Innovation and Development in Information Technology in India: Specific to Software Industry

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Abstract

Information technology (IT) plays an important role in development of business, boosting economic growth and employment by energising higher education sector. Software sector is a major component of IT industry. Development of indigenous software products is necessary for nation's economy through development in software industry. Under 'Digital India' and 'Make In India' programmes major institutions are involved in policies and initiative programmes, R&D and innovation for growth of software industry. The paper attempts to highlight the crucial contribution of key stakeholders such as universities, technical research institute and private-public software firms, STPI and industrial association for development of software products and services. The Indian Government has taken many initiatives for promotion and adoption of Free & Open Source Software for increasing foreign exchanges, developing indigenous products and achieving vendor's independence. The paper raise question about unavailability of indigenous software products as compared to Microsoft and other foreign vendor's products in Indian market. Various institutions are still working on creation of indigenous software and in upcoming time novel products and technologies will be provided by India to domestic and global IT market.

Keywords: *Research and development, information technology, software, innovation, cloud computing.*

INTRODUCTION

Information Technology is an important emerging sector for the Indian economic growth and employment (Vijayasri, 2013). The last decade was remarkable for the Indian IT industry in the form of Information Technology/Information Technology Enabled Services (IT/ITES) industry that has transformed India's image on the global platform. India's cost competitiveness in providing IT services is approximately 3-4 times cheaper than the United States. IT-ITES industry has reached US$ 100 billion export revenues in the year 2012 (Bhattacharjee and Chakrabarti, 2015) and almost generated US$ 117 billion for the year 2016-17 (Deity, 2017).

IT-ITES industry has emerged as one of the most dynamic sector in India's economic development and is responsible for the global recognition of India as a 'soft' power. India is being recognised as the outsourcing destination of the world and known for its reliable and cost-effective delivery of cloud computing services. IT industry has set up over 600 delivery centres across

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the world and providing services with presence in over 200 cities across 78 countries (Deity.gov.in, 2015).The industry has grown at compound annual growth rate (CAGR) of over 21% during the year 1998-2014. The Indian IT industry's contribution to GDP increased from 1.2% in FY 1998 to an estimated 8.1% in FY 2014 (NASSCOM, 2014).

In the year 2000, IT industry added another changing dimension in form of BPO/ITES business. These BPO/ITES included call-centres, KPO, BPO, insurance claim processing, financial and accounting processing, non-banking services including insurance, pension, asset, management and market related services.

Table 1: Year wise IT – ITES Industry's Export Trends in India (in USD billion)

Year	2007-08	2008-09	2009-10	2010-11	2011- 12	2012-13	2013-14	2014-15	2015-16	2016-17
IT Services	22.2	25.8	27.3	33.5	39.9	45.4	51.9	55.3	61.00	66.00
ITES-BPO	9.9	11.7	12.4	14.2	15.9	17.9	19.9	22.5	24.2	26.0
Software Products, Engi-neering Services	8.3	9.6	10	11.4	13	12.8	14.2	20.00	22.4	25.00
Total IT-ITES	**40.4**	**47.1**	**49.7**	**59**	**68.8**	**76.1**	**86**	**97.8**	**107.8**	**117.0**

Source: Own compiled on the basis of data given by Sharma, 2014 and Deity, 2017.

Note: IT–ITES- Information Technology - Information Technology Enabled Services

The preceding table indicate the broader picture of Indian IT–ITES Industry's export performance. IT services exports (excludes BPO, engineering and software products) is expected to be fastest growing segment in the year 2016-17 in terms of generating exports of USD 66.0 billion and ITES/BPO exports is USD 26.0 billion. The Software products and engineering services have generated export of US$ 25.0 billion in the year 2016-17. Above table shows the high demand of ITES/BPO services that affected production and export of indigenous software in domestic and international software market. Our local software firm's key interest is to attract foreign firms for ITES or BPO service and lesser in indigenous software product development.

Purpose and Objectives

The present study focuses on struggling growth of local software production in India in the current scenario. It also describes the government's role in

technological research, policy level, development and diffusion for improved indigenous software products. The Indian software industry mainly depends on outsourced work from other countries. India largely has Microsoft dependent environment and foreign vendor's software products in terms of operating system and its usage in computers, tablets and smart phones. Study emphasises the role of public-private institutions, technical institutes, STPI and industrial association and understands the interaction between various actors in development and diffusion of software products. The paper aims to highlight the following research objectives.

Objectives of the Research:

1. To analyse the role of various actors of National Innovation System specific to the software innovation in India.
2. To present the current status of foreign and Indian software products in Indian IT market.
3. To examine the role of government at policy level for Indian software firms.

Methodology

The present study will be qualitative, quantitative and exploratory in its detail. The descriptive and analytical aspects of events and their interaction with various determining linkages at various levels will be explored. Study is based on secondary data collected through various reports of software companies such as TCS, INFOSYS, C-DAC, BISAG and NASSCOM, STPI reports along with government reports. The secondary information has been collected from text books, magazines, journals, newspapers and internet.

Theoretical Framework

Fagerberg (2005), states that, Invention is the first occurrence of an idea for a new product or process, while innovation is the first attempt to carry it out in practice. As a theoretical framework the present study uses national innovation system because it permits to study activities, actors, norms, rules, relationships and other factors which influence innovation. Freeman (1987), describes NIS as the network of institutions in public and private sectors whose activities and interactions initiate, import, modify and diffuse new technologies. Lundvall (1992) explains, NIS as system of innovation constituted by elements and relationships which interact in creation, diffusion and use of new knowledge for economical purpose. Further, it is narrowly defined by Nelson and Rosenberg (1993) as a set of institutions whose interactions determine the innovation performance such as R&D institutions, technological institutions and universities.

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PRESENCE OF SOFTWARE INDUSTRY IN INDIA

Software industry is seen as a key opportunity for developing countries like India for "socio-economic development" (*Mohammed, 2010*). By the 1990s, Indian software industry achieved superb advancement in the growth of employment, sales and export. The creation of NASSCOM in 1988 and later establishment of STP in 1990 shows serious approach of policy makers for the software industry. The establishment of STP scheme in various cities such as Bangalore, Delhi, Hyderabad, Bombay and Chennai facilitated private software firms to export software and thus entry into USA software market was ensured (Nicholson and Sahay, 2008). The software and services industry generated almost US$ 108 billion in export revenue for the year 2015-16 (STPI, 2016).
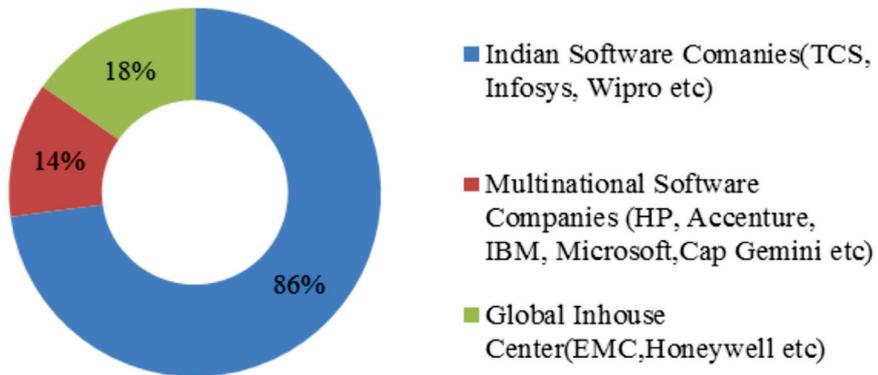

Figure 1: Dominant of national and multinational IT-Software companies in India

Source: Adapted from Kulkarni, 2015

The above figure 1 shows the presence of Indian and international IT software companies in India. There are dominant Indian software companies having share of 86%, multinational companies' share of 14% and global in-house centre having share of 18% in the Indian IT software industry. The government IT policies, schemes, establishment of NASSCOM, STP and SEZ parks are key contributors in the growth of Indian software companies (Kulkarni, 2015). The industry involves various emerging technologies such as Cloud Computing and Big Data. The emergence of cloud computing innovation added to technological breakthrough through improved products and services in Indian IT market (Buyya et.al, 2013). The use of this new technology by industries, government, non-government organizations and consumers are rapidly increasingly in the developing world. The cloud services market in India was $315 million in the year 2012 which is expected to grow to US$2 billion in 2018 (Kshetri et.al, 2017).

Software

Software is a collection of commands and instructions for data processing and performing several tasks (Grohn, 1999). Software is designed and developed by computer engineers specifically aimed to manage day to day data transactions of enterprises, banks, educational institutes, hospitals and many more. Software developed with the help of programming languages can be defined as a complex and recombinant system of commands and instructions for data processing, besides being an intangible good which can be used only in discrete units (Engelhardt, 2008).The basic programs or commands or instructions is written in a specific software programming language (for example, C, C++, Python, Java, etc.) to tell the computer what to do in order to perform certain tasks. The list of commands or source programs (source code) is translated into machine level language so that computer can easily understand and execute the program.

Availabilities of Foreign and Indian Software Products

The current scenario of availabilities of indigenous OS (Operating System) like BOSS (Bharat Operating System Solution) as compared to other foreign OS like Windows which are used in computer, laptop and smart phone are very less. We are highly dependent on foreign software products. The Government of India making policies and initiative programs for adoption of OSS (Open Source Software) in the country. National Resource Centre for Free & Open Source Software (NRCFOSS) and BOSS are key initiatives in area of Free & Open Source Software which started in 2005. Both are funded by the Department of Electronics and Information Technology coordinated by C-DAC (Deity.gov, 2015). Table 2 and another table 3 given below shows availabilities of OS in India and several other foreign countries which are using computer, laptop and smart phone. There are several different versions of Windows OS launched by Microsoft. India also introduced first Linux based OS BOSS 1.0 (Tarang) by C-DAC company in 2006.

Table 2: Availabilities of Foreign and Indian Software Products for Computer and Laptop

	Foreign Software Products (operating system)				Indian Software Products (operating system)			
Sr. No.	Product Name	Company	Description	Price (Rs.)	Product Name	Company	Description	Price (Rs.)
1	**DOS** 2.0 released in 1983	Microsoft Corporation, USA	Operating system used in PC & Laptops	NA	**BOSS1.0** (Tarang)-released in January 2006	C-DAC Pune	Operating system used in PC & Laptops	Free

Sr. No.	Product Name	Company	Description	Price (Rs.)	Product Name	Company	Description	Price (Rs.)
2	**Windows NT** 3.1 released in 1993	Microsoft Corporation, USA	Operating system used in PC & Laptops	NA	**BOSS 2.0** (Anant) -released in Sept, 2007	C-DAC Pune	Operating system used in PC & Laptops	Free
3	**Windows-XP** released in 2001	Microsoft Corporation, USA	Operating system used in PC & Laptops	NA	**BOSS 3.0** (Tejas) - released in Sept, 2008	C-DAC – Pune	Operating system used in PC & Laptops	Free
4	**Windows Vista** released in 2006	Microsoft Corporation, USA	Operating system used in PC & Laptops	NA	**BOSS 4.0** (savir) - released in April, 2011	C-DAC – Pune	Operating system used in PC & Laptops	Free
5	**Windows 7** released in 2009	Microsoft Corporation, USA	Operating system used in PC & Laptops	7,100	**BOSS 5.0** (anokha) released in Sept,2013	C-DAC – Pune	Operating system used in PC & Laptops	Free
6	**Windows 10** released in 2014	Microsoft Corporation, USA	Operating system used in PC & Laptops	7,999	**BOSS 6.0** (anoop) released in 2014	C-DAC – Pune	Operating system used in PC & Laptops	Free

Source: Author compiled it from annual reports of firms

Note: NA-Not Available

C-DAC - Centre for Development of Advanced Computing,
BOSS   -Bharat Operating System Solution

Table 3: Availabilities of Foreign and Indian Software Products for Smartphone and Tablet

Foreign Software Products (operating system for Smartphone and tablet)					Indian Software Products (operating system for Smartphone and tablet)			
Sr. No	Product Name	Company	Description	Price (Rs)	Product Name	Company	Description	Price (Rs)
1	**CUPCAKE** (Android 1.5) released in May-2009	Google -California, (USA)	Operating System used in smartphone and tablet	NA	NA	NA	NA	NA

Sr. No.	Product Name	Company	Description	Prics (Rs.)	Product Name	Com-pany	Descrip-tion	Price (Rs.)
2	**GINGER-BREAD** (Android 2.3) released in Nov- 2010	Google -California, (USA)	Operating System used in smart-phone and tablet	NA	NA	NA	NA	NA
3	**Lollipop** (Android 5.0) released in Oct-2014	Google -California, (USA)	Operating System used in smart-phone and tablet	NA	NA	NA	NA	NA
4	Marshmal-low (Android 6.X) released in March-2016	Google -California, (USA)	Operating System used in smart-phone and tablet	NA	NA	NA	NA	NA

Source: http://androidadvices.com/androids-gingerbread-honeycomb-and-icecream/ , accessed on April 10, 2016

Note: NA- Not Available

The preceding table 3 indicates the availabilities of foreign and Indian software products for Smartphone and tablets. The Google also introduced several different version of Android operating system such as Cupcake, Lollipop, and Marshmallow for tablets and smart phone. The whole market of operating system for Smartphone and tablets is acquired by the foreign companies, namely Google, Sony, Apple, and Microsoft. Android OS almost covers all the latest functionality of Smartphone and provides fast service to users. The developing country like India is still working on creation of operating system like Android. India has not produced any indigenous operating system for Smartphone and tablets till now. In future latest technologies will be provided by India to national and international software market.

MAJOR ACTORS OF NIS FOR SOFTWARE DEVELOPMENT INDUSTRY IN INDIA

The 21st century witnessed software sector as the largest and fastest growing sector of Indian economy. The Indian government is promoting 'Digital India programme' as an umbrella programme to prepare India for knowledge based transformation into a digitally empowered society along with knowledge based economy. The present study deals with major actors and networks of institutions in NIS that led to transition of Indian software industry since the early 1970s. The GOI has invested considerable resources to build finest infrastructure for the development of domestic software capabilities.

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Role of Higher and Technical Institutions

Higher and technical institutions of India are one of the biggest educational systems across the world being just after USA and China. Technical education is the most successful tool to create a knowledge-based society for the future world (MHRD, 2015).The growing technical, skilled and quality manpower created by several higher technical institutions is one of the major achievements in Indian education system. In the early 1960s, high demand and importance of higher technical education led to establishment of central, state engineering institutes and IITs. By the 1974, M.Tech and B.Tech got started at major IITs and other institutions. In the year 1982, two new courses started such as MCA and DCA. The new polytechnic diploma courses started in 1984. The DoE was set up by DOEACC society in the year 1990 to provide computer courses such as 'O', 'A', 'B', 'C' level courses. This DOEACC society had established 699 technical institutes by the 2000 across country (Kumar and Joseph, 2006). The total number of central and state funded institutions for technical and science education are 46 central universities, 310 state public universities, 130 deemed universities, 20 new IITs, 31 NITs, 4 IIITs and 6 IISERs in the year 2016 (MHRD, 2016).

Table 4: Region Wise Technical Institutes for Polytechnic, Engineering and MCA courses in India-2015

Sr No	Region Wise	Polytechnic Institutes(Diploma/BE/ME)	Engineering and Technology Institutes (B.Tech / M.Tech)	MCA-Institutes
1	**Central Region (**Chhattisgarh, Gujarat, Madhya Pradesh**)**	231	540	182
2	**Eastern Region (**Arunachal Pradesh, Assam, Jharkhand, Manipur, Meghalaya, Orissa, Tripura, West Bengal**)**	222	422	104
3	**North-West Region (**Chandigarh, Delhi, Haryana, Himachal Pradesh, J&K, Punjab, Rajasthan,**)**	635	1029	226
4	**Northern Region (**Bihar,UP, Uttarakhand**)**	365	-	-
5	**South-Central Region(**Andhra Pradesh**)**	297	900	674
6	**South-West Region(**Karnataka, Kerala**)**	318	598	144
7	**Southern Region (**Puducherry, Tamil Nadu**)**	462	955	333

Sr. No.	Region Wise	Polytechnic Institutes(Diploma/BE/ME)	Engineering and Technology Institutes (B.Tech / M.Tech)	MCA-Institutes
8	**Western Region** (**Daman and Diu, Goa, Maharashtra**)	609	750	148
	Grand Total	**3139**	**5194**	**1811**

Source: Author compilation based on AICTE, 2015

IITs, NITs, IIITs and Polytechnics/Engineering institutes run technical courses are well known for their excellence and supplier of quality manpower for the IT- Software companies. The above table 4 gives information about growth of region wise technical institutions such as polytechnic, engineering & technology and MCA institutes. In the current year, region wise availability of total 3139 Polytechnic institutes, 5194 engineering & technology institutes and 1811 MCA institutes. These technical institutions produce large pool of scientific and technical human resource for the Indian IT-Software firms. The largest pool of scientists, engineers and technicians has increased from 24,689 in the year 1956 to 609,079 in year 2003 (Chadha et.al, 2015). In the year 2016 it reached about 1,329,685 (AICTE, 2016).

Role of Government at Policy Level

The Government of India played a significant role in the growth of IT-ITeS sector in India (Parthsarathi, 2004). Software industries of India are major part of the IT-ITeS sector. The early initiatives of government contributed to the growth of software development activities like Bhabha Committee of 1963, Electronics Committee by Dr. Sarabhai in the year 1966 and National Conference on Electronics of 1970. DoE (Department of Electronics) was established in 1970 to create and implement policies of government for welfare of electronics sector including IT-Software industries. In the year 1999 DoE was upgraded into a new ministry called Ministry of Information Technology (MIT). This ministry coordinated all the policies and initiative programmes for the development of software firms through improving software exports (Kumar, 2001).

Table 5: Government's Policies for Software Development in India

Sr. No	Year	Policy	Description of Policy
1	1972	Software Export Scheme	Government launched new 'Software Export Scheme' where there was provision for hardware import in exchange of software exports. The purpose of Indian government behind formulating scheme was to earn foreign revenue.

Sr. No.	Year	Policy	Description of Policy
2	1976	Liberalisation of policies related to software industry	The government took initial measures to liberalise the policy for software export by constituting EPZs and making provisions for easy and faster clearance of software export applications. Import duties on hardware were also reduced from 100% to 40%.
3	1981	Software Export Policy	According to this policy, the duty on hardware was increased in order to raise the demand of domestic computer system. Software development firms could also import 'loaned' computer system.
4	1984	New Computer Policy	The procedures of import simplified, import of application software products were allowed and import duty also decreased. Import duties on hardware decreased from 100% to 60% for software programmers. This policy provided many concessions such as firms getting loans from banks and duty exemptions. Software products were exempted from excise duty. Income tax exemption on net export earnings decreased from 100% to 50%.
5	1986	Software Policy	Government made this policy for promoting software exports. Computers systems used to develop software products for export could be imported duty free. However, the importer was expected to export software and earn 250% of the imported computer cost within 4 years. Software developed in India could be exported using satellite communication facilities and exporter communicates with their off□shore clients. Customs duty on imported computer system for software export was reduced.
6	1988	Software Technology Park Scheme	STP was established under the Department of Electronics & Information Technology. It was autonomous body to encourage and support small-medium software exporters. The STP scheme is a 100% export oriented scheme for the development and export of software products and services. This scheme also provided single window clearance and permission of 100% foreign equity. STP units are 100% duty free on import of hardware and software. Units were exempted from payment of corporate income tax up to 2010. They were also provided infrastructure such as buildings, computers, high-speed satellite communication links and an uninterrupted power supply.
7	1992-95	Import duties on imported software	Government decreased 20% import duties on application software and 65% on systems software in the year 1994. Decreased 10% on both in 1995.
8	1993-99	Income-tax exemptions	The Software exports were exempted from income tax and this tax-free status was confirmed every year till 1995 after which it became open-ended.
9	2000	Information Technology Act 2000	The Act provides legal status for electronic governance by giving recognition to electronic records and digital signatures. It is the crucial law in India which deals with e-commerce and cybercrime. It permitted the use of digital signature on documents and also allowed to establish public key certifying authorities and permitted to convert any legal documents into digital form. It also specified legal punishment for 'Cybercrimes', for example hacking websites, databases or whole system, and financial frauds.
10	2005	Special Economic Zones Act	The creation of SEZs in the country for generation of foreign exchange and attract FDI. 100% Income Tax exemption on export earnings from SEZs unit. Exemption from 'central sales tax', 'service tax' and duty free import. SEZs Act provided single window clearance and duty free import on hardware.
11	2015	Policy on Adoption of Open Source Software for Government of India	Government has been promoting the use of open source technologies in the e-Governance domain in order to increase economic and strategic benefits. This policy will encourage the formal adoption and use of OSS in government agencies. The source code of software will be available for the end-user to study and modify. Source code of software will be free from any royalty.

Source: Own compiled on the basis of data given by Athreye, 2005 Rajaraman, 2010 and GOI, 2015.
Note: GOI- Government of India.

Software Technology Parks in India (STPI)

STPI were setup in the year 1990 under the Department of Electronics and Information Technology. It created facilities of infrastructure such as buildings, R&D work stations, power supply, high speed internet and satellite links to the software companies registered in these parks. The Bangalore was first city where STPs were setup and it emerged as global IT Hub for software development (Rajaraman, 2010). STPI are located at 15 major cities in India such as Pune, Noida, Bangalore, Hyderabad, Thiruvananthapuram, Gandhinagar, Bhubaneshwar, Mohali, Jaipur, Mumbai, Mysore, Coimbatore, Manipal, Vizag, Guwahati and Chennai. The STP scheme is a 100% export oriented scheme for the development and export of software product and services. This scheme also provides single window clearance import certification, software valuation, permission of 100% foreign equity, marketing support and training facilities (*Athreye, 2005)*.

Table 6: The Performance of STP Units from 2010 to 2016

Year	Newly Registered STP	Operating Units	Exporting Units
2010-11	294	6554	5565
2011-12	133	5235	4542
2012-13	109	4534	3755
2013-14	115	3676	3335
2014-15	106	3124	2832
2015-16	105	1119	2525

Source: Own compilation based on annual report of STPI from 2011 to 2016

The preceding table 6 shows the commendable performance of STP units. During the year 2010, 294 new units were registered, 6554 units were operative and 5565 units were exporting. By the 2016, 105 new units were registered under the STP scheme, 1119 units were operative and 2525 units were exporting. There were total 53 STPI centres in working mode across the country and out of 53 centres, 46 centres are in Tier-II and Tier-III cities during the year 2014 (STPI, 2014).

Table 7: State Wise Performance in Software Exports Made by STPI Units from 2010 to 2016 (in Rs. Crore)

Sr. No	Name of State	2010-11	2011-12	2012-13	2013-14	2014-15	2015-16

1	Andhra Pradesh	28674.57	28948	34492	36752.95	379.54	477.93
2	Assam	10	6.58	0.92	0.88	1.35	0.18
3	Bihar	NA	17	8.14	9.7	10.63	7.25
4	Chandigarh	413.9	492.76	405.1	558.49	519.89	700.79
5	Chhattisgarh	4.58	8.58	12.29	17.48	18.63	23.29
6	Delhi	1541.2	3604.39	1461.51	1173.02	2217.85	1,442.30
7	Goa	NA	NA	NA	77	94.59	117.17
8	Gujarat	1250.99	1116.05	982.4	1442.48	1917.76	2,224.55
9	Haryana	13650.75	13506.81	15363.69	18327.4	17857.69	19,265.44
10	Himachal Pradesh	0.9	0.87	6.28	4.67	8.35	5.16
11	Jammu & Srinagar	0.8	0.76	1.41	2.18	2.45	3.35
12	Jharkhand	2.1	6.26	7.04	8.66	7.00	49.16
13	Karnataka	70240.93	82110	95048.25	103720.16	109797.67	1,25,418.53
14	Kerala	2071.67	1982.64	2240.7	2665.12	2867.77	3,008.91
15	Madhya Pradesh	246.89	237.23	244.54	301.99	343.38	355.00
16	Maharashtra	49873.78	46262.9	49796.3	55419.79	61314.29	64,063.59
17	Meghalaya	1.64	2.24	2.59	2.84	4.21	6.31
18	Orissa	1253.29	1410	1702.43	1919.09	1940.00	2,179.72
19	Pondicherry	110.25	118.2	117.2	120	153.26	182.55
20	Punjab	438.43	351.04	505.21	340.38	336.34	324.83
21	Rajasthan	491.65	493.63	637.76	664.06	712.27	803.97
22	Tamil Nadu	28289.75	29081.8	29182.8	29880.2	33275.73	33,905.30
23	Uttar Pradesh	10944.75	10989.39	13194.68	13352.66	13740.34	16,450.68
24	Uttarakhand	86.32	44.92	54.54	69.27	74.67	82.57
25	West Bengal	5665	5920	6030	6482.22	7015.00	6,990.00
To-tal		**215264.14**	**226712.05**	**251497.78**	**273312.69**	**254610.66**	**278088.53**

Source: Own compilation based on annual report of STPI from 2011 to 2016

The overall performance of registered STP units increased every year and it became major player in employment generation besides earning foreign currency through export. The above table 7 shows state wise export contribution of STPI registered units across India. There are 25 states which are playing major role in software export. State wise STPI's overall exports of software products were increased from 215264.14crore in 2009-10 to 278088.53 in 2015-16. The overall exports done by STPI registered IT/ITeS units increased from 2,93,797Crore in 2014-15 to 3,19,569Crore in 2015-16 (STPI, 2016). The STPI's remarkable contribution to software-exporting sector is through provision of high speed data communication services, power supply and infrastructure facilities.

Role of Industrial Association (NASSCOM)

NASSCOM, association for Indian software industry was established in the year 1988. Software and services companies were formed by NASSCOM and Dewang Mehta was president during the year 1991. Association played significant role in directing government to make policies, gain access to capital markets, make rules for transaction of foreign revenue, increasing telecommunication facilities for the software development and services industry. The NASSCOM established SIG to resolve Y2K bug problem or millennium problem in the year 1996. The National Institute for Smart Governance was established at Hyderabad in the year 2002 through a joint programme of NASSCOM and Government of Andhra Pradesh. The beginning of NASSCOM with 38 software firms registered as members in 1988 increased up to 1000 members in the year 2005 (Rajaraman, 2010). At the end of year 2016, more than 2200 IT/ITeS firms were registered to NASSCOM.

NASSCOM made significant contribution to create India's brand in domestic and international software development and services market. With the creation of major IT-Expo events and participating in international trade fair India became key player in global software market. Every year NASSCOM publishes an annual report which gives detailed information about member firms. Annual report contains all the information such as sales (import and export), employment generation, certification and information about registered company. The NASSCOM has become a reliable source of information related to software firms in India (Bhatnagar, 2006).

CONCLUSION

The Indian government is promoting 'Digital India' and 'Make In India' programmes as an umbrella programmes to prepare India for knowledge based transformation into a digitally empowered society along with knowledge

based economy. The Government has been encouraging the growth of the sector by funding projects under various programs of Deity, DST, MHRD. The other stakeholders such as universities, technical research institutes and private - public firms such as TCS, INFOSYS, C-DAC, BISAG are also key important players in this area. The government had made policies to encourage the domestic software export and development of local firms during 1972 to till now. There are number of policy changes regarding software export duties and tax. The Department of Electronics and Information Technology has taken many initiatives for promotion and adoption of Free & Open Source Software for increasing foreign exchanges, developing indigenous products and achieving vendor's independence. Other side, India largely has Microsoft dependent environment and other foreign vendor's software products in terms of operating system and its usage in personal computers, tablets, smart phones. The software users are still dependent on Microsoft and other foreign vendor's software products for our personal computer's basic software such as operating system, office tools and also on other IT-business related software. Therefore, it is necessary to develop indigenous software products and services and create an encouraging environment for the growth of BOSS and other Indian products. There are also other necessary step must be taken for small domestic software market, slow and limited communication service, slow and expensive internet service, insufficient electricity, slow government operation and transportation services are also hurdles for IT- Software firms in India. The developing country like India is still working on creation of indigenous software products for desktop, laptops, smart phones and tablets. In future latest technologies will be provided by India to national and International software market.

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