2013/03/17494829/china-2030-building-modern-harmonious-creative-society

[359]Information Technology Annual Report 2010-2011, Ministry of Communications & Information Technology, Available at :http://www.stpi.in/writereaddata/links/356235275AnnualReport.pdf



As it can be seen from the table and graph, the annual growth rate of the Domestic and the Export are the same. Opportunities in the domestic sector are increasing. This will not only boost the ICT sector but will also help the other SMEs of the country, which are one of the major contributors to the GDP on India to gain efficiency and maximize profit. It can be clearly seen in the below figure that the annual Electronics & IT Production has continuously increased from 2005-06 to 2012-2013[360]:



[360] Information Technology Annual Report 2012-13, Ministry of Communications & Information Technology, page 21, The production and growth trend of the Indian
Available athttp://deity.gov.in/sites/upload_files/dit/files/Annual%20Report%202012-13.pdf

Such type of growth has really boosted innovation capacity of IT companies.

These opportunities and the increased competitiveness to cater to the domestic market will surely increase the innovation capability of IT SMEs. A large pool of fresh graduates will add to the trained work force.

We need some robust steps to increase innovation in the ICT Sector and also direct these innovations in the domestic market. The domestic market has a huge potential for the software products, IT companies need to be motivated to orient towards domestic market.

3.1.1.c. SMEs Potential in Developing Electronics Hardware

SME's make a variety of products, however most of them involve devices which may be mechanical, electrical, electronic etc. for the manufacturing of these products. Since the incremental innovation involves innovation in both process and product, these devices are often subjected to innovation to increase efficiency, cut costs etc.[361]

The consumption of Electronic Devices in India was US $28 billion in 2005. It was estimated by the Council of Electronics Hardware Associations (CEHA) that the demand would increase to US $363 billion in 2015, with a Compounded Annual Growth Rate of 16.4% since 2002[362].

The Indian Industry has huge potential in terms of developing and manufacturing electronic hardware which is expected to grow by $320 billion by 2020[363]

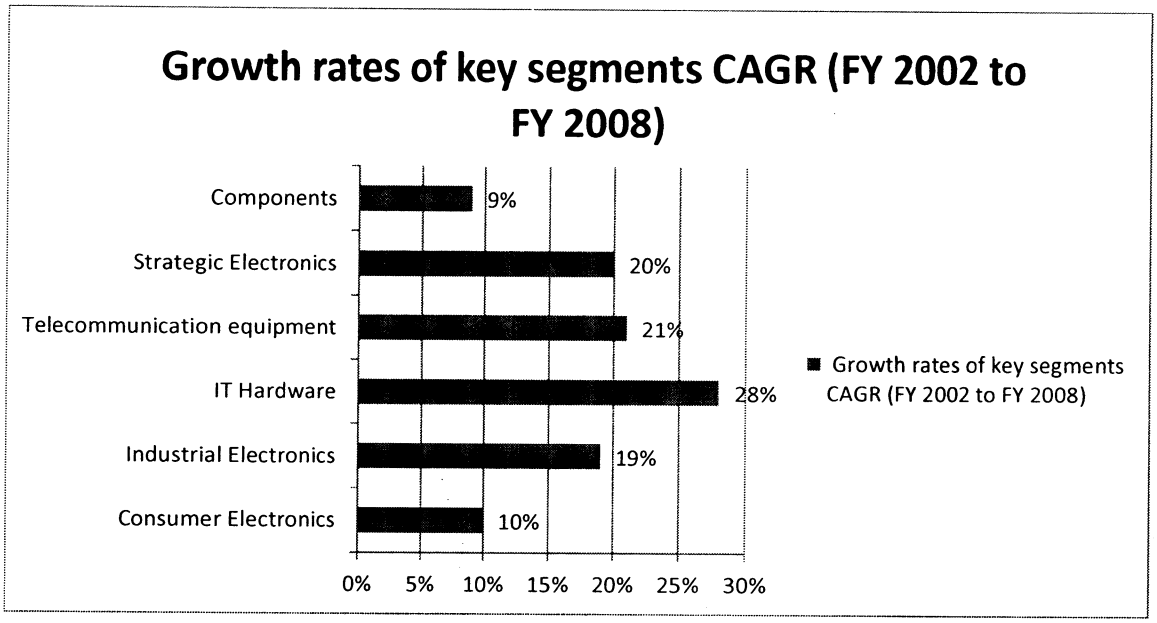
---

[361] Utilizing Rapid Product Development and Late Customization Methodologies within Manufacturing SMEs, By Andrew Newton, Page No. 1 *"To be able to develop products rapidly and efficiently saves the time and expense of laborious development programmes and reduces the significant costs that can be incurred in later production stages through poor product design"* Available at : http://lupo.lboro.ac.uk/research/IPM-KTN/pdf/Technology_review/rapid-production-development-and-late-customisation-for-manufacturing-smes.pdf

[362] Human Resource and Skill Requirements in the Electronics and IT Hardware Industry page 6 *"The consumption of Electronics was US $ 28 billion in 2005. It is estimated that the demand for electronics (consumption) in India will be US $ 126 billion in 2010 and US $ 363 billion in 2015."* available at: http://deity.gov.in/hindi/sites/upload_files/dithindi/files/Electronics_IT_Hardware_NSDC_Report_17311.pdf,

[363] Leading SMEs of India 2011, Available at http://www.dnb.co.in/Axis_bank_SME_awards/ElectronicGoods.asp: "This industry has significant potential to develop and manufacture electronics hardware for the global market and increase its global share. According to the Report of the Task Force for IT, ITES and Electronics Hardware Manufacturing Industry, electronics

Growth rates of key segments CAGR (FY 2002 to FY 2009)[364]



In a developing country like India, the role of Information and Communication Technology can't be neglected.

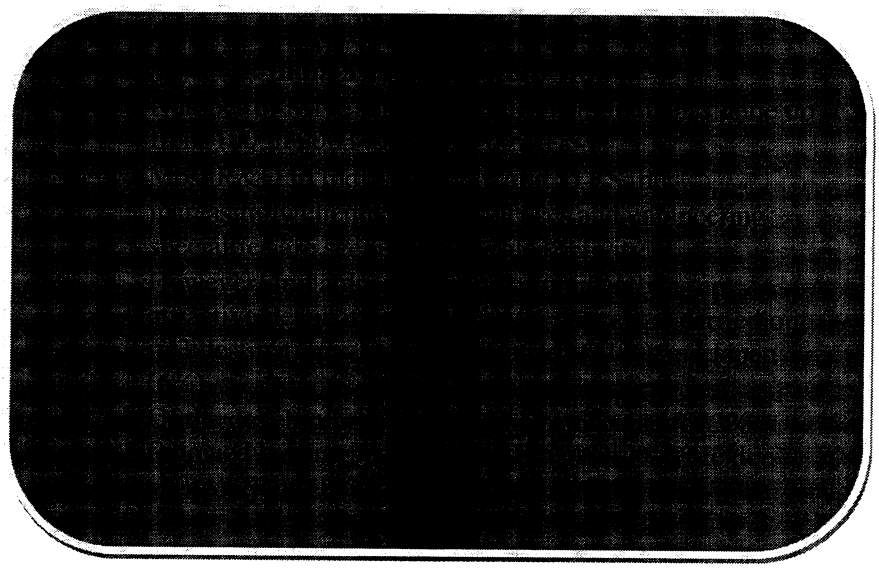
3.1.1.d. The Research & Development Scenario supporting Incremental Innovations

The slide shown below shows that situation that prevails in India as far as R&D expenditure is concerned[365]:

hardware production for domestic consumption is estimated to increase from US$ 16 bn in 2009 to US$ 85 bn in 2014 and further to US$ 320 bn by 2020.

[364]Human Resource and Skill Requirements in the Electronics and IT Hardware Industry, page 9, *figure 6*available at: http://deity.gov.in/hindi/sites/upload_files/dithindi/files/Electronics_IT_Hardware_NSDC_Report_17311.pdf

[365] The Internationalization of R&D in India : Opportunities and Challenges By: Rajeev Anantaram, year 2009, slide No. 7, Available at - http://www.icrier.org/pdf/4RajeevAnantaram.pdf



India surely in the past few years has become one of the R&D "hotspot" in the world. Still the Research & Development work taking place in the country does not match global level. We are well behind our counterpart China, which attracts 3% of the R&D work.[366]

The following table gives us scenario of the spending on R&D as a percentage of GDP[367]

Country	1996	2001	2006	2007	2008	2009	2010	2011	2012
India	0.65	0.75	0.89	0.75	0.88			0.9	
China	0.57	0.95	1.42	1.39	1.46	1.70			1.97
Russia	0.01	1.18	1.08	1.11	1.04	1.25	1.15	1	
US	0.03	2.76	2.61	2.70	2.83	2.89		2.7	

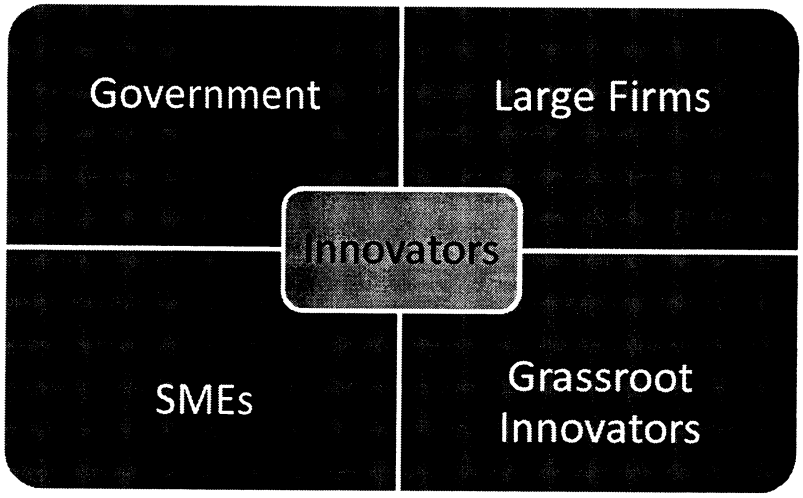
As it can be seen from the table, India spent the highest percentage of its GDP on R&D activities among these countries in 1996. However, it has failed to accelerate these activities with time; as a result India is much behind all of these countries in terms of R&D activities. The R&D activities taking place in India are generally carried out by stakeholders such as Government, Public enterprises, Domestic firms and Foreign Firms[368].

---

[366]The Internationalization of R&D in India : Opportunities and Challenges By : Rajeev Anantaram, year 2009, slide No. 7, Available at - http://www.icrier.org/pdf/4RajeevAnantaram.pdf

[367]The Internationalization of R&D in India : Opportunities and Challenges By: Rajeev Anantaram, year 2009, slide No. 14 Available at -http://www.icrier.org/pdf/4RajeevAnantaram.pdf, Research & Development expenditure (% of GDP). Also see World Bank report available at http://data.worldbank.org/indicator/GB.XPD.RSDV.GD.ZS

[368]Review of literature, Page 43. *"It gives a comprehensive view of the present situation in R&D in these sectors in India and the activities of the key stakeholders in India's R&D setup. The key stakeholders are identified as government ministries, government science and technology departments"* Available at: http://www.dsir.gov.in/reports/ittp_fgn_rnd/Chapter-II-FRD.pdf



3.2.1. Large Firms

Large firms are a major stakeholder in R&D activities and hence in innovation around the world. According to a report by UNCTAD, 700 largest R&D spending firms accounted for 50% of the world's R&D expenditure and about 70% of business R&D. These firms carry their R&D activities both in their home countries as well as internationally. Hence, the R&D activities carried out in a country depend upon the Inward FDI. [372]

In India during the last few years over 300 transnational corporations (TNCs) have been setting up R&D and technical centers in India. These TNCs spend about $4 billion a year. United States contributes about half of the number of TNCs and 72% of the investments. [373]

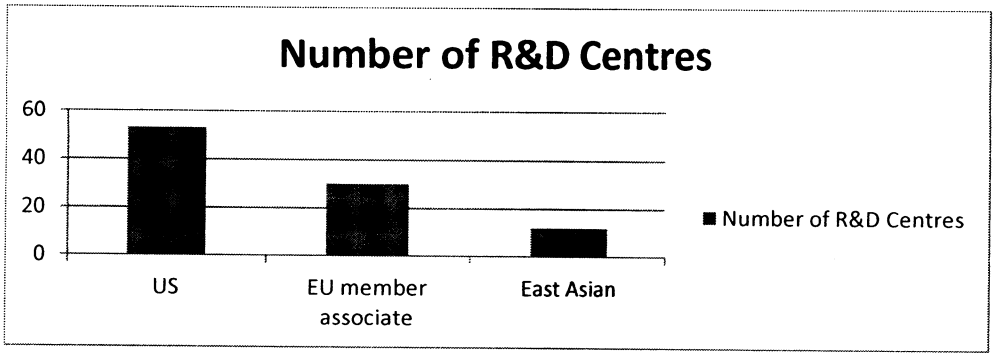
The graph given below gives a break up major R&D centers, according to the 2005 TIFAC Report on Foreign Direct Investment in R&D.[374]

---

[372]World Investment Report United Nations New York and Geneva, 2005 Transnational Corporations and the Internationalization of R&D.page 119 *"The 700 largest R&D spending firms of the world – of which atleast 98% are TNCs1 – accounted for close to half (46%) of the world's total R&D expenditure and more than two-thirds (69%) of the world's business R&D".*http://unctad.org/en/docs/wir2005ch4_en.pdf

[373]Internationalization of R&D – Facing the Challenge of Globalization: Approaches to a Proactive International Policy in S&T Prepared on behalf of the CREST OMC Working Group byJan Peter Wogart p 17 *"In the last few years over 300 transnational corporations (TNCs) have been setting up R&D and technical centres in India. They employ 80,000 plus scientists and engineers. Current spending is about $4 billion a year and further investment plans have come close to US$5 billion."* Available at: http://www.access4.eu/_media/CountryreportIN(1).pdf

[374]Internationalization of R&D – Facing the Challenge of Globalisation: Approaches to a Proactive International Policy in S&T Prepared on behalf of the CREST OMC Working Group byJan Peter Wogart p 17 *"The United States accounts for more than half the number of companies and 72% of the investments. Others key countries include South Korea, Germany, Denmark, and the United Kingdom. According to the 2005 TIFAC Report on Foreign Direct Investment in R&D, companies from EU member and associate countries had established close to 30 R&D Centres in India by 2003, which was less than the 53 US Centres, but clearly ahead of the 12 East Asian ones."* Available at: http://www.access4.eu/_media/CountryreportIN(1).pdf



Most of the R&D work is concentrated on IT, R&D software, engineering design (automotive, consumer durables, aerospace), chemical design (molecules, chemical structures), and agriculture and biotechnology (seeds, food, enzymes). Between 2000 and 2005, some 415 patents from India have been filed by these firms with the U.S. Patent Office.[375] The R&D centers of these large firms are dedicated towards making breakthrough innovations[376] which are generally patentable.

3.2.2. SMEs

Small Medium Enterprise (SME/MSME) is generally recognized as a major contributor to the economy in most of the countries and is often termed as "engine of growth" for developing economies.[377] In India, around 26.1 million SME units exist (registered and unregistered) which have a production value of Rs. 7, 08,073.21 Crore [378] (for registered enterprise) and provide employment to around 8.11 crore people, second most after agriculture.[379]A new

---

[375]Internationalisation of R&D – Facing the Challenge of Globalisation: Approaches to a Proactive International Policy in S&T Prepared on behalf of the CREST OMC Working Group by Jan Peter Wogart p 17 *"Most work is concentrated on IT, R&D software, engineering design (automotive, consumer durables, aerospace), chemical design (molecules, chemical structures), and agriculture and biotechnology (seeds, food, enzymes). Between 2000 and 2005, some 415 patents from India have been filed by these firms with the U.S. Patent Office."* Available at: http://www.access4.eu/_media/CountryreportIN(1).pdf

[376] J. Bessant and T. Venables (eds): Creating wealth from knowledge: meeting the innovation challenge. Edward Elgar: Cheltenham, 2003 page 7 *"On the one hand there is recognition in the corporate sector that innovation may be essential for survival. Indeed, most established companies have specialist R&D units specifically to promote technological innovation."*, Available at:http://www2.sa.unibo.it/~simone.ferriani/articoli/Sustaining%20Breakthrough%20Innovation.pdf

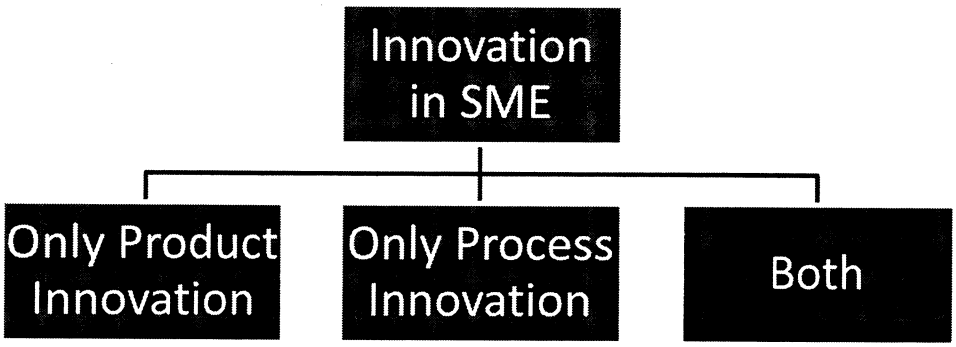
[377]Entrepreneurship Development in the Micro Small and Medium Enterprise Sector in India, Shamika Ravi Indian School of Business, July 2009, page 1. *"The MSME sector has often been termed the 'engine of growth' for developing economies".* Available at: http://www.isb.edu/faculty/shamika/MSME%20chapter_Shamika%20Ravi.PDF

[378]*"As per available statistics (4th Census of MSME Sector), this sector employs an estimated 59.7 million persons spread over 26.1 million enterprises."* Available at: http://msme.gov.in/msme_aboutus.htm

[379]The Economic Times, SME Sector *"According to the report, the SME sector in India, which is all set to become the largest SME nation globally, has given employment to around 8.11 crore people."* Available at: http://economictimes.indiatimes.com/news/emerging-businesses/sme-sector/indian-sme-market-at-4-88-cr-units-growing-at-4-53-pc-zinnov/articleshow/18990951.cms

study by ASSOCHAM showed the contribution of SMEs is around 17 per cent to the national Gross Domestic Product (GDP). The study projects the same to touch 22 per cent in the near future[380]. They amount to 44.1% of the total industrial output.[381]

The SME sector produces a wide range of industrial products such as food products, beverage, tobacco and tobacco products, cotton textiles, wool, silk, synthetic products, jute, hemp & jute products, wood & wood products, furniture and fixtures, paper & paper products, printing publishing and allied industries, machinery, machines, apparatus, appliances and electrical machinery. SME sector also has a large number of service industries.[382] According to Harrison and Watson, 1998, among firms of different sizes, SMEs are generally more flexible, adapt themselves better, and are better placed to develop and implement new ideas. The flexibility of SMEs, their simple organizational structure, their low risk and receptivity are the essential features facilitating them to be innovative.[383]



380http://www.entrepreneurindia.com/news/SMEs-to-contribute-22-to-national-GDP-in-near-future-4804/#sthash.vVZAELxz.dpuf

[381]Small and Medium Enterprises in India *"SSI is one of the significant segments of the Indian economy, contributing about 7 per cent to the Indian GDP.It contributes to around 40% of industrial production & exports"* Available at:http://www.dsir.gov.in/reports/ExpTechTNKL/Abs%20new/1INTRODUCTION.htm

[382]Small and Medium Enterprises in India *"The SME sector produces a wide range of industrial products such as food products, beverage, tobacco and tobacco products, cotton textiles, wool, silk, synthetic products, jute, hemp & jute products, wood & wood products, furniture and fixtures, paper & paper products, printing publishing and allied industries, machinery, machines, apparatus, appliances and electrical machinery. SME sector also has a large number of service industries".*Available at:http://www.dsir.gov.in/reports/ExpTechTNKL/Abs%20new/1INTRODUCTION.htm

[383]Technological Innovations and Firm Performance of Manufacturing SMEs: Determinants and Outcomes, M H Bala Subrahmanya, *2011,* page no.110. *"SMEs are generally more flexible, adapt themselves better, and are better placed to develop and implement new ideas. These qualities along with their simple organizational structure, their low risk and receptivity are, in fact, essential features facilitating them to be innovative (Harrison and Watson, 1998."*available at: http://journal.asci.org.in/Vol.41(2011-12)/41_1_Bala%20Subrahmanya.pdf

SMEs tend to prefer Product innovation over Process innovation. However, generally we see a combination of both.[384]

A study was conducted in Karnataka, which covered 648 micro enterprises on a sample basis and 1358 small scale enterprises on a census basis across all industries in the manufacturing sector.[385] A validated questionnaire was sent to SMEs in each of the sectors and gathered primary data from 72 auto component SMEs, 67 electronic SMEs and 75 machine tool SMEs. Only those SMEs which have come up prior to 2001/2 were covered by the study. The quantitative data were gathered for a period of five years from 2001/2 to 2005/6. Data collection was done during January–December 2007.[386]

The first objective is being analyzed here descriptively by making use of frequency tables for innovative SMEs. The following preliminary result was obtained-

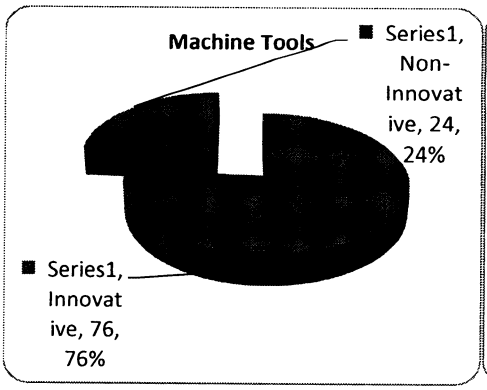
1. **Break up of innovative and non-innovative firm**[387]

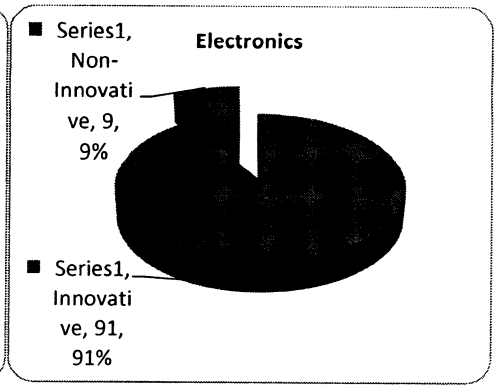
[384]Product and Service Innovation in Small and Medium-Sized Enterprises: Smeal College of BusinessThe Pennsylvania State University, September 20, 2006Page 7. *"SMEs can introduce process innovation to enhance the capability of their production processes or their supply chain operations (e.g., increase reliability or reduce cost). These innovations are developed for their own use; in-house engineering is used to customize them to suit specific applications. SMEs also can introduce product innovations into existing or new markets. Product innovation can include the introduction of new functions, enhanced performance, or added features to existing products. Innovation of this type is generally incremental. The underlying technology can be new to the firm, but is unlikely to be "new to the world". Radical innovations are relatively rare events, of course, and enhance product performance significantly or even create new product categories or industries."* Available at: http://www.smeal.psu.edu/cmtoc/cmtoc/research/nistnpd.pdf

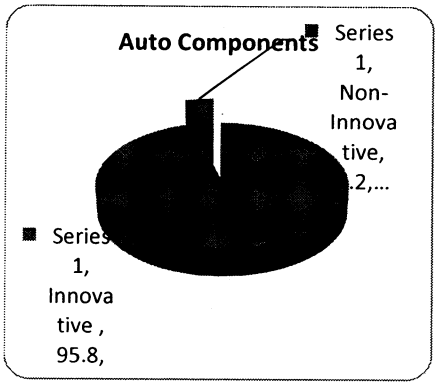
[385]Importance of Technological Innovation for SME Growth Evidence from India, M. H. BalaSubrahmanya, M. Mathirajan and K. N. Krishnaswamy page 4 *"The first one was confined to Karnataka state in India, which covered 648 micro enterprises on a sample basis and 1358 small scale enterprises on a census basis across all industries in the manufacturing sector"*. Available at: http://www.wider.unu.edu/publications/working-papers/2010/en_GB/wp2010-03/

[386]Importance of Technological Innovation for SME Growth Evidence from India, M. H. BalaSubrahmanya, M. Mathirajan and K. N. Krishnaswamy page 6 *"Accordingly, with the validated questionnaire, we approachedabout150 to200SMEsineachofthesectorsandgatheredprimary datafrom72autocomponentSMEs,67electronicSMEsand75machinetoolSMEs.OnlythoseSMEswhichhavecomeu ppriorto2001/2werecoveredbythestudy.Thequantitativedataweregatheredforaperiodoffiveyearsfrom2001/2to2 005/6.Datacollectionwasdone during January–December2007."* Available at: http://www.wider.unu.edu/publications/working-papers/2010/en_GB/wp2010-03/

[387]Importance of Technological Innovation for SME Growth Evidence from India, M. H. BalaSubrahmanya, M. Mathirajan and K. N. Krishnaswamy Page 16 table 1. Available at: http://www.wider.unu.edu/publications/working-papers/2010/en_GB/wp2010-03/







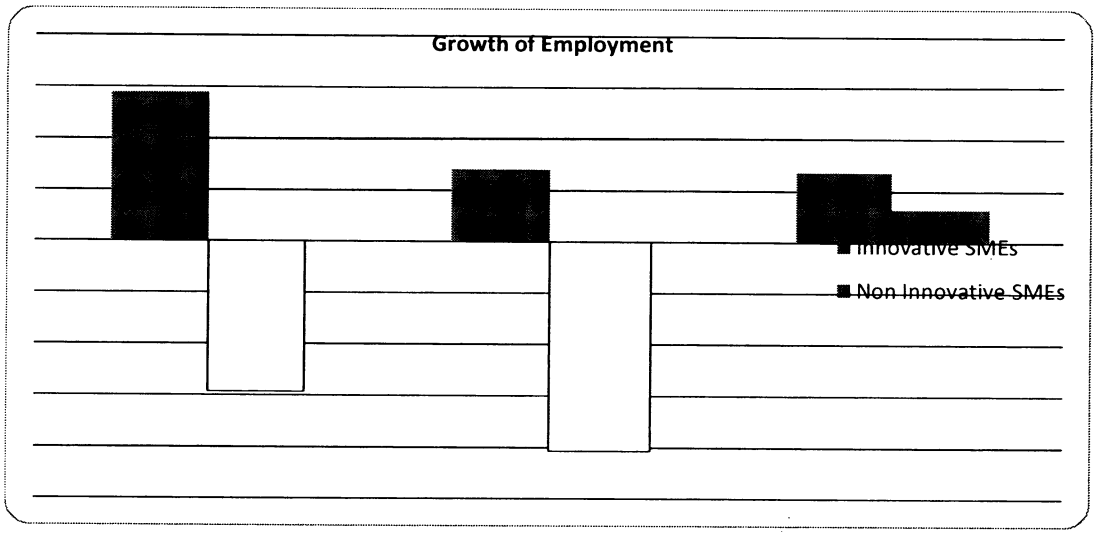
2. Type of Innovation [388]

Dimension of innovation	Auto Components	Electronics	Machine Tools
Product innovations only	2	7	3
Process innovations only	21	6	29
Both	46	48	25
Total	69	61	57

3. Growth of employment [389]

[388] Importance of Technological Innovation for SME Growth Evidence from India, M. H. BalaSubrahmanya, M. Mathirajan and K. N. Krishnaswamy Page 16 table 3. Available at: http://www.wider.unu.edu/publications/working-papers/2010/en_GB/wp2010-03/

[389] Importance of Technological Innovation for SME Growth Evidence from India, M. H. BalaSubrahmanya, M. Mathirajan and K. N. Krishnaswamy Page 18 table 7. Available at: http://www.wider.unu.edu/publications/working-papers/2010/en_GB/wp2010-03

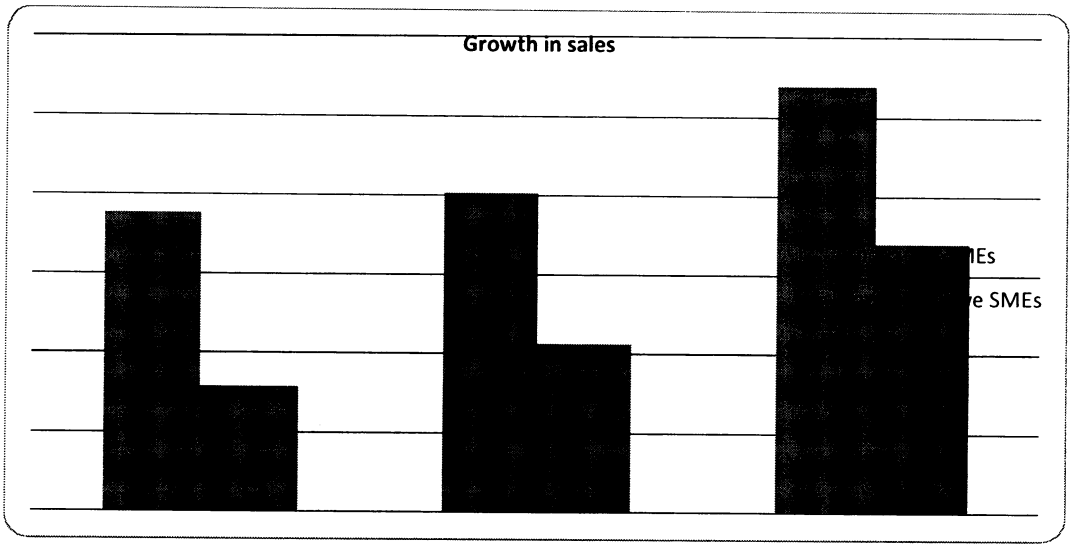


4. Recognition achieved due to innovations[390]

Recognition		Auto Components	Electronics	Machine Tools
Product Patent	National	0	2	3
	International	0	0	0
Process Patent	National	0	0	0
	International	0	0	0
Citations	National	2	3	5
	International	0	1	1
Awards	National	16	6	28
	International	0	0	1
Total innovative SMEs		69	61	57

[390]Importance of Technological Innovation for SME Growth Evidence from India, M. H. BalaSubrahmanya, M. Mathirajan and K. N. Krishnaswamy Page 17 table 5. Available at: http://www.wider.unu.edu/publications/working-papers/2010/en_GB/wp2010-03/

5. **Growth of innovative SMEs and non-innovative SMEs in %** [391]



Thus, SMEs tend to innovate both product and process which are generally incremental innovations. These innovations help them to scale up, increase sales. Since, these innovations are generally incremental, intellectual protection is generally not granted to them; however these innovations are praised at various national and international platforms for proving their commercial and innovative viability. [392]

6. **Growth Trend "SME and overall Industrial Sector"**[393]

Financial Year	SME Sector	Industrial Sector
1997-98	8.43	6.7
1998-99	7.70	4.1
1999-00	8.16	6.7
2000-01	8.23	5.0
2001-02	6.06	2.0
2002-03	8.68	5.7
2003-04	9.64	7.0

[391] Importance of Technological Innovation for SME Growth Evidence from India, M. H. BalaSubrahmanya, M. Mathirajan and K. N. Krishnaswamy Page 18 table 7. Available at: http://www.wider.unu.edu/publications/working-papers/2010/en_GB/wp2010-03

[392] Importance of Technological Innovation for SME Growth Evidence from India by M. H. BalaSubrahmanya, M. Mathirajan, and K. N. Krishnaswamy, January 2010 page8 *"The limited resources of SMEs generally constrain them from going for obtaining product and process patents."* Available at: http://www.wider.unu.edu/publications/working-papers/2010/en_GB/wp2010-03/_files/82882154003693585/default/wp2010-03.pdf

[393] EMERGING CONTRIBUTORS TO INCLUSIVE GROWTH **MICRO SMALL AND MEDIUM ENTERPRISES by S.K.AGGRAWAL, Available at:** *www.icsi.edu/docs/38nc/Presentations/skagrawal.ppt*

2004-05	10.88	8.4
2005-06	12.32	8.2
2006-07	12.60	11.5
2007-08	13	8

SMEs in general have more growth rate than the overall industrial sector.[394] As seen in the above study innovation in most of the cases is the enabler of growth for SMEs. A report on Innovation by National Knowledge Commission also reported that SME have more innovation intensity than large firms and tend to innovate both process and products, while in the case of large firms, process innovation is generally seen. [395]

3.2.3. Grass root Innovators

The term "grassroots" was introduced to China in the 1980s, and is interpreted as the general public with neither authority nor knowledge in social economics. Similarly, grassroots innovation can be defined as the innovative activities of improving products, techniques and crafts in a random and extensive way by the grassroots people who have grasped the corresponding techniques and skills. It is a flash in the common people and embodiment of their wisdom[396]. According to WIPO the heart of competitiveness lies in the human Endeavour to excel and in continuous innovation to develop superior products, in terms of quality, features, design, and content and service that satisfy the end-user. These innovations may have an economic viability but in the most of the cases do not meet the patentability criteria. These innovations are generally driven by scarce resources and customers' needs[397]. The National Innovation Foundation (NIF), an autonomous body under the Department of Science & Technology, has been significantly working for the betterment of these innovators

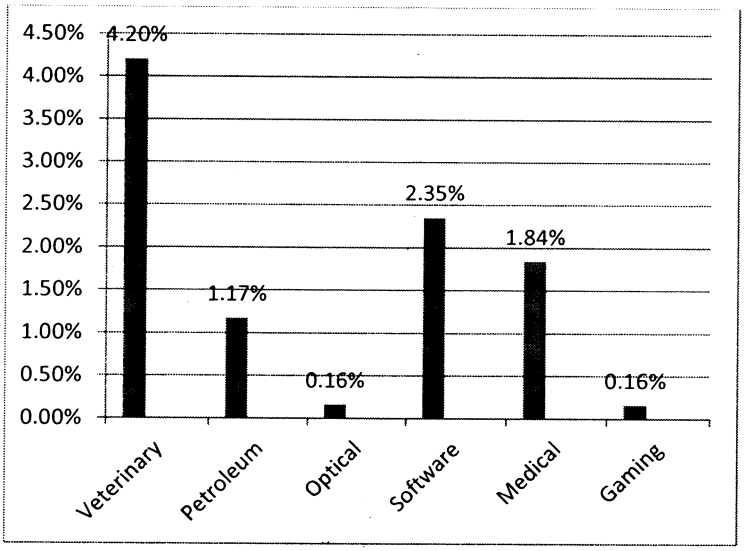
[394]Home page of MSME. *"In recent years the MSME sector has consistently registered higher growth rate compared to the overall industrial sector."* Available at: http://msme.gov.in/msme_aboutus.htm.

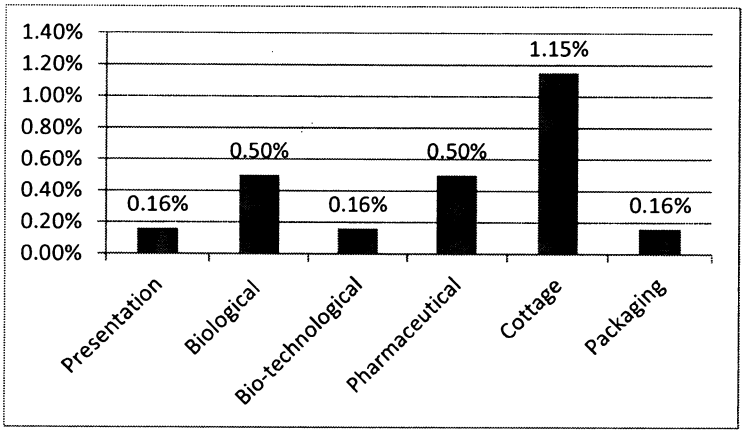
[395]Importance of Technological Innovation for SME Growth Evidence from India, M. H. BalaSubrahmanya, M. Mathirajan, and K. N. Krishnaswamy January 2010 page VI, *"SMEs have greater Innovation Intensity than large firms."* Available at: http://www.knowledgecommission.gov.in/downloads/documents/NKC_Innovation.pdf

[396] Proceedings of the 7th International Conference on Innovation & Management: Grassroots Innovation, Characteristics, Status Quo and Suggestions by Li Hua, Yu Jiang and Ye Lin, Page No: 2048, Available at: http://www.pucsp.br/icim/ingles/downloads/papers_2010/part_9/44_Grassroots%20Innovation,%20Characteristics,%20Status%20Quo%20and%20Suggestions.pdf

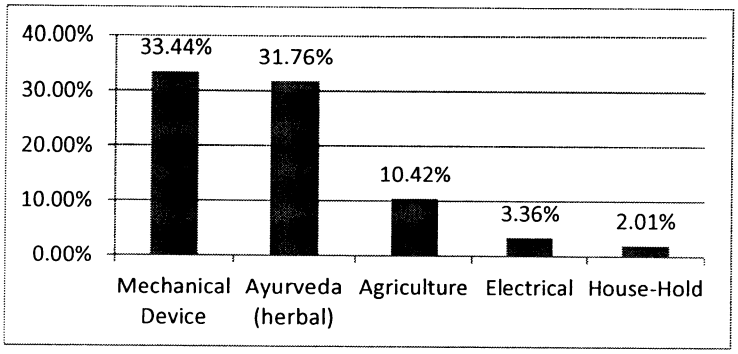
[397] Policy Guide to Scaling Social innovation 2013, Available at: http://reports.weforum.org/social-innovation-2013/view/the-national-innovation-council-india/

since 2000. NIF has facilitated filing of 596[398] patent applications in India out of which 35 patents have been granted and 50 have been abandoned. It is anticipated that low inventive threshold of these inventions might be one of the reasons of abandoning the patent applications. Even NIF points out that not all the innovations are innovative enough to get protection under the existing patent law. These innovations have emerged from India's rural population which covers various sectors such as agriculture, mechanical, electrical, automobiles, herbal, biological, chemical, petroleum, cottage, software and veterinary. It could be seen from the classification of the data that almost majority of the inventions belong to Mechanical (33.44%), Agriculture sector (10.42%) and Herbal (31.76%) as shown below:



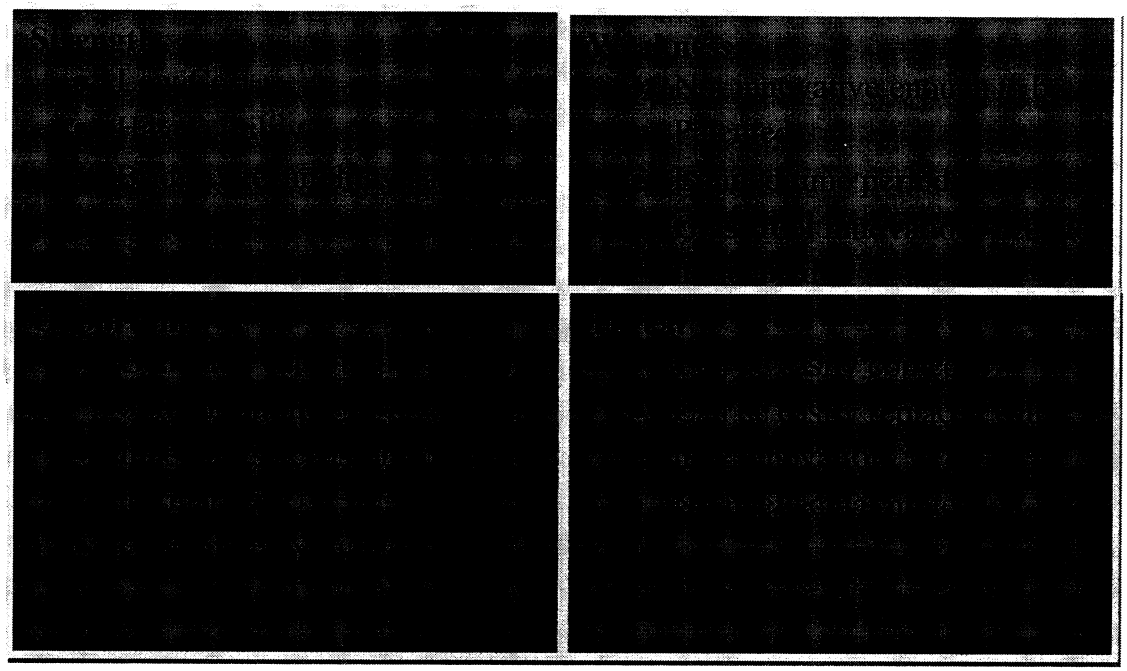


[398] Annexure 2



Some innovation in SME & Grass root are listed in Annexure 7

Strength, Weakness, Opportunity and Threat (SWOT) Analysis of Incremental Innovations in India:



3.3: EXISTING SITUATION WITH REGARD TO PROTECTION OF INDIAN INNOVATIONS IN INDIA

Generally Patents are used to predict the trend of innovation of a country, however merely calculating the patents granted may not be a reliable data for predicting the innovation, as not all patents are equally commercially valuable. Also, there is a wide discrepancy between the patent filing procedures and standards of the countries. For example in Japan, until few years

back, different patent application had to be filed for each claim, but in most of the countries multiple claiming is allowed within the same application.[399] Some countries follow the system of relative novelty while some follow the system of absolute novelty besides the variation in the scope of subject matter protection, like in India incremental innovations are not patentable under section 3d[400] while it can be in USA.

The patent scenario surely gives a glimpse about a country's innovation, but still it has been criticized because of biasing towards High Technology Fields as majority of innovations taking place in the developing countries are incremental which can't be protected under the standard patent system.

While it is understood that the touchstone of the grant of IP rights is for the progress of science and technology besides benefit of the society, it is important to understand whether such an object is being met? While the term society has not defined however, this would definitely cover domestic inventors. It is thus important to identify whether the creation of monopoly rights under the standard patent system have benefited this part of society (i.e. the Indian innovators). There are large numbers of application which have been rejected to Indian applicants on the grounds of lack of inventive step. In order to prove this, controller General's decisions were evaluated from the period of January, 2009 to March, 2013 (total 2785 decisions). Further, the sample analysis of year 2014 was also done to see if the trend continued in terms of rejections to Indian patent applicants.

Analysis of Data set (Year 2009-2013):

Out of 2785[401] applications there are 587 Indian applications on which Controller has given out decision with respect grant or rejection. Out of 587 decisions (digital copies of few of the documents were unavailable), statistical analysis was done to identify the total number of patent applications which have been rejected from receiving grant to Indian applicants. The analysis revealed that approx. 224 (38%) applications could not proceed to the stage of grant to Indians. These rejected patent applications were further evaluated to understand the

---

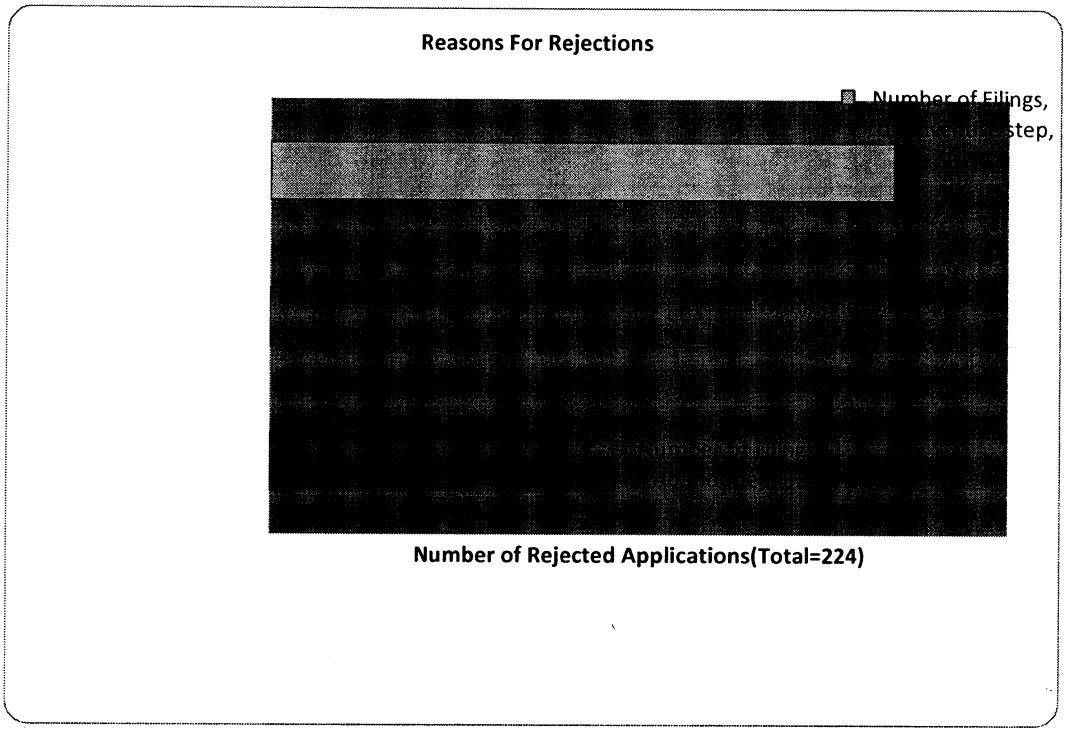
[399] A new ranking of the world's most innovative countries: Notes on methodology, An Economist Intelligence Unit report page no.3 *"Patents Data paragraph 2."*Available at:http://graphics.eiu.com/PDF/Cisco_Innovation_Methodology.pdf

[400]Section 3.What are not inventions: *"[(d) the mere discovery of a new form of a known substance which does not result in the enhancement of the known efficacy of that substance or the mere discovery of any new property or new use for a known substance or of the mere use of a known process, machine or apparatus unless such known process results in a new product or employs at least one new reactant".*

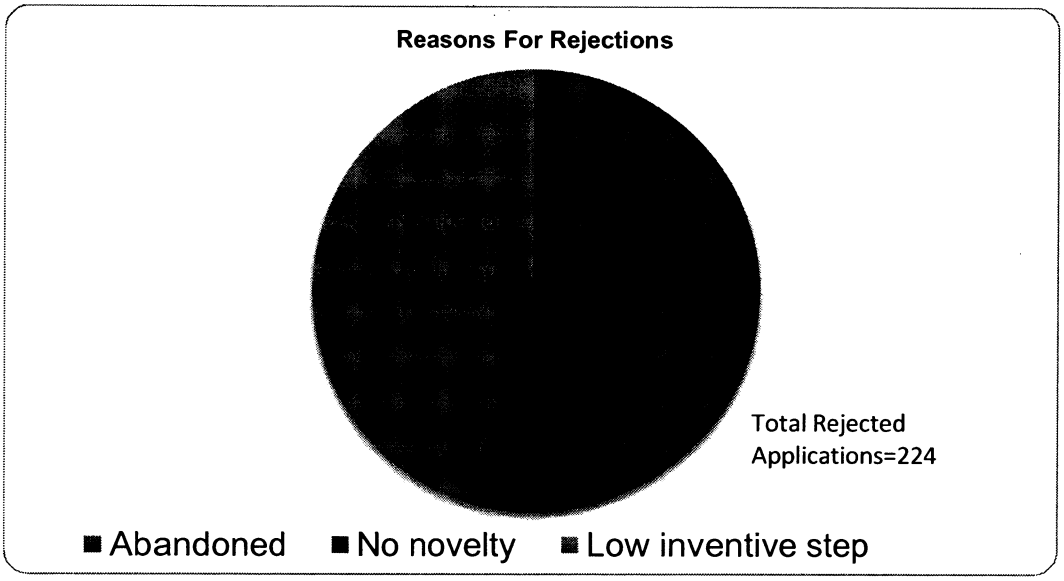
Explanation : For the purposes of this clause, salts, esters, ethers, polymorphs, metabolites, pure form, particle size, isomers, mixtures of isomers, complexes, combinations and other derivatives of known substance shall be considered to be the same substance, unless they differ significantly in properties with regard to efficacy;]

[401] Annexure 3

number of applications rejected on the grounds of low inventive threshold. As depicted in chart below, 101 patent applications have been rejected on the basis of low inventive threshold to Indian applicants, which amounts to 45%)[402].



These 101 patent applications belong to sectors such as Pharma, Chemicals, Education, Food, Agriculture, Engineering, Textiles and Biomedical.

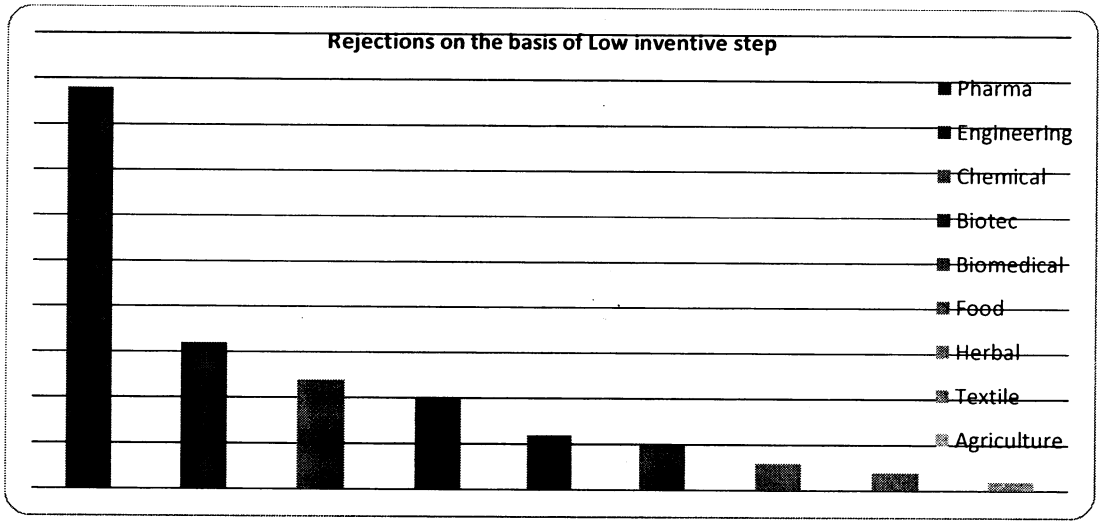


[402] 101 divided by 224 multiplied by 100

Figure 1

As seen from the Pie Chart in Figure 1, amongst all the rejections, 45% applications have been rejected because of a lack of an inventive step.

Out of total 101 patent applications rejected on the grounds of low inventive step, 2 could not be evaluated due to lack of details on the Intellectual Property's website, 16 applications belong to the field of Engineering, 1 belong to Agricultural sector, 2 belongs to textile sector, 5 belong to food sector and 6 belong to biomedical sector, 44 belongs to pharma sector, 10 belongs to Biotech, 3 belongs to Herbal and 12 belongs to Chemicals (Total 99).



Data set analysis for year 2014:

A similar trend was seen with regard to the rejection of patent applications filed in year 2014 (January to April 2014, please see Annexure 3.1. Approx. 1278 patent applications were evaluated which revealed that there were 209 patent applications (16.35%) which belonged to Indian applicants including universities, companies and inventors. Out of 209 patent applications, the data of 85 patent applications was available. The review of 85 patent applications revealed that approximately 35 applications were refused. Out of these 35 applications, there were 24 applications (28.23%) which were rejected on the ground of low inventive threshold which covered inventions ranging from pharmaceutical, automobile, agriculture, FMCG, Food technology etc.

Thus, under the current Patent System there are huge set of innovations (45%) which are being rejected on low inventive step are extensively examined by the Patent office, which can go on for years, only to be rejected at the end of the process. Considering the growth in

innovation that is happening in the country, this percentage will only grow, thus putting a great stress on the Indian Patent Office without any results. Similar situation is identified in Australia where approx.50%[403] of patent applications could not proceed to grant because of low inventive threshold which as a result not only burden IP office but also adds to a significant cost on the applicant.

3.3.2. Survey of Innovations in the areas of Electronics, Engineering, Healthcare, Agriculture, Mobility & Energy

The sample survey was done of the innovations related to engineering, mechanical, Electrical and IT. (see Annexure 10, total 47). The list of inventions have been selected basis those who filed for the applications to receive CII innovation awards for the inventions carried out in the areas of Electronics, Engineering, Healthcare, agriculture, Mobility and Energy. Further, the email survey was also carried out with 283 CII member companies operating in the Electrical Sector and 750 CII member companies operating in the space of Mechanical Sector, however none responded.

The email questionnaire given below was sent to them, followed by telephonic interviews:

1. Briefly explain about your invention
2. Is your invention a breakthrough or an improvement over the existing technology/prior art?
3. If your invention is an improvement then what are the benefits of your invention over the existing technologies (for example, better use, enhanced features/cheap/ease in manufacture etc.?
4. Can further improvements be made easily over your invention by a person skilled in the art?
5. Have you filed patent application or design application for your invention? If yes, what is the status of that application and if not then what are the reasons for not filing it?

---

[403] Review of innovation Patent System" by Advisory Council on Intellectual Property, August 2011, page no. 27, available at http://www.acip.gov.au/library/Innovation%20Patent%20Issues%20Paper_Final_v2.pdf: "*Up to 50 percent of applications for standard patents do not proceed to grant. A significant number of these applications lapse during the examination process due to problems with inventive step. As evidenced by a study by the European Patent Office, an examination of a patent application is a time-consuming and costly exercise for a patent office which is only partially offset by revenue raised by renewal or continuation fees. Whilst society benefits from the disclosures made by these lapsed applications, they still represent a significant investment by applicants which may, at best, be only partially recovered. In some instances, the investment was sourced from public funds made available through various government programs. In Australia, many of these lapsed applications could have been granted as innovation patents had they proceeded as such*".

Need for New IP System to protect Incremental/improved innovations:

Out of survey of 47 innovations (listed in Annexure 10), 16 responded (34%) (Annexure 10.1).As can be seen, the respondent's innovations are not breakthrough and are increments over the existing technologies. Out of 16 innovations, 9 represent (approx50%) the inventions representing Engineering sector, 3 inventions (approx. 25%) from mechanical sector, 4 inventions (25%) from IT sector. Further, approx. 90% of the inventions emanating from mechanical, electrical and IT sector are envisaged to have low shelf life in lieu of the fact that the technology may become obsolete soon. It is understood that such improvements/modifications are basic in nature and may further be improvised easily by a person skilled in the art thus making such improvements having lesser shelf life. It has also been understood through the survey that the shelf life of majority of such innovations has lesser shelf life since further improvements can be further easily made by a person skilled in that art. Further, some of the inventors have decided to not file patent application due to the high fee of filing including the fee of lawyers which is considered to be more than the amount incurred in coming out with the invention.

Economic Losses:

The survey of the aforesaid inventions, reveal that the existing IPR regime in terms of their protection is not conducive enough. These being incremental in nature do not require 20 years long term protection as provided under the Patents System. Further, many of such inventions are subject to rejection on the grounds of Obviousness, with no importance paid to utility of such inventions which can enhance the performance of the product or increase the ability of the product to be useful for solving an issue for which it did not have ability earlier. While few such incremental inventions are granted patent protection however inventor is not interested in maintaining those for 20 long years since the product can be further easily modified. Basis the survey, it has been understood that inventors also avoid filing an application for grant of patent due to the high fee levied including its maintenance which is felt to be much higher than the innovation itself. Further, due to non-availability of appropriate environment/legislative route to protect innovations, the inventor community deters from marketing the product due to fear of getting copied or infringed thus leading to hampering progress of Science & technology. As a result not only is leading to huge losses to Exchequer (that may vary to the tune of 10-30% per product revenue) but also losses to the

inventors to the tune of 10-15% of profit (EBIDTA[404] minus expenses) per product. Further, as depicted in Annexure 10.1, these innovations have tremendous positive impact on generating employment, post their market reach.

Indian Government announced this decade as a decade of innovation. Thus, a clear intent has been to bring India to the next value chain by emerging it as a global leader in innovation/creativity. India has huge potential to realize this dream as skills exists in India to develop inventions which can address the local needs. Evidences prove that the majority of innovations are incremental in nature and offer solution in terms of local adaptability. However, given the fact that such inventions are not eligible to receive protection under the standard patent system, leaves wide range of such inventions unprotected besides leaving domestic innovators at disadvantage. It would thus be in interest of India to develop a system, in line with several other countries, namely 2nd Tier patent protection in the form of Utility Innovation Act which can protect incremental inventions and spur domestic innovations. Such a system must not only come to the rescue of innovators but must also be considerate about the patentees on whose inventions increments may be made. Further, the new system must be in a position to ensure the benefit of public at large by incorporating provisions that demand commercialization thereby addressing the issue of defensive filings. In considerable number of countries Utility Models are being granted to provide a low-cost and economical entry point to the Small and Medium Enterprises (SME) into the intellectual property system. In a country like India we need to promote and encourage our innovators and artisan to participate in the economic development of the nation by way of assurance to them that a cheaper and a feasible way exist to protect their invention. A less technical system than patent is required to enable the domestic innovators to take advantage of intellectual property (IP) rights. In a resource constrained economy like India, the fact that the minor technical inventions which sparingly use local resources needs to be encouraged by providing a legal framework for their protection and commercial exploitation such as UM. It is highly recommended that India should be in favor of introducing Utility model so as to ensure smooth and effective utilization of proposed system. While it is very important to have robust UM legislation that can be implemented in the country, it is equally important that various other measures or steps should be taken to facilitate adequate use of this system by domestic inventors/researches/SMEs.

[404] Earnings Before Interest, Taxes, Depreciation and Amortization.

3.3.3: Survey of Innovators, Associations, Researchers, Educational &Research Institutions, Industry & Associations and Law Firms

A survey, sample size of each is given below, by sending them the questionnaire was done with innovators, law firms and Associations, so as to identify the need for having 2nd tier protection for their innovations. The aim of the survey was to gain the 1st hand information from the inventors and the legal fraternity regarding the issues that they faced while filing applications for protection of incremental innovations under the standard patent system. The survey also comprised of telephonic interviews based on following broad questions:

Q1. Any Specific examples whereby patent application was abandoned/withdrawn/rejected on the grounds of less inventive threshold of your invention?

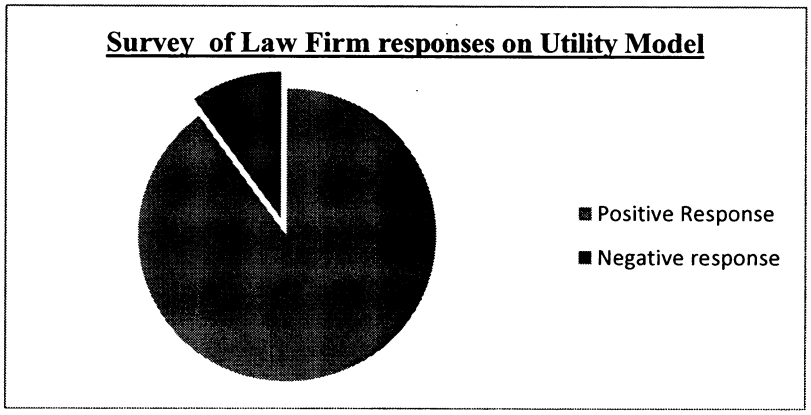
Q2. As a result of non-protection of your invention under the patent system have you ever encountered copying of your invention by your competitors/others?

Q3. Which sectors needs UM legislation? What should be the subject matter of protection? Mechanical, electronics, IT etc.

Q4. What are the specific provisions that must be built in to ensure that proposed legislation is free from potential pitfalls? Especially what provisions must be built in to ensure that the domestic innovators are major beneficiaries, UM thus granted is not frivolous thus ensuring its quality and legal certainty, it is not litigation pro, effective commercialization as against defensive filing?

Q5. What provisions must be implemented in proposed UM framework to compensate the patentee in case UM so granted is based on patented invention?"

a. Response from Law Firms



Out of total of 517 law firms **(See Annexure 8)**, respondent law firms who gave their suggestion that whether law relating to Utility Model should be introduced in India or not, only one law firm has given a negative response reasoning that this would require diversion of financial resources besides human resource crunch at Patent office and the lack of skilled manpower.

Some of the important viewpoints in support of utility model given by the experts from the legal fraternity are:

- India has plethora of petty inventions, which are generated at the grass root level. These petty inventions generally are unable to stand their ground in view of the strict inventiveness criteria of Non-obviousness of the patent law.
- It increases the possibility of an increased role of small-scale innovators (small and medium scale enterprises) in economic development and helps them reap the benefit of their innovations, which might have short shelf life.
- It will develop an understanding and importance of creating and protecting Intellectual Property Rights amongst masses thereby contributing to the overall growth of the society by encouraging innovations.

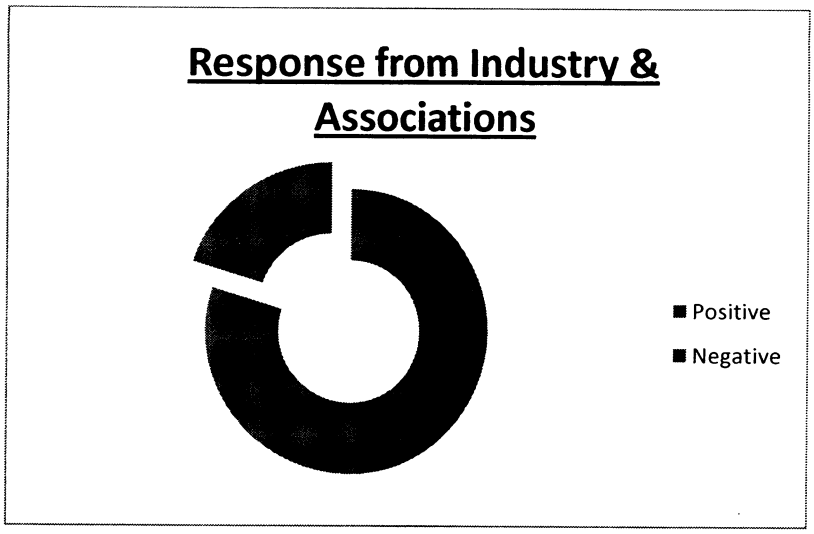
b. Responses from Industry Association

The prominent Chamber for small scale Industry is in complete favour of a law for utility models. It suggests that there are many innovations for which no patent can be obtained due to various reasons. The Micro and Small Entrepreneurs, on their own, in order to remain competitive in the market make certain improvements in the products. They improve their processes also by applying talented changes which results in saving the cost and thus there is a much need for a law in favour of Utility Models.

The separate legislation for Utility Model has been advocated which will serve all the provisions regarding the enforcement, registration etc. Further it says that simply by the enactment of a new separate law for the Utility Model, the existing Patent Act or the Design Act will not be diluted, as the new Act serves a completely different purpose altogether. The new Act will be for those innovations or rather improvements for which the patents are not possible.

A total of 31 industry Associations were sent mails for discussion on this topic. **See Annexure 9**

(Out of 5 responses received, 4 agreed that Utility Model is needed in India).



b. Response from the Inventors

Total 93% of the innovators and other stakeholders agreed that there is a need to have such a system in place which can protect incremental innovations and enable the innovators to safeguard the same from misappropriation.

They opine that:

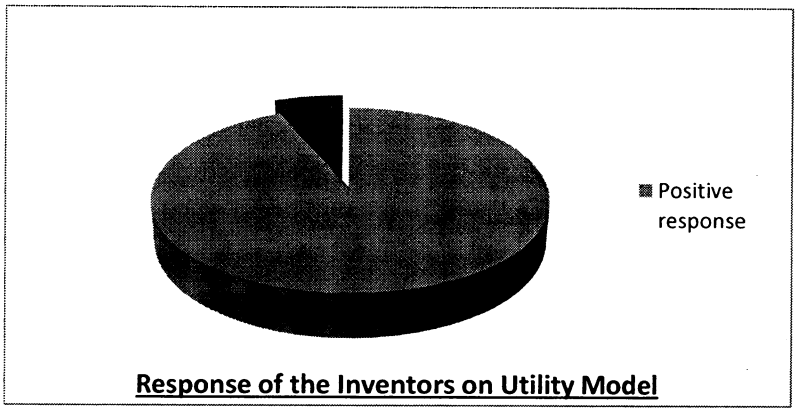
- it would uplift and protect the grass root inventions that take place in India everyday bringing it at par with other countries which already have a separate Utility Model law.
- UM will not only benefit the small inventors but will also definitely encourage SMEs and innovators particularly in field of food, engineering, biotech (for ex. medical devices) etc.
- It can be predicted that UM will not only promote the SMEs/individual innovator through technical/economic advancement but will benefit society as a whole.

The majority of inventors also believe that instead of restricting the scope Utility Model Law to the mechanical devices it should also cover other inventions that have a utility value in the market, India's innovations go far beyond just mechanical – more so into electronics, embedded electronics, software systems, medical, other domains but are of the view of excluding the pharmaceutical industry out of the ambit of the Law.

Thus, it can be safely concluded that majority of respondents are in support of the Law.

A total of 11,912 mails were sent to various inventors & innovators (Out of the total 52 responses received, only 3 have the view that Utility Model should not be enacted in India whereas the remaining was silent on this topic of discussion but they did mention about their own inventions).

In line with the Afore-said, it will be worthwhile for India to consider implementing the system of 2nd Tier Patent Protection to spur domestic innovations.



Response of the Inventors on Utility Model