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Innovation and Spatial Dynamics

Bangalore and Karachi IT Industry in the Light of Innovation Systems and Historical Prospect

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Abstract

A current growth in the field of information technology is certainly innovative in nature. In size and ease of access, knowledge and information are growing. Prospect decision makers in many fields will be accessible with extraordinary new tools for growth. In fields like health, agriculture, human resources, education and business improvement, transport or environmental improvement the consequences actually could be innovatory. Communication and IT have huge potential particularly for growing nations and in furthering sustainable growth. India and Pakistan two growing nations of Asia pacific now a day doing great performance in the field of IT and have different advantages on each other in this field. Indian city Bangalore is known as Silicon Valley of India due to its great contributions in IT field of the country. Karachi city of Pakistan also well recognized in this field. IT industry of both cities working under different IT policies like Karnataka state of India in which Bangalore city is located has its own IT policy under through this industry is going on and Karachi city of Pakistan which is situated in Sindh province of Pakistan has no IT policy and IT industry of Karachi city is working under National IT policy of Pakistan. Study based on how Karachi and Bangalore contribute in the economic development of their respective countries through IT industry, what kind of institutional arrangements both cities have in respect of innovation system and to know whether there is National Innovation System, Regional Innovation System or they are Industrial Clusters.

Keywords: Innovation, India, Pakistan, Bangalore, Karachi, IT Industry, Developing Countries, Industrial Cluster, National Innovation System, Regional Innovation System

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LIST OF ABBREVIATIONS

BCC	Bangalore City Corporation
BDA	Bangalore Development Authority
BMRDA	Bangalore Metropolitan Region Development Authority
CMM	Capability Maturity Model
CMMI	Capability Maturity Model Integration
EIS	Electronic Information System
FAST	Foundation for Advancement of Science and Technology
FIA	Federal Investigation Agency
FDI	Foreign Direct Investment
GST	General Sale Tax
IT	Information Technology
ICT	Information and Communication Technology
ISPs	Internet Service Providers
ITP	Image Transfer Protocol
NUST	National University of Science and Technology
NWFP	North West Frontier Province
PTA	Pakistan Telecommunication Authority
PSEB	Pakistan Software Export Board
PASHA	Pakistan Software House Association
SEI	Safety Equipment Institute
SPSS	Statistical Package for the Social Science
STP	Software Technology Park
STPI	Software Technology Parks India
SBP	State Bank of Pakistan
UUCP	Unixto-Unix CoPy
WEF	World Economic Forum
WIPO	World Intellectual Property Organization
WLL	Wireless Local Loop

CHAPTER 1 INTRODUCTION



Figure: 1 Indian and Pakistani Flags

India and Pakistan both got independence in August 1947 with the difference of one day, India got independence on 15 August 1947 and Pakistan got independence on 14 August 1947. After their independence both countries face different ups and down in their economies and done different reforms in different fields and different cities too to enhance their performance. Bangalore is the capital and largest city of Indian state Karnataka and it is the fifth largest city of India and the 27th most populous city of world. It is the fastest growing city in Asia. Population of Bangalore is about 6,200,000 with density of 8,367 /km² and it is 2007 estimated figures. Total area of Bangalore city is about 741 km² and climate is salubrious and warm. Literary rate is about 84 percent.

Bengaluru International Airport which is operational from 24th May 2008 is the fourth busiest airport in India and on the other hand city is also well connected to other parts of India by well constructed roads. 100 billion US\$ economy of Bangalore makes it a most important economic center in India with economic growth rate of 10.3 percent and Bangalore is the fourth biggest rapid moving consumer goods market of India. Bangalore city is the third biggest hub for high net significance individuals and a home to 10,000 US\$ millionaires and roundabout 60,000 excellent rich working class who have an investable superfluous of 1 million US\$ and 100300 in that order. In year 2001 Bangalore city share 300 million US\$ which was the fourth uppermost Foreign Direct Investment for an Indian city.



Figure: 2 Public Utilities Building which is located on MG Road, a key commercial hub in Bangalore.

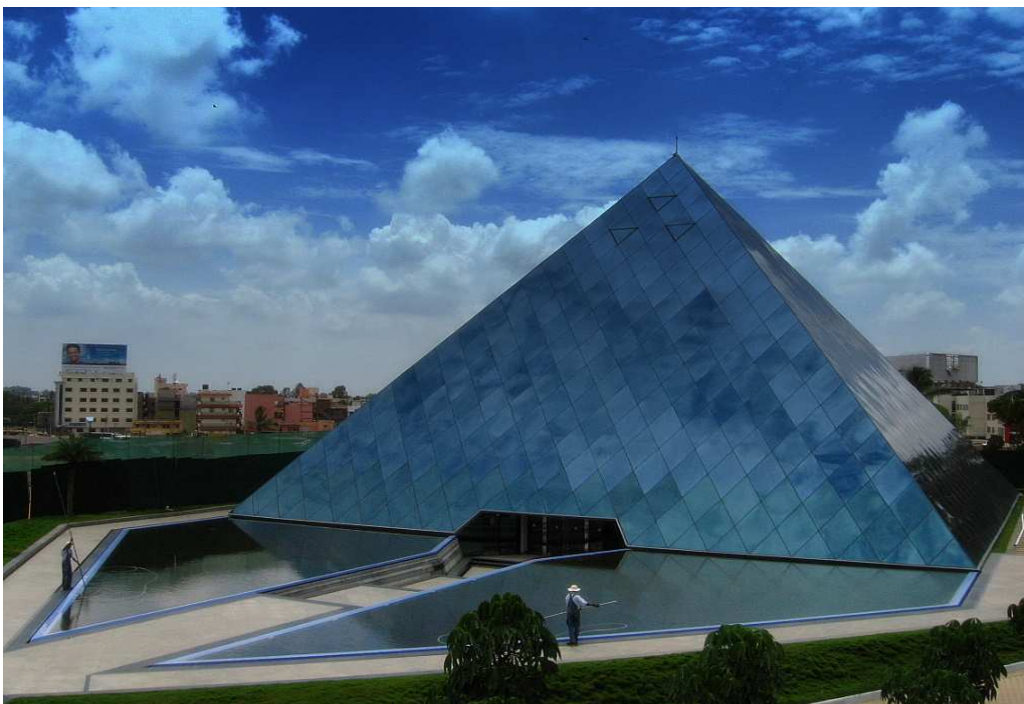


Figure: 3 India's second largest IT Company Infosys headquarters is located in Bangalore.

Due to large number of Information Technology Companies in Bangalore the city is also known as Indian Silicon Valley and contribute 33 percent of Indian IT export which is about 29 billion US\$ (2006/07). Basically Information Technology Industry of Bangalore has been separated into three key clusters which are Software Technology Park of Indian, International Technology Park Bangalore previously which was the International Technology Park Limited and in the end Electronics City. United Breweries Group headquarter is also situated there in Bangalore which is a high end commercial zone. Indian second and third largest software companies Infosys and Wipro respectively also have headquarters there in Bangalore and many more global SEI CMM level 5 companies are also there. Bangalore is also known as a hub to Indian biotech related industry and in year 2005 roundabout 47 percent of the 265 biotech companies of India situated in Bangalore including India's biggest biotechnology company Biocon.

When Pakistan got independence in 14th August 1947 then Karachi was the first capital of Pakistan and at that time its population was only 450,000 but after getting independence a great sequence of refugee's arrival was started and in 1951 its population reaches more than one million and during that period its growth rate was about 80 percent. Today Karachi city has grown 60 times as compared to its size in 1947 when it became the first capital of Pakistan. Since 1960 Islamabad remains the national capital of Pakistan. Now Karachi is the capital city of Sindh Province and has population about 18,000,000 and density 4,115 persons/km² (2007) and it is the first biggest city of Pakistan and 15th largest populous city of world.

Table: 1 Population of Karachi City, 1856-2007

Year	Population	Year	Population	Year	Population
1856	56,875	1931	300,799	2006	13,969,284
1872	56,753	1941	435,887	2007	14,500,000
1881	73,560	1951	1,068,459		
1891	105,199	1961	1,912,598		
1901	136,297	1972	3,426,310		
1911	186,771	1981	5,208,132		
1921	244,162	1998	9,269,265		

Figure: 4 Karachi City Population (in millions)

Information and communication technology, call centers and electronic media becomes an important element of Karachi business hierarchy. Basically call centers for foreign companies embattled as important area of development and government decrease taxes about 80 percent in order to expand foreign investment in IT sector. Karachi stock exchange is the biggest stock exchange of the country with numerous Pakistanis and overseas listed and in 2002 it was declared the best performing stock exchange of the world. Karachi is known as software outsourcing hub of Pakistan and key industries are textile, pharmaceuticals, steel and automobiles. It also has a fast thriving free zone with an annual development rate of just about 6.5 percent and an expo center is also setup in Karachi which host many regional and global exhibitions. Karachi is also famous because of automobile manufacturing company's plants there like Toyota, Suzuki, Millaat Tractors, Adam Motor Company, Daihatsu, Hino Pak buses and Truck manufacturing plants.

Pakistan's biggest and busiest airport Jinnah International Airport which is also known as Quaid-e-Azam International Airport is situated in Karachi and it handle about 10 million passengers in a year. On the other hand Karachi city has two ports which are Port of Karachi and Port Qasim respectively. City is also very well connected to the other parts of the country by roads and railway track networks. Karachi is also known as the biggest fisheries center of Pakistan. Climate in Karachi is moderate because it is situated on semi arid zone and has marine affects. May and June are hottest months of year. Karachi city has the highest literacy rate in Pakistan and has number of highest universities and educational institutions are there. Literacy rate was estimated 65.26 percent in year 2004 to 2005.



Figure: 5 Electronic Mall and Finance and Trade Center in Karachi

1.1 Aim of Study and Research Question

The main purpose of this study is to analyze the Systems of Innovation in Bangalore, India and Karachi, Pakistan. Study will be focused on two major cities of India and Pakistan which are Bangalore and Karachi respectively. These cities are very important for both countries and are included in their main and major cities. Both have a strong historical background and famous due to their performances and contributions to the economies. Literacy rate in both cities are reasonable and standard of living is also good as compared to other regions. IT industry in both cities has remarkable contribution in the economy of their respective countries.

Following questions will be presented in this study;

1. How Karachi and Bangalore contribute in the economic development of their respective countries through IT industry?

2. What kind of institutional arrangements both cities have in respect of innovation system?
3. What is the importance of National Innovation System, Regional Innovation System or Industrial Clusters?

This master thesis aims to answer these questions from side to side research and analysis. In first question their performance will be analyzed, in second question which is based on description of innovation system will be analyzed and last question which is based on difference of innovation system in them will be analyzed.

1.2 Delimitations

As I mentioned above under aims and research question, in this master thesis study will mainly be focused on these three questions written above to analyze the role of innovation in the economic development of developing countries. Karachi and Bangalore these two cities will be studied in respect of their IT industries rather than Automobiles Industry and Biotech industries there. To make this master thesis more easy and clear study has been divided into different parts under different respective heads and sub-heads. Study is divided into six different chapters in first chapter there will be short introduction to the research question along with aims and research question, delimitations, methodology and summary of previous research. In second chapter of this thesis theoretical approach will be introduced. In third chapter there will be a historical background regarding these three questions written above till 2000 and from 2001 to 2009 and a short view of these cities. Fourth chapter will be based on facts and figures gathered from different reports and research articles. Fifth chapter will be based on analysis of theoretical foundation used in this thesis and last chapter of this thesis will be based on conclusions.

IT is the study of plan, growth, execution, management or support of computer based information system, chiefly computer hardware and software application. In short

Information Technology deals with the use of computer software and electronic computers to convert, protect, store, retrieve information, transmit and process securely (FBS, Government of Pakistan, 2007).

1.3 Methodology

The methods and techniques of research along with statistical tests and operational definitions of the concept being used are briefly described in this chapter. Methodology is “the logic of scientific procedure”. In this chapter tools and techniques used to collect data for the present research are discussed. It also deals with operationalization of major concepts of the present study. In research methodological techniques and method of statistical analysis, observations are important. Advancement of sociological knowledge during this era has been possible largely due to increase use of methodological tools and techniques. Scientific methodology is a method of clear rules and procedures upon which study is based and besides which the claims for information are evaluated. (Hussain, 2006)

Usually methodology can be about the methodical research when scientist or researcher wants to do a number of research works, for instance exploring or using methods, theories or notions and fundamental ideology in unusual fields with particular regulation. On the other hand one can say that methodology could be used to discover right answers when some one is analyzing diverse issues. For example when few peoples say their answer is right then methodologists would desire to be acquainted with the cause behind it on which base why their motive is right and how. On the other hand one can see that epistemologist desire to be acquainted with actually what the knowledge is. Methodologists are on the other hand further anxious about the process of receiving knowledge and how other people obtained it. There should be many reasons for what we find a section of methodology in many academic papers but the one reason is that so scholars can use a comprehensible way to do follow a line of investigation works later (Xie Hao, 2008: 3).

It is like that if people would like to investigate some particular fact of issue then some time they have to obtain sufficient associated information or some particular information for it. So in that situation researcher or scientist choose qualitative methodology to execute the study work. If we see historically then actually qualitative study was one of the earliest forms of societal studies. Period of 1950 to 1960 popularity wise was the peak period of qualitative science and after that period it was weakened in importance and once more begins to appreciation in 1970. The word qualitative study was in anticipation of limited as a regulation of sociology, anthropology, ethnography, fieldwork and participant observation. In the period of 1970 and 1980 qualitative study start to be used in other regulations and turn out to be an important kind of study in the ground of education learning's, societal work learning's, disability studies, female studies, information learning's, nursing service learning's, administration studies, human service studies, communication studies, psychology and others. On the other hand few qualitative studies also came to mind in consumer products industry during this time and during the previous thirty years by academic journal publishers the receiving of qualitative study has been raising (Wikipedia/Qualitative Research).

Basically there are four kinds of data collections under qualitative research methodology which are participation in the setting in which the researcher become a part of that particular group or area to whom they want to study for a certain period of time, after that there is direct observation method of data collection in which researcher directly observe the desired information, after that there is in depth interviews data collection method in which researcher collect desired information through interviews from the sample which he has chosen and in the end there is analysis of documents and materials data collection method which I have selected for my this master thesis data collection, in this method data will be collected from different previously done research works, reports, articles, journals and survey reports (Hakim, 2000).

Basically the observer thought is the mainly general kind of qualitative data analysis. Data examined by the layman or expert and form an impression and after that report their thought in an ordered mostly in quantitative outline. When all these works are done then these thoughts might be the final ending of the study or in further for more analyzing of

data few quantitative methods can also be used. Programs like SPSS, NVIVO and Activity Lens are not going to be used in this master thesis (Wikipedia/Qualitative Research).

Trustworthiness or reliability is one of central issue in qualitative study. Through many ways validity can be established like interviewer corroboration or member check, saturation or peer debriefing, negative case analysis or prolonged engagement, balance or audit ability, conformability and bracketing. On viewpoint of positivism however validation is naturally based. Validation is vital as the study itself for positivist perspective (Hakim, 2000).

Data for this study will be collected from Ministry of Information Technology websites of India and Pakistan, Federal Bureau of Statistic Pakistan, Pakistan Software Export Board Website, Pakistan and Gulf Economists website, Embassy of India website, IT Examiner Indian Website, Government of India Ministry of Statistic. Previous research done by student of different universities in both countries. From different books and articles. News papers, academic journals and from different websites.

1.4 Introductory Factors about Karachi & Bangalore

Karachi

Pakistan is focusing on IT education in the country to enhance the performance of IT sector role in the economic development. Pakistan developed high level awareness of quality Information Technology education that places of interest a great deal with educational instructions in private and public both institutions to produce skilled information workers and professionals to meet the current needs of Information and Communication Technology. Some universities like NUST- National University of Science and Technology, CIIT- COMSATS Institute of Information Technology and FAST- Foundation for Advancement of Science and Technology are playing major role in producing skilled IT workers along with great number of public and private institutions. Along with all above government considered to build a Virtual University for the distance learning and education portal putting together all the associated information regarding all education institutions in country. Pakistan Software Export Board (PSEB) an organization which was build by the government of Pakistan for ensuring growth and execution of national framework policy for software's and associated services industry and promoting software export and along with this match making between local and overseas software companies. Special center of attention was on mounting and executing Software Technology Parks (STP). For Karachi, Islamabad and Lahore the Software Technology Parks imagine as one stop shop for the all software companies which search for working circumstances favorable to generate unlimited bandwidth and supremacy supply. High IQ structure, least dictatorial overheads, greatest elasticity in alternative and use of liberty and minimum costs. Those development companies which will construct and manage these Software and Technology Parks will guarantee all such services are accessible with barest least pester to software houses themselves. Many well-known Information Technology and software enlargement companies are currently housed in Software Technology Parks (STP) and causative a huge deal in the government dream for exporting Information Technology goods and services. There are many national objectives to be pleased like political steadiness, substantial infrastructure, basic health care and basic literacy, employment to be making available, business openings to be

produced and to enhance exports. Obviously Information and Communication Technology is not an answer to such growth problems faced. Anyway Information and Communication Technology can play an important role in achieving such growth and economic goals and be able to contain a main force sharpen up national growth policy to be additionally rational and attainable. That's why true settlements do not stretch out in stipulation of technology somewhat in its appliance to build commanding social and financial networks by fundamentally civilizing communication and the trade of information (Mujahid, 2002).

From the previous 30 years ICT industries flourished in Pakistan. Telecommunication equipments and legacy data dealing out system improvement was the early focus points. Industry has now encouraged on providing to anxiety of set of connections economies. Attention has been also given to chances consequential from the development trends of outsourcing hardware developed and safeguarding, software growth and offshore services like call centers, dealings, back office shore up and associated services. Local industry of ICT faces different dares and threats in worldwide market and the biggest threat was faced in 2001 and 2002. Pakistan Software Export Board (PSEB) was the selected administrator organization of the government for developing and utilizing Information Technology business prospective of Pakistan. It also aimed to help and promote local IT companies in worldwide markets by assisting growth in local market place to give confidence growth in this area. About 550 companies are currently members of PSEB and they are giving their services in miscellaneous area like technological support services, solutions for e-commerce, development and design of web, establishment of communication and networks, development of m-commerce related applications, multimedia and graphic designing, manufacturing of hardware and for other specialized areas playing a role of host to them. Currently information technology industry is exporting roundabout US\$35 million significance of products and services per year and also has prospective to create thousands of offshore information technology employment opportunities inside subsequently five to ten years. Basically Pakistan has long times gone by of mechanized and development of IT equipments. Hardware assembly and manufacturing area acknowledged US\$52 million in capital venture and at present has an annual earnings of US\$100 million per year and it also give jobs to 3600 personnel

which include 300 professionals and has more than 30 fully efficient developed facilities diagonally the country. Along with other services in which Pakistan enjoy large scale growth potential IT services are also included in them. Government as key enabler and catalyst to IT industry growth has fully dedicated itself for lessening of software piracy and protection of intellectual property rights mainly in the area of software applications and government is also a key supporter for the use of unlock foundation technologies and software's (Masood, 2003 / 2004).

For all managing and business problems IT is considered as a magic potion. Basically developed nations are enjoying benefits of IT industries and developing countries are on their way to digitization so far and there are technology gaps between developed and less developed nations in respect of IT use. Developed nations are using leading edge technologies and on the other hand less developed nations are deficient in state of the art knowledge and as a result they are lagging behind. In developing nations like Pakistan achievements and installation, use and maintenance of IT beside with preparation of user is an obstruction to e-business. On the other hand because of deprived and low standard Information Technology educational institutions, less developed nations are facing challenges of shortage of skilled IT professionals in sort to fulfill their national necessities of e-business. In year 2000 IT policy and achievement plan was announced. New IT literacy centers were opened and skilled IT professionals were appointed to impact IT training and teaching in universities. All over the country IT seminars, contests and exhibitions were prearranged and for creating awareness about IT and internet use Cyber Cafés were opened. E-business in Pakistan is still in its formative years but it is developing in which banking and telecom sectors are playing important roles. So far speed is slow due to many inauspicious conditions like political, managerial and technological. In Pakistan, IT business is developing with the annual rate of 50 percent per year where growth rate of PCs is 30 percent per annum. Pakistan imported 350,000 new systems in 2002 to 2003 out of which 65 percent were non-branded and sale of laptop also grew 35 percent from 15 percent. Computer hardware and associated devices imported by Pakistan was around \$20 million. Estimated number of computers in the country is about 1.5 to 1.6 million and presently software exports arrived at \$2.2 billion and predictable to cross \$10 billion in 2010. According to Pakistan Telecommunication

Authority (PTA) in the year 1991 about 90 percent of telephone lines were converted into digital lines and in year 1995 Internet Service Providers (ISPs) start giving internet services. Currently now out of 250 ISPs more than 85 are working along with 7.5 million users. Furthermore, government of Pakistan has decreased bandwidth duty from \$87000 to \$1400 per mbps to support the expansion of IT traditions by given that relief to the end consumers. Use of technology and attainment is still a problem in growing nations particularly in Pakistan. Required numbers of qualified IT professionals are not available in Pakistan, while Pakistan has attractive quantity of skilled IT professionals. So far uncompetitive market income leads them to move toward Silicon Valley for skilled development. Pakistan is currently producing about 2500 to 3000 IT graduates yearly and contrast to development of e-business this figure seems to be small (Kundi et al, 2009).

Estimated total population of Pakistan is about 165.8 million and country has been divided into four provinces which are North West Frontier Province (NWFP), Sind, Punjab and Balochistan and after that Pakistan has been further divided into Divisions and Districts and each district has a major quantity of rural population along with urban population. NWFP has 7 divisions, 24 districts and 79 percent rural population. Punjab has 8 divisions, 34 districts and 72 percent of his population is living in rural areas. Sind has 5 divisions, 21 districts and 57 percent of his population is living in rural areas and Karachi is also included in this province. Balochistan has 6 divisions, 22 districts and 84 percent of his population is living in rural areas. Without education ICT cannot be promoted. For generating and sustainable economic development education and training play a vital role. Flexible workforce and accessibility of well education, facilitate economic diversification and the desirability of earnings and job producing chances to rural areas as well as urban areas. Growths of new knowledge need flexible labour force along with high intensity of broad literacy and possessing high-quality basic talents in handling information technology. Unemployment rate in urban areas of Pakistan about 9.9 percent in 2000 which decreased in 2004 to 9.8 percent. In Pakistan about 2.28 million peoples are jobless in rural areas and about 1.44 million in urban areas. Rural population has been mostly disregarded regarding efforts for improving education and education services giving by the government of Pakistan are of poor quality with no consideration to peoples necessitate or progression (Sattar,2007).

Bangalore

Due to ICT cluster in Bangalore city, India has concerned much study and media consideration. Mostly it has been referred as Silicon Valley of India. Presently there are so many IT companies in Bangalore about more than 1500 along with a lot of more in further sectors for instance electronics. Additionally many of the big IT companies in India for example Infosys and Wipro has headquarters' in Bangalore. Even some other big companies like Texas Instruments, Motorola and Hewlett Packard also have their foundations in Bangalore city and many more are moving there. Basically these IT companies are giving services like customer software application development, maintenance, guidance and capability management. IT zone of the Bangalore city brought it into limelight and it has a reasonably miscellaneous selection of activities with companies manufacturing machine tools, electronic products, telecom equipments and to a number of level auto components situated there. In the current years, Bangalore city has appeared as a leader bio tech cluster in the country (Basant R., 2006).

Frequent attempts have been done in excess of the precedent few years to calculate the proportional levels of ICT growth of countries. Global Information report 2003 to 2004 positions India at 45th place and the report also stated that big pool of capable manpower in India and the fresh schemes by fundamental and state government in receiving the states or province e-ready as the key factors supporting India's competitiveness. Nowadays even along with a labour force increasing at 2.4 percent a year, speeding up has been pragmatic in rate of development in India and it comes chiefly from enhanced labour output demonstrating the fundamental role efficiency plays in the economy. In the context of growing nations, ICT is visioning as an instrument to enhance human ability, modernizing stipulation of services, incorporate marginalized sections of the social order and decrease rent in search of activities because of enlarged simplicity and process competence. Notion of IT cluster in Bangalore was one with the intention of nations all greater than wanted to imitate in their possess backyards. ICT application in social division might enhance governance and carry in improved fiscal regulation in the stipulation of civic services (INDIA: E-Readiness Assessment Report 2004).

CHAPTER 2 THEORETICAL APPROACH

2.1 National Innovation System (NIS)

NIS means flows of information and technology between enterprises, people and institutions are input to innovative development. Technology and innovation growth are the consequences of a composite set of associations between actors in system that integrated government study institutions, universities and enterprises. An indulgent of NIS for strategy makers are able to facilitate identifies influence points in favor of expanding innovative over all competitiveness and performance. Inside the system it is able to help to indicate mismatches' between institutes and in association to government policies that might prevent technology improvement and growth (OECD, 1997).

National Innovation System Assessment and Measurement

It consisted on four kinds of information and knowledge flow which are,

- Dealings between organizations mainly through mutual research actions and additional technological partnership.
- Dealings between the public research institutes, universities and organizations as well as mutual co patenting, research, co publications and additional unofficial associations.
- Spread of technology and knowledge between organizations as well as business implementation rates in favor of new knowledge's and spread in the course of machinery tools.
- Human resources mobility centered on flow of technical workforce inside and among private and public sectors.

Efforts to relate such flows with company's performance demonstrate good scales of technological partnership, diffusion of technology and human resources mobility helps to enhance innovative capability of organizations in respect of output, patents and products.

National Innovation System Analyzing Approaches

- Organizational level innovation survey through questioning companies regarding their sources of information mainly related to innovation and permits a leveling of diverse associations via industrial region and nation.
- Second approach is regarding cluster analysis which focuses on dealings among particular kinds of sectors and companies that might be clustered in respect to their respective associations and knowledge distinctiveness.
- Noticeably from cluster to cluster and inside nations focused about diverse industrial groups the prototype of information flows might be different.

At diverse scales innovation system can moreover be explored for example on national, international, pan-regional and sub-regional levels.

Different Definitions of National Innovation System

- According to Metcalfe (1995) group of different institutions that independently and mutually participated to grow and spread of new techniques and which gives outline through which governments execute and shape strategies to encourage innovation process. In respect of this, it is a scheme of interrelated institutions to generate, store and shift skills, information and artifact which describe new technology.
- According to Patel and Pavitt (1994) state institutions inducement formation and competencies' which decide directions and rate of hi-tech knowledge in a state.

- According to Nelson (1993) a group of institutions to whom dealings decide innovative performance of state companies.
- According to Lundvall (1992) associations and elements that network in creation, distribution and utilize of new and cost-effectively valuable information and are moreover situated inside or embedded within borders of a country.
- According to Freeman (1987) in private and civic regions system of institutions whose dealings and actions begin import, transform and distribute new knowledge.

According to my observation after reading these definitions and material National Innovation System mean mutual cooperation of different firms and institutions in a country which work together and share new ideas and knowledge and become the reason of flow of information from one firm or institution to another firm or institution and they are not limited to any particular region they belong to whole country.

2.2 Regional Innovation System (RIS)

Increase in recognition of RIS notion has been in element determined by means of improved concentration of international rivalry in globalizing market the noticeable inadequacy of customary regional growth strategies and forms and appearance of flourishing groups of industries and firms in numerous regions all over the world. Firm explicit learning methods and competencies might direct to regional aggressive advantages if they are founded in local capabilities like skills, particular resources, share of ordinary cultural and social principles and institutions. On the other hand we can say that regional growth arises because competitiveness arises in areas where local capabilities like skills, built formation, institutional bequests and knowledge exists. Efforts to clarify institutional and social circumstances of regional competitiveness also have

resulted in rising of such thoughts as innovative milieu, learning region, local productive system and industrial district (DOLOREUX D. et al 2005).

- Fundamental saying is that these groups of actors create universal and enveloping effects which promote companies inside region to extend particular kinds of capital which is derivative from norms, public relations, dealings and values inside the society order to strengthen regional innovative competitiveness and capability (Gertler, 2003).
- RIS thought has no particular straight explanation but frequently understand as group of public and private interests, proper institutions and additional institutions which perform according to institutional and organizational dealings and preparations favorable to invention, utilize and diffusion of knowledge (Doloreux, 2003).

Root of RIS idea fabrication in two key bodies of research and theory which are,

System of Innovation

- In regard of societal characteristic of innovation it refers to cooperative knowledge procedure among numerous subdivisions of firm along with exterior partnerships to additional companies, training, finances and knowledge providers (Cooke et al 2000).
- Innovation is encouraged and motivated by numerous factors and actors outside and inside to the company (Dosi 1988).
- System of innovation constructed on development hypothesizes of technological and economic alteration and the innovation system study material explain innovation as social and evolutionary procedure (Edquist, 2004).

Regional Science

Regional science basically center on clarifying social institutions settings where innovations appear.

- Study material available on regional science explain proximity which is benefits receiving from spatial attentiveness and localization benefits and regional widespread group of norms, conventions and rules from side to side which procedure of information generation and diffusion happens (Kirat and Lung, 1999).
- As of milieu thought innovation is confined to a small area and locally rooted and not placeless procedure (Storper, 1997).

In a way we can say that RIS is characterized by co-operation in innovation activity among companies and information generating and spreading firms like training institutions, universities, technology transfer agencies, research and development institutes and a culture that support innovation and facilitate systems and firms to develop with the passage of time and all such things belong to a specific area which make a system and work together like a force and create new knowledge and ideas and form the shape of regional innovation system.

In today progressive economies regional cluster of associated industries are the foundation of income, jobs and export growth. A trading cluster is an area concentration of balancing, challenging and mutually dependent companies that generate the prosperity of areas through exports and these clusters shape value chains that are the primary units of struggle in contemporary and globalized world economy. Clusters shape greater than time and stalk from areas economic basics and its presented firms and confined demand for services and products. From the structure of the confined community, they come into view to turn out to be the economic champions of the region. Regional strategy is mainly

effective when it constructs on its potency, as of its industry clusters contained by the countrywide context (Hargroves , et al 2005).

Regional innovation structure can be deliberation of as institutional communications underneath innovation contained by production formation of an area. Notion of region places of interest a key level of supremacy of economic process among individual cluster or company or national level. At meso-level regions are essential basis of economic harmonization and the region is gradually more the altitude at which innovation is shaped throughout regional systems of innovators, fractious fertilizing possessions of research institutions and local clusters. In both private legislature organizations regional supremacy is articulated in changeable degrees, like local agencies with powers delegated from nationwide level to endorse enterprise and innovation sustain (Fagerberg J. et al 2004).

For a long time cities has been notion as innovative centers. Almost certainly Giovanni Botero from 1544 to 1617 was the first who articulated this obviously. For the rulers and nations he illustrated the consequence of enormous cities. He argued that neither contentment of existing in an immense city nor requirement of security given to its peoples give explanation of its brilliance. What substance the majority are the city's multiplicity of buy and sell, industry and crafts, communication with neighboring cultivation districts', existence of a society that acknowledges and comprise immigrants, encompass a successful and well-organized justice system, good education system and a substantial place with right of entry to good quality ports that facilitate trading with other cities and possible nations. Merely cities are able to present essential surroundings for growing power and income (Botero G.1979).

Feasible and applicable distinctiveness of a local modernization method incorporated by having institutionally and sectorally different knowledge producing organizations and industries that might illustrate inventive ideas from numerous possible resource. High intensity of company's specialism to provide most excellent in worldwide and national markets. Foundation on familiarity of technical circumstances and worldwide markets promotion and profit-making proficiency. New traditions of doing stuffs and new

thoughts with wider societal civilization and well liberal of multiplicity. Companies capable to develop information and sustain information appliance by supplementary. High intensity of technological complexity between both consumers and creators of knowledge. Money matters of extent. From complicated worldwide information spillovers as well as locally characterized global firms provide narrow innovation system with in sequence on most important edging services, products and knowledge (Simmie, 2001).

Companies which grow strapping domestic comprehension basis mainly in expressions of superiority of their labor strength encompass superior absorptive competencies and supplementary inducements to explore for external information as they be acquainted with which they strength of character be talented to formulate beneficial utilize of it. Such companies are as well expected to be required out by means of comparable companies whose cognitive remoteness is not consequently huge because to reduce communication. These might be situated countrywide or in supplementary nationwide economies and locally. In consequence companies with strapping domestic information foundations are expected to substitute information further intensively as compared to those who have weaker foundations. Such companies are almost certainly enhanced in discovering innovative most important edging information and cooperatively by means of it to enlarge on hand or make innovative path ways of trade and industry growth (MARTIN & SIMMIE, 2008).

City narrow establishments are able to spend in resourcefulness of their respective population when building city additional striking in knowledge financial system. But inventive cities cannot subsist created as of scuff. Ancestry of modernization constantly lies in presented traditionally urbanized urban atmosphere. Local governments occasionally are inclined to disregard this in their keenness. Motivated through accomplishment narratives like Silicon Valley they anticipate to create their municipality a techno polis of comparable height. Expression like Silicon Glen in Glasgow, Silicon Prairie in Dallas, Silicon Forest in Portland and Silicon Kashba in Istanbul verbalize level in this view. On the city explicit distinctiveness local authority would perform superior to

foundation its policies and by means of them at the same time as beneath pinning in support of urban creativeness (HOSPERS, 2008).

2.3 Industrial Clusters

An industrial cluster is geological attentiveness of interrelated linked institutions, providers and industries in a fastidious field. Clusters are well thought-out to enhance the production through which firms are able to contend internationally and countrywide. In respect of inner-city research expression agglomeration is use. Word business cluster also recognized as competitive cluster and industrial cluster and it can be described as, (a) geographical cluster, (b) vertical cluster which is supply sequence cluster, (c) horizontal cluster which is interrelation among industries at the level of distribution resources like skills and knowledge and (d) sectoral cluster which is group of industries working jointly inside in similar business region (Wikipedia/Business Clusters).

Clusters are set of interconnected diligence which drives prosperity generation in an area chiefly through export of services and goods. As an explanatory instrument use of clusters intended for local economic dealings gives a more affluent and more significant illustration of local industry, local dynamics and drivers than perform conventional systems. From the typical description of industry sector the cluster is dissimilar for the reason that it characterizes whole value sequence of largely characterize industry from providers to ending products as well as sustaining particular infrastructure and services. Physically cluster diligences interrelated and concerted through stream of services and goods superior than stream association to rest of country. Clusters comprise low and high worth supplementary employment (San Diego Association of Governments, 2007).

Geological agglomeration of companies inside diligences is a noticeable piece of information in lots of nations and has been acknowledged numerous years before. In regard of economic available study material industrial clusters are set of companies on similar place composing an invention structure with spillovers which might be horizontal or vertical (Madsen et al, 2003).

Social science study has started highlighting key role of learning and knowledge in growth clusters. System of trust between different economic actors is the key relations that merge to form a society's social capital. Regions that constantly slot in stakeholders inside an action and learning frame work be inclined to succeed in cluster growth. Chief economic actors are big institutions of research, businesses and governments. Knowledge economies first and foremost employ highly dedicated and educated professionals. Consumer expenditure multipliers and busy trader firms produce significant spin off jobs. In term of labour market clusters are gated societies which maintain the haves in and the have-nots out in term of education (Larisa V. Shavinna, 2004).

For public guiding principle and corporate policy, methods in which clusters appear and develop are important. Considerate of how and why clusters enlarge and come out provides approaching into innovation capability, agglomeration occurrence, and advantages of location may influence investment of local government. Study has traced origins of clusters to chronological trajectories and to rationally unsystematic and approximate exogenous events. On the other hand clusters may be begin by accident throughout the existence of focal companies that create spin offs or often origin of clusters because of one or a small grouping of firms. Spin offs usually be likely to position near the parent company probably to keep away from load of relocating families and shifting away from community contacts and such spin offs capable to settlement from preceding public and business contacts. Clusters study frequently paying attention on transfer of routines, parental practices, skills and blueprints to the new companies (Tavares and Teixeira, 2006).

Both countries are known as developing countries and as compared to Karachi city of Pakistan Indian city Bangalore has some advantages in respect of internationally well known cities and in Information and Communication Technology industry. But both city clusters of these two countries have great importance and have remarkable contribution to their respective economies. On the bases of the above written theories for the convenience of readers to understand topic more deeply, I will bring in some more historical information or stuff about this topic. Then I will analyze how Karachi and

Bangalore contribute in the economic development of their respective countries through IT industry, then what kind of institutional arrangements both cities have in respect of innovation system and then try to know whether there is National Innovation System, Regional Innovation System or they are Industrial Clusters. After historical background I will use different facts and figures from previously done research's, reports and surveys and then put them together in the shape of tables to support my above written questions and to use them in analyses chapter also.

CHAPTER 3 IT AND ECONOMIC PROSPERCT

In this chapter of study facts and figures collected from different previous done researches will be presented regarding Karachi and Bangalore. Actually I did not find any single research paper, report or article in comparison of these two cities according to my topic so I collect this data from different well known websites of both countries and some articles also.

3.1 IT & Economic Development in Bangalore, India

Every fortnight Bangalore be a focus for three overseas equity firms and the number of firms which register with Software Technology Parks India (STPI) are as follows,

From 2001 to 2002: 110

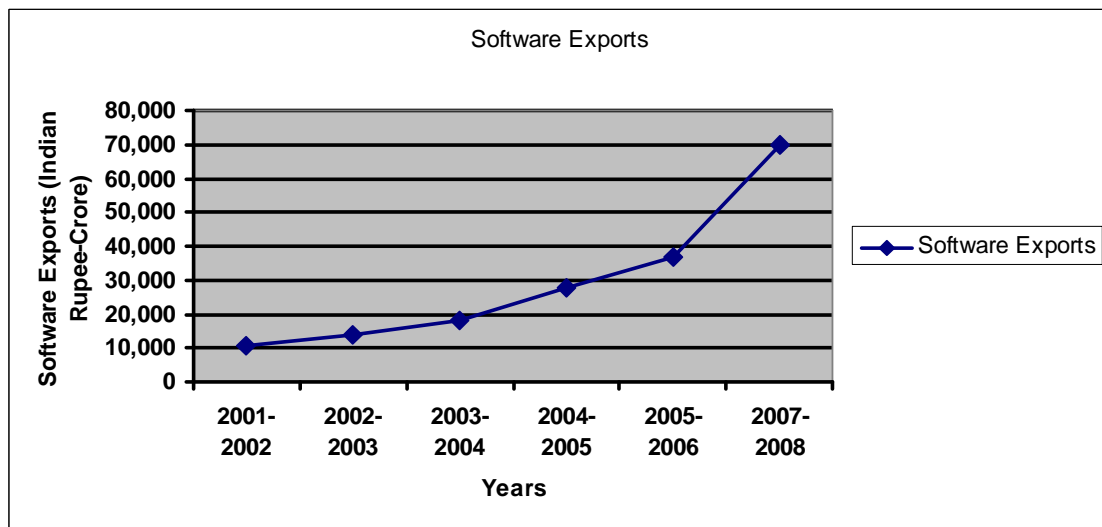
From 2002 to 2003: 116

About 94 to 96 percent software exports from Bangalore city are routed through SPTI centers in Bangalore. Software exports from Karnataka state is as follow,

Table: 2 Karnataka State Software and Hardware Exports. Figures are in Indian Rupee.

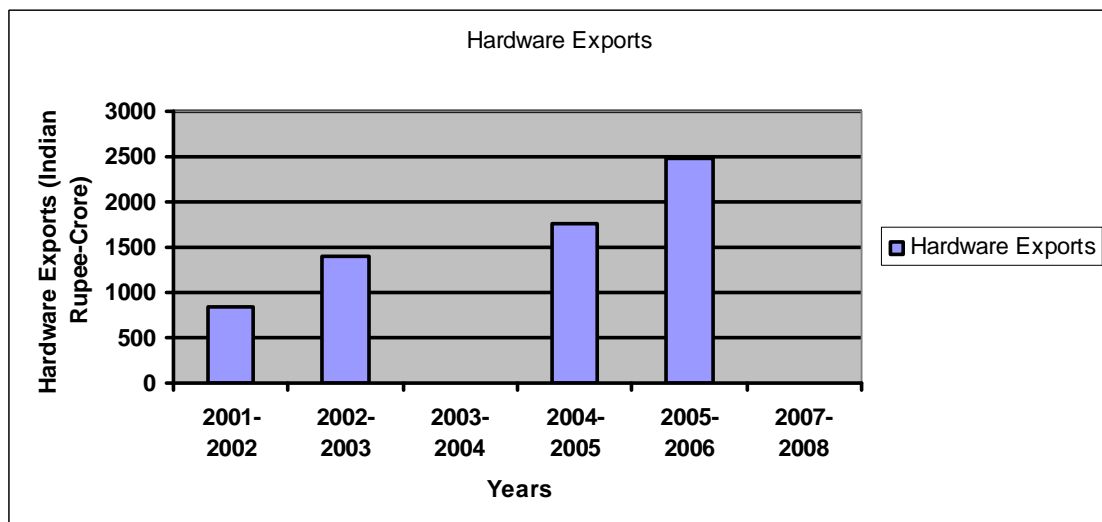
Year	Software Exports	Hardware Exports	Contribution in Total Indian Software Export
2001-2002	Rs.10,745 Crore	Rs.838.09 Crore	-
2002-2003	Rs.13,754 Crore	Rs.1,403.85 Crore	-
2003-2004	Rs.18,100 crore	-	33 %
2004-2005	Rs.27,600 Crore	Rs.1764 Crore	34 %
2005-2006	Rs.37,000 crore	Rs.2481 Crore	37.6%
2007-2008	Rs. 70,000 Crore (Expected Figure)	-	46%

Source: <http://www.karnataka.com/industry/software>

Figure: 6 Software Exports from Karnataka State

Source: Table 2

Karnataka state is one of the India's most important and famous state regarding IT industry and Bangalore city is also in it. That was the first state in India which has its own IT policy. With the passage of time and helping hands of government IT industry in this state expands a lot and gets attention of so many international well recognized firms and today almost all of the worlds top IT companies have their setups there. From 2001 to onward 2008 IT exports from this state increased remarkably and United State of America was the top buyer for them.

Figure: 7 Hardware Exports from Karnataka State

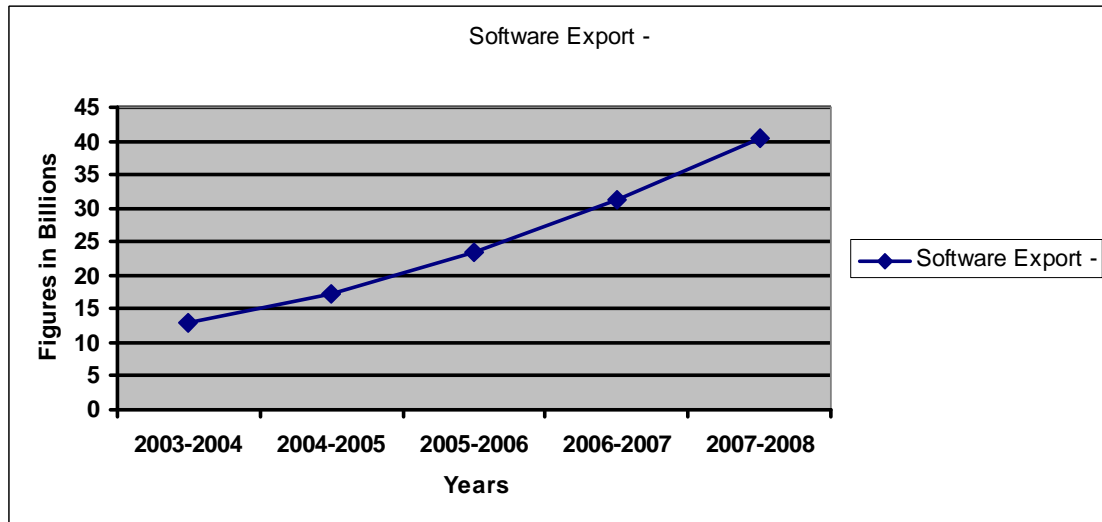
Source: Table 2

Where software exports each year increases from this state on the other hand hardware exports also increased a lot and contribute a lot in great performance of this industry in India.

Table: 3 Software Exports from India, contribution in GDP and Enhancement in Number of IT Professionals Employed

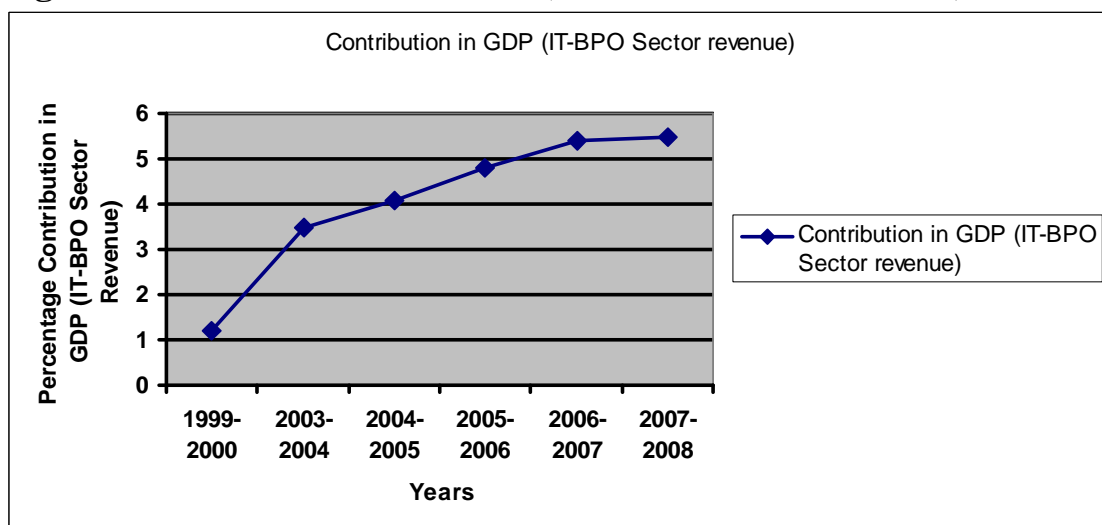
Years	Software Exports	Percentage Increase in Software Export	Contribution in GDP (IT-BPO Sector revenue)	Increase in It professionals employed
1999-2000	-	-	1.2 percent	284,000
2003-2004	\$12.8 Billion	-	3.5 percent	-
2004-2005	\$17.2 Billion	34 percent increase in both term rupee and dollar	4.1 percent	1 million
2005-2006	\$23.4 Billion	32 percent increase in dollars term	4.8 percent (Projected)	1,287,000
2006-2007	\$31.3 Billion	32 percent increase in dollars term	5.4 percent	1,630,000
2007-2008	\$40.3 Billion	28.3 percent	5.5 percent	2.0 million

Source: Information Technology Annual Report of India 2003-04, 2004-05, 2005-06, 2006-2007, 2007-08

Figure: 8 Software Exports from India

Source: Table 3

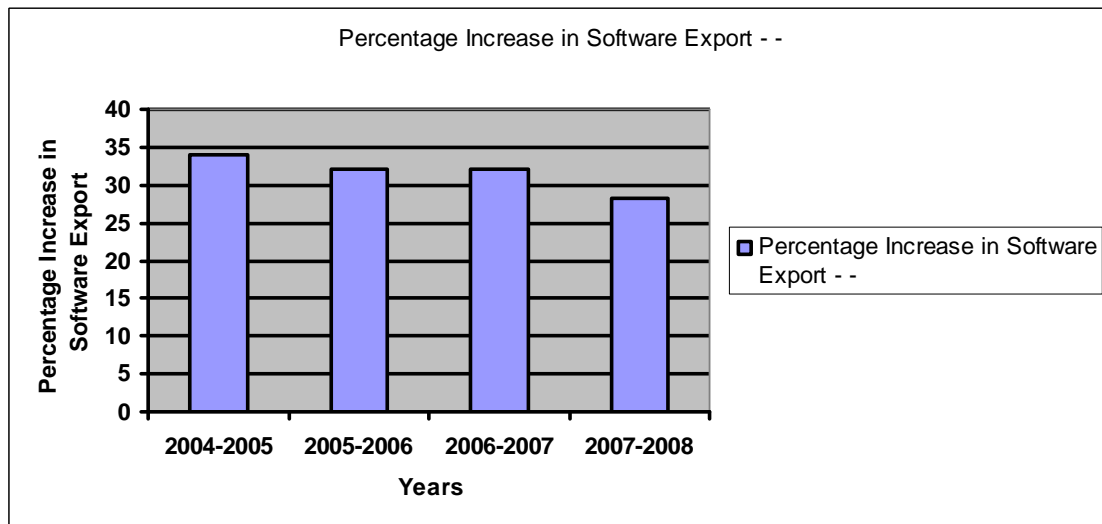
India makes great progress in their IT industry and with the passage of time as compared to Pakistan, their IT industry expands a lot and its all because of their stable government and political conditions and industry friendly IT policies. From 2003 to onward 2008 as compared to Pakistan Indian IT industry expands tremendously and Pakistani IT industry still need a great time and devotion to reach that level.

Figure: 9 Contributions in GDP (IT-BPO Sector Revenue)

Source: Table 3

Indian IT industry earned remarkable revenue from 2000 to onward 2008 and with the passage of time its contribution to GDP increased and showing a great performance of this industry.

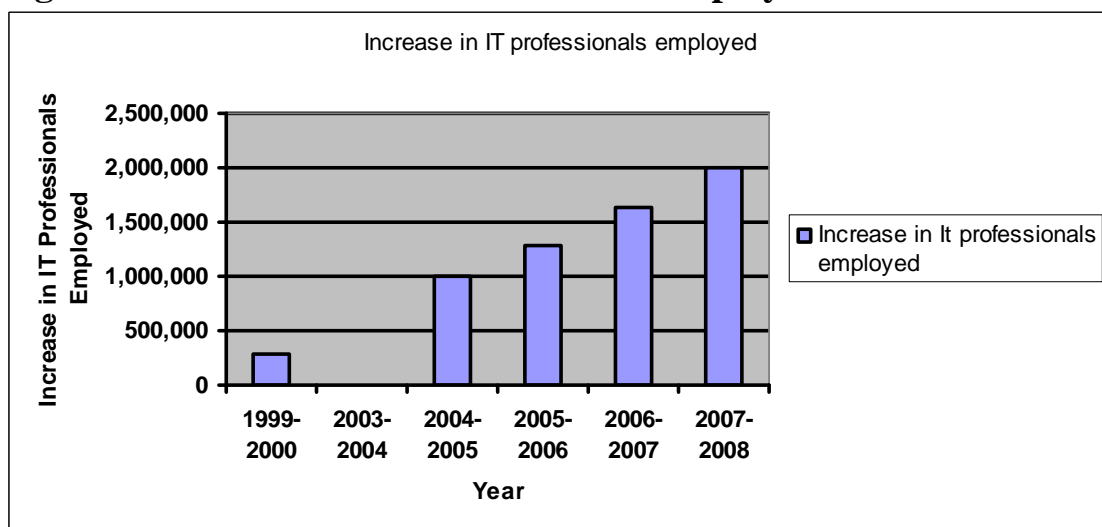
Figure: 10 Percentage Increase in Software Export India



Source: Table 3

From the year 2004 to onward year 2008 where Indian IT industry expands a lot and each year earned a lot of revenue for the country and contribute a lot to put it on the right track of development each year they achieved a new target of software export.

Figure: 11 Increase in IT Professionals Employed in India



Source: Table 3

With the expansion of IT industry in India, where that industry earned lot of revenue each year on the other hand each year create so many new job opportunities also for the new comers in this industry.

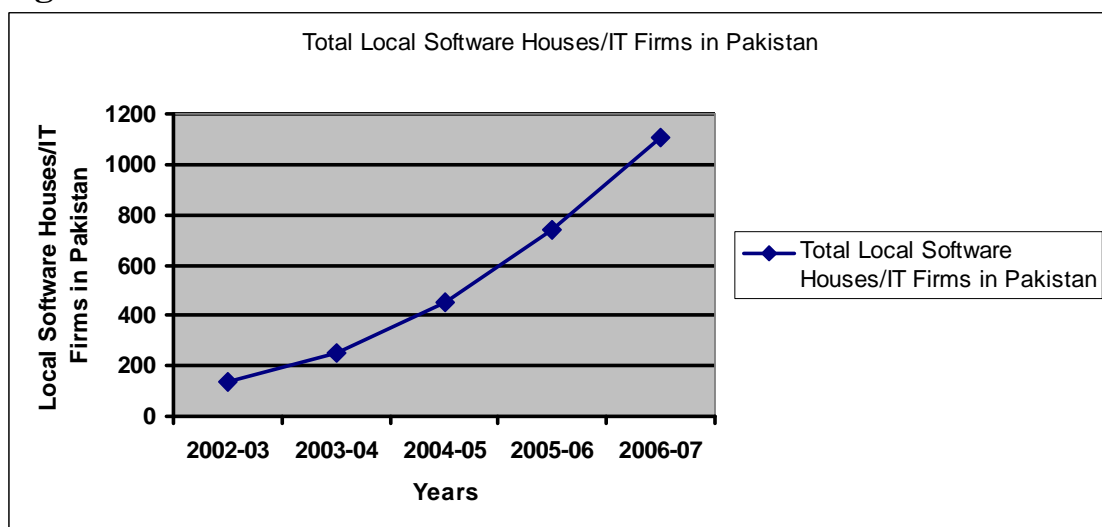
3.2 IT & Economic Development in Karachi, Pakistan

Table: 4 Software Houses/IT companies in Karachi and Foreign Companies doing IT Business in Karachi

Year	Total Local Software Houses/IT Firms in Pakistan	Total Foreign Firms Doing IT Business in Pakistan	Local Companies in Karachi	Foreign Companies in Karachi
2002-03	134	6	39	3
2003-04	248	18	81	8
2004-05	454	37	170	15
2005-06	737	48	265	12
2006-07	1105	60	396	23

Source: Report on Pakistan ICT Indicators by FBS, Government of Pakistan 2007

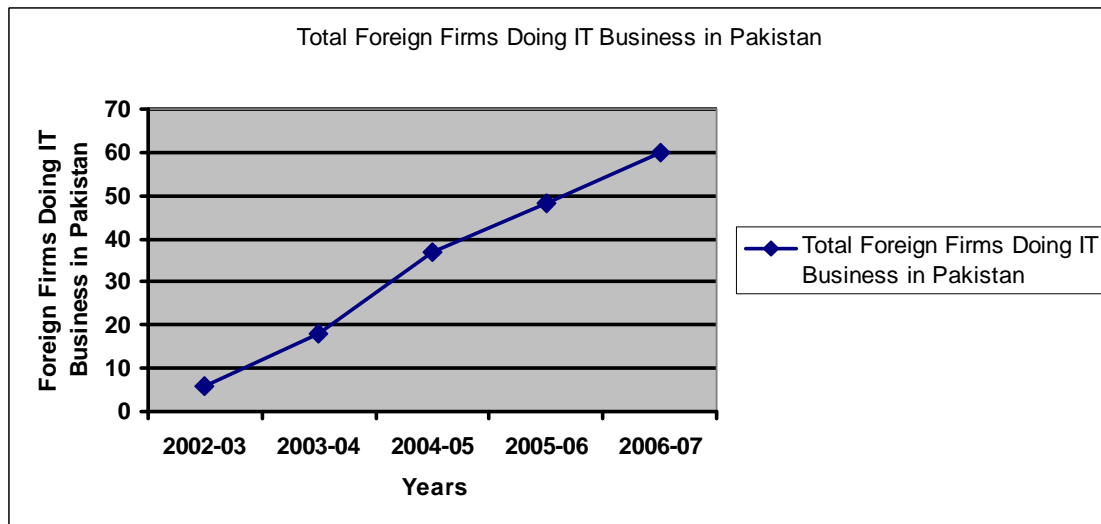
Figure: 12 Increase in Local Software Houses/IT Firms in Pakistan



Source: Table 4

With the passage of time as Pakistan passed from different ups and down in political condition software industry developed in different steps and from 2002 to onward number of software houses increased and day by day new people come in this field and become a part of it and It industry expands a lot in Pakistan

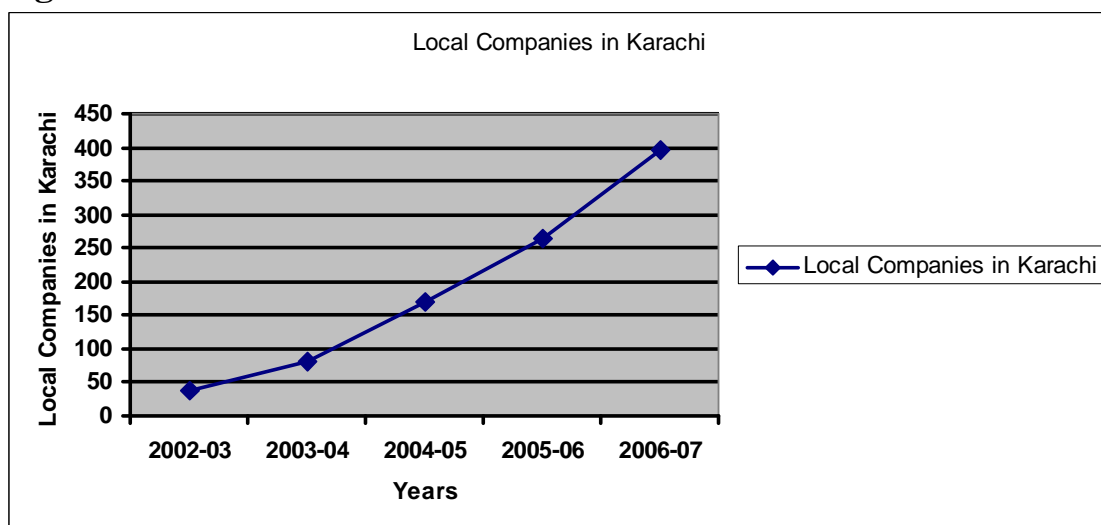
Figure: 13 Increase in Foreign Firms Doing IT Business in Pakistan



Source: Table 4

Where local IT companies in Pakistan increases in number and give their performance and gets attention of international world. So many foreign companies also open their offices and Pakistan and with the passage of time this number increased.

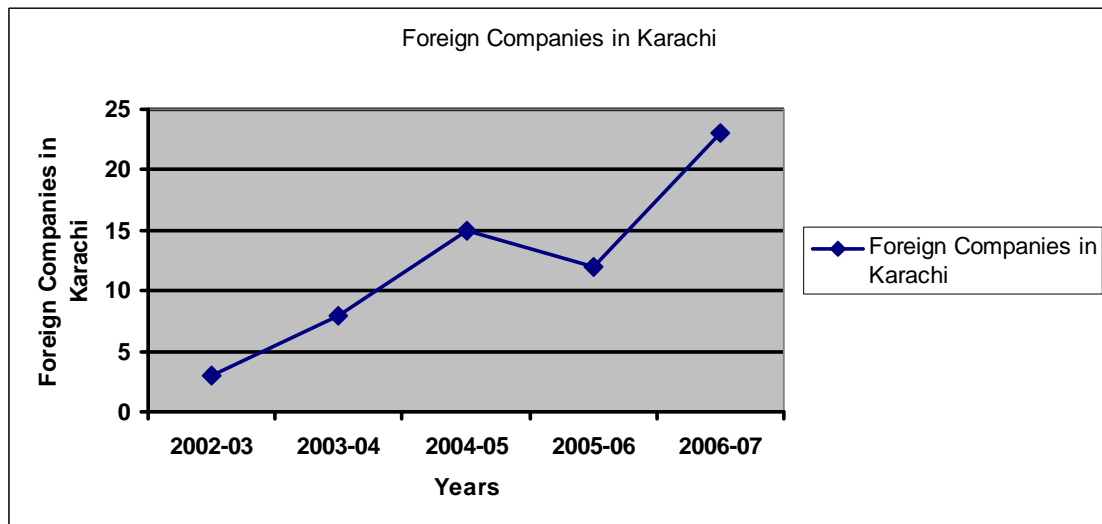
Figure: 14 Increase in Local Software Houses/IT Firms in Karachi



Source: Table 4

Basically graph number 5 shows increase in number of local IT companies in Karachi city and today a remarkable number of IT companies exist in Karachi and because of them Karachi city become a software hub for Pakistan.

Figure: 15 Increase in Foreign IT Companies in Karachi



Source: Table 4

Due to problem in political conditions through out the country there is decline in number of foreigner IT companies in Karachi in between 2005 to 2006 but later on that foreign IT companies again start increases in number after new helpful and good polices of government.

Table: 5 Software House by Database in Karachi (2006-2007)

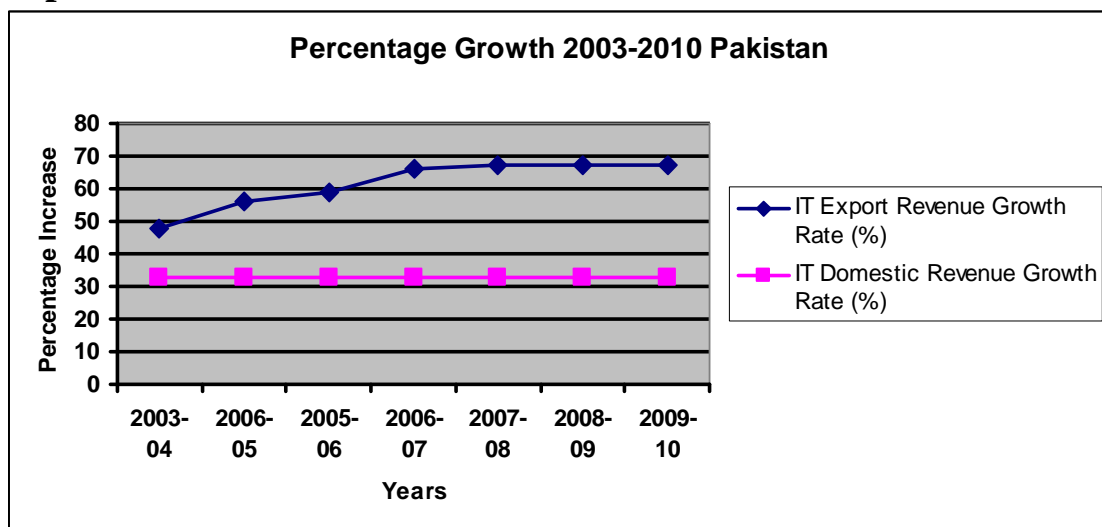
Database Name	Karachi City
Access	21
Terra Data	3
SQL	86
DB2	11
Oracle	175

Source: Report on Pakistan ICT Indicators by FBS, Government of Pakistan 2007

Table: 6 Percentage Growth 2003-2010 Pakistan

Years	IT Export Revenue Growth Rate (%)	IT Domestic Revenue Growth Rate (%)
2003-04	48	33
2006-05	56	33
2005-06	59	33
2006-07	66	33
2007-08	67	33
2008-09	67	33
2009-10	67	33

Source: PSEB Pakistan IT Industry Yearbook 2007-08

Figure: 16 From Year 2003 to 2010 Percentage Increase in IT Export Revenue Pakistan

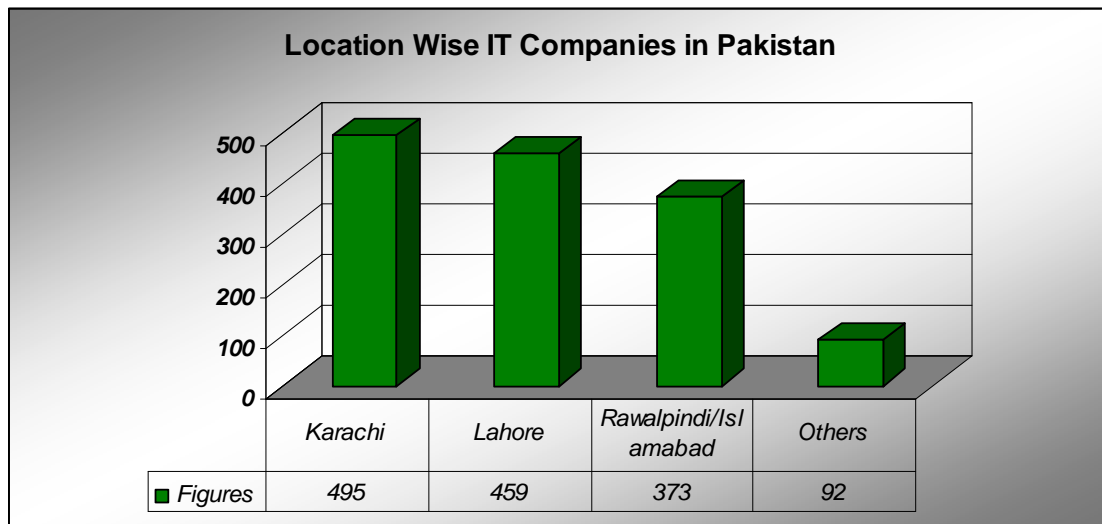
Source: Table 6

Pakistan software industry expands a lot in couple of few years and earned remarkable revenue locally and internationally. But as compared to India they still need to do a lot to catch them. From year 2003 to onward 2009 Pakistan IT industry internationally earned revenue with the average rate of 61.42 percent.

Table: 7 Location Wise IT Companies in Pakistan

City	Figures
Karachi	495
Lahore	459
Rawalpindi/Islamabad	373
Others	92
Total	1419

Source: http://www.pseb.org.pk/item/industry_overview

Figure: 17 Number of Software Firms in Different Cities of Pakistan

Source: Table 7

With the passage of time as IT industry grows in Pakistan the number of IT companies also grow and today about 1419 IT companies exist in Pakistan and city wise Karachi city is on top by having 495 IT firms there

CHAPTER 4 IT DEVELOPMENT AND IT STRATEGIES

If we want to know the role of innovation in economic development of developing countries (India: Bangalore, Pakistan: Karachi) in respect of IT industry, it will be good to know some historical information regarding this problem. Through historical background readers can get a better picture of IT conditions and contributions and their step by step developments in these cities of India and Pakistan.

4.1 Development of IT Industry till 2000 in Bangalore

In 1862 Bangalore Municipality was recognized and in 1949 Bangalore City Corporation (BCC) was established which became Bangalore Development Authority (BDA) later in 1976. Bangalore Metropolitan Region Development Authority (BMRDA) was formed in 1985 with the power to sketch for metropolitan state as well as Bangalore urban and rural districts and one Taluka in Kolar district and in 1995 a preparation was offered for the entire region. Municipal government of Bangalore city then on track to invent positive economic policies both normally and with admiration to small and average IT companies in the city. City government is very dynamic and developed in its own IT strategy and looks for civic personal partnerships for infrastructure advancement (Meine, 2003).

In Bangalore a lot of its economy is centered on typical local economies that accommodate to middle income and poor groups. In the late 1970s to mid 1980s these economies grows, urged by civic investment in defense and industrial founding in the late 1960s and early 1970s. In the late 1980s to middle of 1990s Bangalore city was brought to the country's concentration after it experienced a noteworthy real estate boom. Mid of 1990s Bangalore had seen fast development of information technology industry which peaked in 1999 to 2000. This happened next to the growing visibility of non resident Indian and Indian information technology professionals in USA and in the India, in Silicon Valley and beside Route 128 on the USA's east coast. Notion of information technology sector as a foundation for transformation captured the thoughts of Bangalore's bureaucratic and political elite (Benjamin, 2000).

About five million inhabitants are living in Bangalore city in which a quarter is expected to live in one of the 700 slums. Bangalore city is not only the IT cluster in India but frequently named India's IT capital and focuses in software making. Computer company name E4E also set up lab in Bangalore. India's first aircraft industrial unit was established in Bangalore city during the Second World War. On the other hand when India got independence in 1947 and from that time Bangalore is one of the most technically superior industrial city of India and has work strength of that time in India. Government of India build few of country's major civic sector industrial units in Bangalore in the years after independence and particularly Bharat Electronics, Indian Telephone Industries, Bharat Earth Movers and Hindustan Machine Tools. In Bangalore city rapid development they have been drivers. Now Bangalore city is recognized as hub for outsourcing the growth of software's. A Netherlands company name Philips in 1996 opened a software growth center in Bangalore and about 750 peoples were already working only after the four years center opened and each year firm grew 60 percent per year. In India about half million peoples are working in IT sector, with large attentiveness in Hyderabad, Mumbai, Dehli, Bangalore and Chennai and their first two preferences are Mumbai and Bangalore. Indian states like Karnataka, Andra Pradesh and Tamil Nadu developed strong reputes as basis of software services. Especially, Bangalore city is mostly known as Indian version of Silicon Valley and referring to the attentiveness of computer related companies in the city. With complex annual development of almost 30 percent in between 1987 and 1991 Indian software industry expands twice as fast as worlds leading US software industry during that time. Basically firms select Bangalore city because of its favourable type of weather which is somewhat superior to many other Indian cities because of its altitude and sophisticated character. Accessibility of Internet makes possible this growth also. Because of the availability of cheap skilled labour and because of Karnataka own state developed IT policy many IT firms select Bangalore city for setting up plants. Good training and research institutes are also there in Bangalore city which is also an attractive reason for firms to start their setups. High-tech services like communication and information type industries mostly dependent on a system of urban labour markets and universities. High quality of life is also an important thing in a location which is also a reason of Bangalore development. For new companies until 1977 the authoritarian structure proved insufficient for the establishment of technical

capabilities. Previous industrial policies of Bangalore city restrict access of companies to technical resources from abroad, obstructed excellence competition and slow down innovation diffusion progression. Though, it was thriving in structuring human capital stock essential for fast development of an indigenous computer diligence. In May 1998 Prime Minister had setup National IT Task Force (Meine, 2003).

For the promotion of IT cluster in Bangalore following activities are performed by the government which included tax and infrastructure incentives for a reasonable period of time to the companies which are going to settled in Bangalore city, reasonable educational institutions in respect of IT education from whom companies can get benefits, support in marketing sector in respect of promotion of Bangalore city and IT industry, for the development of backward areas in city establishment of industrial policies, interest free loans and for initial five years price inclinations for small scale units was also presented, continues and good availability of cheap electricity and water supply, enterprise buildings, involvement of research institutions for innovation promotion, motivating incubator centers, encouraging of relationship with R&D and training institutions, reasonable land was available for the IT companies, in case of emergency secondary electronic infrastructure, enhancing cooperation between enterprises and restructuring of inner city according to the need of time. All these activities are not properly performed but they done a lot and get reasonable benefits from them (Meine, 2003).

On 14th August 1995 first time VSNL introduce internet in India via dialup in 6 cities. In 1996 India's first cybercafé launched in a hotel at Mumbai. In 1997 first online banking site was launched by ICICI Bank. In 1998 India introduces new ISP Policy and which ends VSNL's monopoly on internet and Sify becomes India's first ISP. In 2000 IT Act 2000 passed by the Indian Parliament. In the year 2001 Indian Railways launches online ticketing site and Indian's first cyber crime police station established in Bangalore. In 2003 AirDeccan become first airline to offer online ticketing in India. In 2005 there was about 40 million net users, 200,000 cyber cafes and half a million broadband connections in India.

Bangalore city began to develop in significance in consequence and it had more than a few advantages like companies were fascinated by cheaper real estate than Mumbai and Infrastructure was cheaper there and along with it first Software Technology Park was built there under UCP-1984 with secure supply of electricity and telecommunications bandwidth was situated in Bangalore city. Bangalore city has small size firms and they are free of union troubles. More over, Bangalore is situated at the middle of four southern states Tamil Nadu, Kerala, Andhra Pradesh and Karnataka whose capital is Bangalore and about 52% of India's engineering graduates are produced by these states together. Elite Indian Institute of Science was recognized in 1909 in Bangalore city. The majority of its research and graduates intended for in the direction of public sector and few of these helped Bangalore's growth in software (Dossani, 2005).

4.2 Development of IT Industry till 2000 in Karachi

Municipal Act of Karachi city was disseminated in 1933. At the start Municipal Corporation was comprised a mayor, a deputy mayor and 57 councilors. In 1976 Karachi Municipal Corporation was altered into Metropolitan Corporation. Supervision area of Karachi was a second level sub-division recognized as Karachi division, which was sub-divided into five districts which are Karachi Central, Karachi East, Karachi South, Karachi West and Malir. In the year 2000, a new decentralization plan by the national government executed which eliminated the second tier divisions and combined five districts of Karachi into a New City District, prearranged as a three tiered confederation, by means of the two lower tiers collected of 18 towns and 178 union councils.

Karachi city is the twentieth biggest city of the world in respect of metropolitan population and is Pakistan's head of state center of trade, banking and industry. For Pakistan's biggest companies which concerned in arts, entertainment, commercial, fashion, medical research, publishing and software development Karachi city is known as home to them. In South Asia it also provides a chief hub of higher education and the wider Islamic World. Karachi city is also recognized as home to numerous old and well-known educational institutions and universities of Pakistan. It includes in the fastest growing cities of South Asia and Karachi enjoys its well-known location, because of its

geographical position on a bay, making it the economic capital of the Nation. Around the globe Karachi was seen as an economic character model during the 1960s and there was a great deal admiring for the way its financial system was succeeding.

Internet come into Pakistan with the beginning of first commercial email service in 1993 and Pakistan Telecommunication Authority (PTA) start issuing licenses of Electronic Information Service (EIS) category and from that time internet development in Pakistan is rising with each upcoming year (Board of Investment, Pakistan IT Sector Overview January 1, 2008).

Due to development of information and communication technology Karachi city has become software outsourcing hub of Pakistan. For an important area of development call centers for overseas companies have been beleaguered with the efforts of government by reducing taxes as much as 10 percent in organize to increase overseas venture in IT sector. Many independent radio and television channels of Pakistan are based in Karachi together with worlds well-liked GEO TV, Business Plus, CNBC Pakistan, TV One, Sindh TV, Dawn News, Indus Television Network and ARY Digital along with a number of local stations. Karachi city has a number of Industrial zones like Northern Bypass Industrial Zone, SITE, Bin Qasim, Korangi and North Karachi situated on the edgings of central city. Many local and international exhibitions are hosts by Karachi Expo Center (Karachi City).

The majority of software houses, although recognized in 1980s, came to attention after the creation of Pakistan Software Export Board (PSEB) and potential exporters were asked to register and during the first year less than hundred firms registered with board and 116 in 1996 and 200 in 1999. About 55,000 software engineers in a year it is asserted that India is producing while less than 2,000 software engineers are producing by Pakistan with in relation to 40 percent expansion. In 1986 Indian market grow up from \$10 million to \$1.2 billion in the end of 1996 at the same time as its only export is reported to have developed by 64 percent in between 1995 to 1996 and in year 2000 it was predictable to arrive at \$5 billion. In India till the end of 1996 more then 700 firms concerned in software industry along with total employ of more then 140,000 and

elsewhere of which 100,000 were software developers. On the other hand no data source was found from Pakistan during that time and PSEB and PASHA which claims to be the pioneer of the foundation of software industry even did not disclose any figures and even State Bank of Pakistan does not have appropriate record of software industry at that time (Software Exports).

1995 Digicom launched the first international internet service in Pakistan and from 1996 commercial internet service providers has been given licenses. In 1995 Digicom launched first online internet service in Karachi and the service was connected to Global Internet by 64 Kbps line. In the year 1999 there was about 21 ISPs in Karachi. From the IMRAN.AR.PK host two Pakistani computer devotees in 1991 established a UUCP email connection to global internet. This joint would set email traffic and from side to side a worldwide phone call to Lahore exchange email through domestic servers and was located in New York City. In 2000 there were about 500,000 to 700,000 internet users in Pakistan and there was about 40 ISPs in 1999. Most noteworthy technical expansion touching the internet in Pakistan was the Internet Infrastructure Project which was initiated in 1998 and this project was phased over 3 years from 1998 to 2000 (Peter Wolcott, Seymour Goodman December, 2000).

Most of the figures and information gathered by the writer in this article which is being used here in this study is from the market sources. According to approximations, 100 percent of the projects conceded out in the industry in 1996, the initial year of software as production in country, be carried out for the home market and in 1997 the second year, with reference to 97 percent projects esteemed over 7 million dollar was exported. Exports in year 1998 might be as soaring as 99 percent of projects carried out inside nation which is predictable to be as regards 20 million dollars. It was claimed that India is generating about 55000 software engineers in a year at the same time as Pakistan bring into being less than 2000 software engineers with 40 percent increase and software engineers being created in Pakistan as an exportable talent to below 500 and not the 2000 at the same time as India too extremely a lot smaller than claimed. In 1986 Indian market developed from 10 million dollar to 1.2 billion dollar in the end of 1996 while its exports only reported to grown by 64 percent in between 1995 to 1996 and was expected to be

reach about 5 billion dollar by the end of 2000. In the ending of year 1996 nearby more than 700 firms engaged in software industry in India with overall employment of more than 140000 out of which 100000 were software developers (M.K. AREOLA, 1998).

4.3 Development of IT Industry After 2000 in Bangalore

There are about 1,000 software companies in Bangalore which are employing about 80,000 IT skilled persons and Bangalore is the undoubted IT Capital of India. With 100 percent foreign fairness contribution at least one firm each week set up shop in the city. Apart from IT majors for example Infosys, Tata Consultancy Services, Wipro and Microland, leading firms of world like Texas Instruments, GE, Digital, CISCO, HP, IBM, Motorola, Compaq, Sun Micro Systems, Lucent Technologies, Microsoft, Novell, Oracle and many other have made Bangalore their home. Though, IT companies are frequently located in city or at one of the subsequent locations like Electronic City and about 78 IT companies are there and about 60 percent of total number at that location. ITPL Whitefield, Rajajinagar Industrial Estate and Peenya Industrial Estate are also the places where IT companies are situated. For international technology park ITPL Whitefield is the location, with an investment of about Rs15.4 million it was established and absolutely it accommodate the need of IT houses and industry the state of the art infrastructure essential for the additional IT sector growth. Indian programmers gone to US who were functioning on short term contracts and that thing enhance the total number of visas given to software skilled persons in 2000 to 100,000 in May 2001 and half of this number was Indians. Most of the hardware companies are in Rajajinagar, Indiranagar, Jayanagar and Malleshwaram and software firms are in Korammangala and computer peripherals are in S.J.P road, Chickpete and Balepete (Meine, 2003).

As direct subsidiary 77 global companies established R&D centers in India and nearly 40 of the 77 centers are in Bangalore. On the topic of new investments on a standard 6 new MNCs per month open their centers in Bangalore. Even in the 1950s Bangalore city have high literacy rate and greater than before swiftly to 65 percent in 1981 and in 2001 it was 86 percent. Bangalore education system was producing about 100,000 IT professionals annually and a lot of through private educational institutions. Karnataka state has about

132 engineering colleges along with 25,000 seats and in accumulation to 200 diploma institutes. 78 further colleges in science and engineering were permitted with a promising addition of a further 10,000 students in 2000. In 1997 state IT policy was introduced by the Karnataka government. In 1999 to 2001 DoE allowed 100 percent foreign direct investment in IT industry and in 2001 to 2005 deregulation continues although at deliberate speed (Rakesh Basant, 2006).

In world Bangalore city has maximum number of engineering colleges and roughly 50 percent of world's SEI CMM Level 5 firms are there. More than 103 R&D institutions and even COPC/ISO acknowledged customer relations centers are there. It is in fact home to GE's largest Research and Development center outside United State. The Jack Welch Technology Center which hires more than 200 scientists/PhDs each month is there. By none other than United State Bangalore was ranked 4th best global hub of technological innovation. Bangalore is known as home to many success stories. Bangalore has almost 1000 software firms and this number still growing. In the software industry of Bangalore city in the year 2001 they saw a cumulative investment of about US \$1.3 billion. During 2001 about 146 new software companies and during 2002 about 110 were established and the total number of software professionals was more than 80,000. During the period of 2002 to 2003 about 116 new Software Technology Parks were recognized. In 2002 a large number of firms in Bangalore were involved in high technology software development (Bangalore Technopolis of India).

4.4 Development of IT Industry After 2000 in Karachi

Current tendency of deregulation and liberalization in Pakistan has been flourishing and reliable. Pakistan was ranked number 1 in South Asia in World Banks Doing Business 2008 report for its easiness of doing business and number 76 globally and India was on number 120.

In Pakistan 1,900 towns and cities have internet accessibility and the biggest number of internet subscribers are in Karachi, Lahore and Islamabad. From total internet subscribers in Pakistan these three cities mostly comprise approximately 80 percent subscribers. Only

two started commercial operations in 2004 to 2005 out of 17 companies to whom Wireless Local Loop (WLL) license was awarded and TeleCard started its WLL service in Karachi on 12th of January 2005. In developed part of the globe the basic cause of the incredibly quick spread of broadband is the existence of infrastructure to deliver services was previously there in form of superior quality copper network and cable. These two networks are available in Pakistan but the superiority is still a question. With deprived network cable operators are small entrepreneurs apart from for a couple of chief players in Karachi and Lahore. For internet city in Karachi government has allocated 200 acres land. For making all government departments online an e-government department has been established. IT parks has also been established by the government in Islamabad, Lahore and Karachi throughout public private corporation. Optical fiber infrastructure will be provided by the government along with data connectivity up to the building and private sector operators administer the Image Transport Protocol (ITP). For bulk bandwidth, operator pays and re-distributes bandwidth within ITP (Khan W. U., 2006)

Since 2004 broadband licenses has been opened to ISPs. In the entire Asia pacific region Pakistan offers mainly aggressive bandwidth charges. At the cost of 2000 US dollar a committed E1 circuit is obtainable only in Pakistan. For internet traffic Pakistan is using 1700 MB bandwidth, which is 2.42 times superior to bandwidth use in 2005. In the year 2004 there were about 2 million internet subscribers in Pakistan which reaches nearly 10 million now. More then 1900 towns and cities are connected to the internet currently. About 132 Internet Service Provider licenses have been awarded to ISPs and out of them 70 are operational and in Pakistan a broadband policy for ISPs has been also announced. Till the year 2016 tax exemption has been given to IT companies by the government of Pakistan in the income from export of computer related services and software's. Pakistan is a member of Bern Copyright Union, World Intellectual Property Organization (WIPO) and Universal Copyright Convention. In April 2005 Pakistan's Federal Investigation Agency (FIA) arrested 9 peoples and detained about 100,000 pirated Compaq Discs (CDs), cassettes and videos and shutdown 6 criminal replication facilitates in Karachi (Pakistan Software Export Board).

According to a news published in The Nation newspaper on March 27, 2009 Pakistan has further fallen nine points on the Global Information Technology index and ranked 98th amongst 134 nations surveyed by World Economic Forum (WEF). WEF released its 8th annual Global Information Technology Report 2009 which indicates a weak Information and Communication Technology base in Pakistan. Pakistan was on 89th number last year out of 127 nations (The Nation 27-03-2009).

Throughout the first 7 months of financial year July-January 2008-9 enhancement in sales tax and obligation of import duty on computers badly affected Foreign Direct Investment (FDI) in Information Technology Services and hardware in Pakistan. Imposition of 16 percent general sales tax and 5 percent import duty on IT sector affected FDI growth in IT sector. According to a report of State Bank of Pakistan (SBP) in July 2008 to January 2009 foreign direct investment in hardware declined to \$0.5 million from \$1.1 million as compared to last year and showing a decrease of 52.1 percent. With the increases of 1.7 percent in the same period, FDI increase in communication sector from \$751 million to \$763 million. 16 percent increases in GST and imposition of 5 percent import duty affected the purchasing power of people particularly the end users and as a result most of hardware demand has been decreased during 2008-09 (Pakistan Computer Association).

In 2000 to 2001 there were about 283 register software houses in Karachi and from which about 103 were closed because of the negative implications' of the incident of 9/11. According to the distribution of PC's and PC servers installed in SWH by major cities in Pakistan in between 2000 to 2001 in Karachi 103 software houses were given 2946 computers and 266 server PC's and 38 other server PC and as an average figure 28 computers were available to each software house in Karachi. And in 2000 to 2001 from 103 software houses of Karachi Dialup connection was available to 91 software houses, ISDN was available to 10, Digital Cross Connection was available to 14, Radio Modem was available to 2, VSAT was available to 3 and 5 other kind of connection was available to these software houses for internet connectivity. In Karachi during the period of 2000 to 2001 regarding the export earnings of software houses 33 software houses from Karachi reported their earnings and according to them from July 2000 to June 2001 they earned

almost 3.4 million dollar and in July 2001 to September 2001 they earned almost 0.7 million dollar (Khan A. M., Shah . A., 9 December 2004).

Pakistan government has established Software Technology Parks in Lahore, Karachi, Islamabad and Peshawar by having aim of encouraging, boosting, and promoting software/BPO exports from Pakistan. Government run organizations like Karachi Electric Supply Corporation and Water and Power Development Authority are liable for providing supply of electricity. Mostly due to theft there have been high transmission losses. Power abounding by these government proscribed giants is usually expensive, unreliable and unstable and Information Technology enabled services requisite highly steady power. Most of the vendors to meet this requirement in such kind of business like IT setup their own power generating facilities. The majority of recently build Software Parks have their own primary generators and they do not rely on electricity supplied by the government at all. By permitting private power generating firms Government of Pakistan embarked on improving power infrastructure and current effort at privatizing KESC power distributing company at Karachi. Domestic infrastructure of telecom in Pakistan is quite modern and since 1990 Pakistan has a Fiber Optic based national trunk backbone. In Islamabad, Lahore and Karachi PTCL laid a Fiber Optic access network and WorldCall also laying its HFC network in Lahore and Karachi (Pakistan Software Export Board September 20, 2005).

According to news published in Daily Times newspaper of Pakistan on 26-04-2007, two main challenges which is facing by the Pakistan are human resource and infrastructure in IT industry. Office liberty in the city centers of Karachi, Islamabad and Lahore become a major issue along with accessibility of human resource because Information Technology sector closely relies on skilled human resource. With an enlargement rate of 50 percent year on year, human resource starts becoming a constraint. In 2007 there was about 3 IT parks in Islamabad, two in Karachi and two in Lahore and according to news none of them was IT Park in true sense. They were merely usual office space, where power and connectivity services have been improved. Punjab IT Board in Lahore begins constructing a purpose built IT Park which was likely to be finished in the end of year 2008. In Karachi 240 acre Korangi Creek Industrial Park developed by government of

Pakistan which have 16 acres obvious space for IT and IT enabled services firms and a lot additional needs to be completed if Information Technology industry carry on rising at this space. As a comparison to India the writer mention that India is one of the most important players in IT and IT enabled services and being familiar as a world organizer. India claims with the intention of IT and IT enabled services exports from India are in the county of 27 billion dollar (Romail Kenneth, 2007).

For foreign investors Pakistan government has permissible 100 percent ownership of equity and 100 percent profits repatriation and that's the reason why IT is being heavily invested in Pakistan. By way of annual IT exports significance USD 1.4 billion Pakistan has 2.8 billion dollar IT industry. About 1082 active IT firms in country and out of which ISO certified 110 and over 25 companies are going through CMMI evaluation at present. Pakistan has about 110,000 IT professionals as well as several thousand expatriates from Europe and North America with world class expertise and exposure. In Defence and other area, large public research and development infrastructure of Pakistan employs more than 15000 IT professionals. Internet users in Pakistan exceed from 3 million and there are about 250 ISPs operational throughout the country and giving different services. There are about 384 IT companies in Karachi city which is highest number of firms in a city in Pakistan. Presently more than 1900 cities and town have internet access in Pakistan. Ambitious programs of world class Information Technology Parks along with a rental rate of about US\$ 1 per sq ft /month is also a reason for IT outsourcing to Pakistan. Pakistan has following liberal investment policy which included,

- For FDI all economic sectors are open
- For overseas and local investors the same opportunities
- 100 percent overseas equity allowed
- No sanctions from Government requisite
- Striking tax/tariff incentive packages
- Franchise and technical fee, royalty of transfer of funds, dividend allowed and capital profits

To secure the FDI in the country Pakistan has following laws

- Foreign Currency Accounts Protection Ordinance, 2001
- Protection of Economic Reforms Act, 1992
- Foreign Private Investment Promotion and Protection Act, 1976

Up to 2016 tax exemption has been given to IT firms on income from computer software exports and related services (Pakistan IT Industry Yearbook 2007-08).

According to another article which is based on a conversation with Mr. Farhan Mirza a CMMI Lead Appraiser in Pakistan and based on India Pakistan IT industry comparison specially CMMI certified companies. According to them one of the important reason of Indian IT industry growth is the adaptation of latest methods and best practices by Indian IT houses and the most important in this type is Capability Maturity Model Integrated (CMMI). It is a customary which is mutually developed by US Department of Defence and Carnegie Mellon University and at the present monitored by SEI, Software Engineering Institute. India have remarkable number of CMM certified firms as compared to Pakistan and it is for the reason that sheer size of every firm there, individual branches or departments of the similar firm and the sheer volume of one Indian firm is most likely identical to the volume of the figure of students that graduate every year from the whole Indian nation. CMMI is fundamentally a compilation of most excellent performances which have a verified data of growing the effectiveness and project management. Most of the famous IT players themselves adopted it and at the present they merely work with associations that are evaluated on CMMI. This is a minimum benchmark which a software house has to achieve if that software house wants to get clients and business. China has 500 companies, India has more than 350 firms, Korea and Taiwan has near about 100 and Japan has about 220 firms that are evaluated on CMMI requirements. So far Pakistan has only 20 firms which are appraised on CMMI which are very few as compared to India and other countries existed in the region. There were about 400 Lead Appraisers in the world and Mr. Farhan Mirza was the first Lead Appraisal authorized by SEI from Pakistan (Business Technology Leadership, CIO Pakistan).

4.5 IT Policies and Strategies in Bangalore

(European Journal of Development Research December 2003) at state level Karnataka state as a first state has taken following initiatives and announces

- ❖ At a premature stage a detach Department of Information Technology was shaped
- ❖ For the preparation of people in this sector used existing engineering colleges
- ❖ For Indian Institute of Science houses and supports
- ❖ Government is getting up by the state government and Indian Institute of Information Technology at Bangalore was led by industry
- ❖ On the outskirts of Bangalore Electronics City formed
- ❖ In Mysore and Bangalore Software Technology Park was created
- ❖ Information Technology Park created at Bangalore, Whitefield
- ❖ Notions of electronic governance and electronic kiosks initiates
- ❖ State extensive network being recognized

4.6 IT Policies and Strategies in Karachi

(Information Technology Policy of Pakistan January 1, 2008) basically in Pakistan no one of his state has its own specific IT policy for IT industry and they are working under national IT policy and In August 2000 Pakistani Federal Cabinet permitted the National IT Policy which distinct the responsibility of Government as enabler for IT based prospect economy. Main features of that policy is,

- ❖ Human Resource Development
- ❖ Infrastructure Development
- ❖ Efficiency and Transparency in Government
- ❖ Improve Services to Citizens
- ❖ Stimulate the Domestic Economy
- ❖ Increase Exports

Under main features of National IT Policy of Pakistan following are the aims of government. In human resource development their main aim was to build new IT universities to meet the increasing demands and the buildings are being obtained through leasing at small rent or donations and as an initiative 7 new IT departments and universities were initiated. Formation of Virtual Universities for distance learning through top class faculties. Strengthening of IT institutions and for that purpose funds were provided to 30 public sector degree awarding institutes. International faculty hiring by inviting international caliber to join local universities on high salary packages. Scholarships for IT and Computer Science student's at bachelor and master level courses. Promote IT education in schools and colleges. Introduce professional training programs. National testing system and training higher level IT professionals in respect of Ph.D.s. These were the aims of Government for the enhancement of human resource development in respect of IT Industry in the country. In respect of infrastructure their first aim was fiber optic connectivity through which they want to connect all parts of Pakistan to each other. After that their aim was to increase in bandwidth and for that purpose internet bandwidth accessibility in Pakistan has been improved from 35 Mbps to 410Mbps. Reduction in bandwidth tariff was also an aim of government and through that aim internet connectivity is now accessible at USD 6000 per month as evaluated to price of USD 83,000 per month previously. Internet growth was also an aim of government through which they want to spread access of internet in the whole country and in 1996 Internet Service Providers (ISPs) was operational in the country and till June 30, 2000 29 cities with 0.1 million internet subscribers were recorded. Where government was aimed to do above mentioned things information technology parks were also aimed to build and for that purpose on different locations they were built with different incentives from government. Establishment of multi services data network and educational intranet was also included in infrastructure development along with rural area communication and incentives for investment in IT industry in which IT companies were allowed a 15 year income tax exception and for IT professional's 50 percent income tax rebate was offered and 0 percent import duty on computer parts and computers which is remarkable. Where government aimed such things in respect of IT industry they also planned some enabling measures which included IT law to smooth the progress of e-commerce and other on line

transactions that have needs of digital signature and authentication along with IT accreditation. Electronic government programme was also a main feature of national IT policy that included improvement in the internal efficiency of government operations of all departments or divisions of the government by having aims to enhance employee's performances by the use of computer and computer applications and to provide improves quality of services delivery to citizens (Information Technology Policy of Pakistan January 1, 2008).

CHAPTER 5 ANALYSES

5.1 Performance in Respect of IT Industry

If we look at the history of IT industry development in Pakistan and India Respectively than in 1995 Digicom launched the first international internet service in Pakistan and from 1996 commercial internet service providers has been given licenses. In 1995 Digicom launched first online internet service in Karachi and the service was connected to Global Internet by 64 Kbps line. In the year 1999 there was about 21 ISPs in Karachi. From the IMRAN.AR.PK host two Pakistani computer devotees in 1991 established a UUCP email connection to global internet and as compared to this development of IT in Pakistan on 14th August 1995 first time VSNL introduce internet in India via dialup in 6 cities. In 1996 India's first cybercafé launched in a hotel at Mumbai. In 1997 first online banking site was launched by ICICI Bank. In 1998 India introduces new ISP Policy and which ends VSNL's monopoly on internet and Sify becomes India's first ISP. In 2000 IT Act 2000 passed by the Indian Parliament. In the year 2001 Indian Railways launches online ticketing site and Indian's first cyber crime police station established in Bangalore. In 2003 AirDeccan become first airline to offer online ticketing in India. In 2005 there were about 40 million net users, 200,000 cyber cafes and half a million broadband connections in India.

With the passage of time where IT industry of both countries expands a lot on the other hand they helped their respective economies also and especially Indian IT Industry give a boost to their economic performance. If we see the performance of Karnataka state as a whole in which Bangalore city is, then as compared to its previous performance in software and hardware it earned 10,745 Crore in 2001-2002 and after that period due to its continuous growth in 2007-2008 that earnings reached to 70,000 Crore which is a remarkable performance state wise. If we see performance of Indian Software industry as a whole then in 2003-2004 their only software earnings were of US \$12.8 Billion and its contribution in Indian GDP was 3.5 percent and after that period that figures continuous increases and in the year 2007-2008 Indian Software Exports reached to US \$40.3 Billion and its contribution in Indian GDP was 5.5 percent which shows a remarkable

performance of this industry and its remarkable contributions in Indian GDP. Software exports from Bangalore city in 2003-2004 was about Rs. 17,474 Crore and in year 2008 it was expected that software exports from Bangalore to touch 13.5 billion dollars. In the mid of 2008 there were about 248 Business Process Outsourcing (BPO's) and 183 bio technology companies with a work force of 5.5 lac technicians in Bangalore. As compared to above IT export revenue growth rate of Pakistan which was 48 percent in 2003-2004 reached 67 percent in 2008-2009. According to State Bank of Pakistan in the year 2007-2008 the estimated total IT industry export revenue was about US\$ 1.4 billion and estimated total IT industry size was about US\$ 2.8 billion.

According to previous overview of research, to enhance the IT performances in these regions both regions emphasizes on the quality of IT education available there and enhance the number and quality of IT institutions there to produce more and more IT skilled professionals to meet the up coming needs of each year. Today both cities have remarkable number of IT institutions which are producing good quality skilled professionals. For all managing and business problems IT is considered as a magic potion. Basically developed nations are enjoying benefits of IT industries and developing countries are on their way to digitization so far and there are technology gaps between developed and less developed nations in respect of IT use. Developed nations are using leading edge technologies and on the other hand less developed nations are deficient in state of the art knowledge and as a result they are lagging behind. As compared to Bangalore which improved a lot and today consider as Silicon Valley of India Karachi is still far behind. There are more then 1500 IT companies in Bangalore and as compared to it there is only 495 companies in Karachi and as we can see that figures show a remarkable difference in IT companies situated in these two cities. Main reason of this difference is unstable political conditions of Pakistan and problems in Karachi city like local political conflicts and unstable electricity conditions and on the other hand good and stable political and electricity conditions of Bangalore. Important reason of Indian IT industry growth is the adaptation of latest methods and best practices by Indian IT houses and the most important in this type is Capability Maturity Model Integrated (CMMI). India have remarkable number of CMMI certified firms as compared to Pakistan and it is for the reason that sheer size of every firm there, individual branches or departments of

the similar firm and the sheer volume of one Indian firm is most likely identical to the volume of the figure of students that graduate every year from the whole Indian nation. CMMI is a minimum benchmark which a software house has to achieve if that software house wants to get clients and business both in Bangalore and Karachi. India has more than 350 IT firms of that level and as compare to it Pakistan has only 20 companies that are evaluated on CMMI requirements. There are about 81,000,000 (2008) internet users in India with user growth rate of about 1,100.0 % (2000-2008) and as compared to it in Pakistan there are about 17,500,000 (2008) internet users with growth rate of about 12,969.5 % (2000-2008) which is high as compared to Indian growth rate and according to worldwide internet user ranking India is on number 4 and Pakistan is on number 19. There are about 3,130,000 (2008) broadband internet connections in India and as compared to it there are about 128,700(2008) broadband users in Pakistan which are very low as compared to India.

5.2 Institutional Arrangements in Respect of Innovation System

Karachi city is the capital of Sindh Province, Pakistan and Sindh province has no state wise or province wise IT policy. IT industry of that province is working under National IT policy which was announced in 2000 and as compared to this province of Pakistan Karnataka state of India whose capital is Bangalore city, has its own IT policy which was introduced in 1997 and it was the first state of India who introduced its own IT policy and all the IT industry of that state is operational under this policy which is very flexible for the smooth running and growth of this industry there. Karnataka state policy become an example of success for the other nations and countries and today many developing countries after looking their success trying to enhance the performance of their IT industry and making different reforms in their IT policies to attract international IT firms and investors to come there and start their branches and business there. After such a long time in Pakistan no province still have its own IT policy and they are still working under the National IT policy of Pakistan.

Earlier growth of Bangalore in respect of software industry as a specialized hub could be somewhat clarified by the reality that few of the best Indian educational institutions

which are famous globally are situated there like Indian Institute of Information Technology, Raman Research Institute, Indian Institute of Science, National Institute of Mental Health and Neuro-Sciences and Indian Space Research Organization. High availability of knowledge providers in the Bangalore region resulted in a significant collection of highly qualified and low cost labour force that can clarify the early interest of United State companies in establishing their outsourcing activities in Bangalore (Chaminade, Cristina 2008) and in case of Karachi some quality institutions are also there like Quaid-E-Azam University etc.

Without any doubt the existence of a large number of research institutions and educational institutions along with high tech clusters gives a base for the emergence of Regional Innovation System especially in Bangalore as compared to Karachi. But if one eradicate handful of world class technological institution than the image is one of deficiency of good quality workers and low spending in research facilities. Universities with little exclusions are approximately entirely dedicated to provide manpower to local companies. Mostly research is fundamental and in result universities are not contributing an important role in helping innovation and creating research outcomes for local companies. That's why TNC's gradually more started to construct their own training centers in Bangalore. Resultantly cooperative learning along with universities is poor although but there are few examples also which shows valuable results of universities and industry collaboration. None of the systemic aspects of Regional Innovation system is strong in emerging Bangalore Regional Innovation System (Chaminade, 2008) and in case of Karachi universities and industry cooperation as compared to Bangalore is not good. Universities and technology institutions are existed there and also providing quality education but their fees are very high and government spending on education sector is also low.

Regional government of these two cities might play an important role in motivating cooperation among knowledge providers and small medium enterprises and this activity required more and assigned resources along with more financial resources to those who provide knowledge along with little changing in thinking of researchers who are willing to cooperate with large companies more as compared to small companies. In addition to

above it is also essential to enhance the research capability of existing research centers and universities by focusing on applied research. It is also a big problem and obstacle that researcher leave universities and join other companies and start their own companies due to larger salaries. Further more for the same reason attracting PhD students is also a problem and resultantly this thing hindering the possible future growth of universities in both cities (Chaminade, 2008).

For the promotion of IT cluster in Bangalore following activities are performed by the government which included tax and infrastructure incentives for a reasonable period of time to the companies which are going to settled in Bangalore city, reasonable educational institutions in respect of IT education from whom companies can get benefits, support in marketing sector in respect of promotion of Bangalore city and IT industry, for the development of backward areas in city establishment of industrial policies, interest free loans and for initial five years price inclinations for small scale units was also presented, continues and good availability of cheap electricity and water supply, enterprise buildings, involvement of research institutions for innovation promotion, motivating incubator centers, encouraging of relationship with R&D and training institutions, reasonable land was available for the IT companies, in case of emergency secondary electronic infrastructure, enhancing cooperation between enterprises and restructuring of inner city according to the need of time. As compared to these incentives and facilities given by the Karnataka state in his first state wise IT policy, Pakistan government gives following incentives and facilities 15 year corporate tax exemption for information technology, 100 percent repatriation of profits allowed to IT sector companies, in IT sector 100 percent foreign equity allowed, tariffs and custom duties on imports was 0 percent before but from 2008 5 percent import duty has been imposed on computer equipment imports, for venture capital funds 7 year tax holiday, 0 percent income tax liability for software development companies, before 2008 sales tax liability on sales of computer hardware and software was 0 percent but after that period 16 percent sales tax liability has been imposed on them. Some other ongoing and development features of that policy are human resource development, infrastructure development, efficiency and transparency in government, improve services to citizens, stimulate the domestic economy and increase exports. If we compare these two policies

from the investment point of view than they have remarkable attractions to local and international investors but along with such policies the reliability and stable political and government conditions are also necessary and peaceful environment of that place also play an important role for the development of industries like IT. That's the reason as compared to Pakistan as a whole and Karachi city India as a whole and Bangalore city developed a lot in this industry.

So far as compared to India who has face no martial law from the time of separation Pakistan face three martial laws, the first one was declared on 1958, second was in March 1969 and the third was declared on July 5, 1977. Government of Prime Minister Nawaz Sharif was dissolved on October 12, 1999 and Pakistan army took control once more but Martial Law was not imposed. President General Pervez Musharaf on November 03, 2007, declared state emergency in country which was claimed to be equivalent to state of Martial Law according to constitution of Pakistan 1973. During all these time no Martial Law has been seen in India and that thing give a solid base to there industries and FDI also. That is one of the reasons of so many companies existence in Bangalore and all over the India. In 2000 to 2001 there were about 283 register software houses in Karachi and from which about 103 were closed because of the negative implications' of the incident of 9/11 and at that time IT industry of Bangalore city was not that much effected as compared to Karachi.

Office liberty in the city center of Karachi becomes a major issue along with accessibility of human resource because Information Technology sector closely relies on skilled human resource. With an enlargement rate of 50 percent year on year, human resource starts becoming a constraint. In 2007 there was about two IT Parks in Karachi and none of them was IT Park in true sense. They were merely usual office space, where power and connectivity services have been improved. As compared to office space and liberty Bangalore city have specific regions for specific IT industries like most of the hardware companies are in Rajajinagar, Indiranagar, Jayanagar and Malleshwaram and software firms are in Korammangala and computer peripherals are in S.J.P road, Chickpete and Balepete. In the period of 2002 to 2003 about 116 new Software Technology Parks were recognized in Bangalore and in 2002 a large number of firms in Bangalore were involved

in high technology software development. In 2008 about 240 acre Korangi Creek Industrial Park developed by government of Pakistan in Karachi which have 16 acres obvious space for IT and IT enabled services firms and a lot additional needs to be completed if Information Technology industry carry on rising at this space. Information Technology enabled services requisite highly steady power. Most of the vendors to meet this requirement in such kind of business like IT setup their own power generating facilities in Karachi. The majority of recently build Software Parks have their own primary generators and they do not rely on electricity supplied by the government at all in Karachi.

As direct subsidiary 77 global companies established R&D centers in India and nearly 40 of the 77 centers are in Bangalore. On the topic of new investments on a standard 6 new MNCs per month open their centers in Bangalore. Even in the 1950s Bangalore city has high literacy rate and greater than before swiftly to 65 percent in 1981 and in 2001 it was 86 percent. Bangalore education system was producing about 100,000 IT professionals annually and a lot of through private educational institutions. According to these figures we can see the rising of IT Industry from a long time in Bangalore city and as compared to it with Karachi city then Karachi city is till far behind and need a long way to go because even presently they still have not that much number of R&D centers in Karachi and number of IT professionals producing in Karachi city is also low as compared to Bangalore today.

In world Bangalore city has maximum number of engineering colleges and roughly 50 percent of world's SEI CMM Level 5 firms are there. More than 103 R&D institutions and even COPC/ISO acknowledged customer relations centers are there. It is in fact home to GE's largest Research and Development center outside United State. The Jack Welch Technology Center which hires more than 200 scientists/PhDs each month is there. As compared to Bangalore SEI CMM Level 5 firms Pakistan has total One CMM Level 5 Company, one CMMI Level 5 company, three CMMI Level 3 companies and sixteen CMMI Level 2 companies (figures from PSEB website).

5.3 National Innovation System, Regional Innovation System or Industrial Clusters

Both cities historically have remarkable backgrounds in economic activities which today provide them a strong base in their development. Geographically on their respective locations where they are situated they have remarkable advantages in different ways like their atmosphere conditions, labour conditions, infrastructure conditions and network of their local connections along with international connections. Basically nowadays progressive economies regional cluster of associated industries are the foundation of income, jobs and export growth. In the light of this saying now a days in India not only Karnataka state and Bangalore city but many other states and cities are emerging in IT industries as well as in Pakistan also. Awareness generating and helpful infrastructure, local subsystems consists on unrestricted and classified research vocational education organizations, laboratories, universities, colleges, and knowledge affecting agencies. Such active and combined communication comprises what is more often than not called innovation system which is classification so as to implicit as communication networks. One of the main reasons in development and emergence of these regions is the availability of advance level information technologies and fast way of communications also. Availability of cheap labour and manpower also play an important role in the development of a region or industry and luckily it is available in these regions also. Government of both nations on national level and state or province wise level also playing important role by giving incentives, making new attractive and industry friendly policies and making investment more and more secure which is also an important factor for FDI and local investment. For smooth running of industry and growing demands for skilled professional's construction of new and better educational and vocational training institutions are also important and today both cities have remarkable number of educational institutions which are giving quality education and producing quality professionals.

But according to the previous research review, historical background and facts and figures presented in this master thesis, if we see them in the light of theoretical base used in this master thesis at some extent Karachi city is working through national innovation

system because the mutual cooperation of firms along with universities and new knowledge creation is not limited to a particular area and mainly they are connected to all over the country and Bangalore city through not mature but emerging regional innovation system because most of the firms existed there have connection with the available sources for new ideas and knowledge creation like universities and other SME's and industries. Both cities have other industries also there along with IT industries and they are also the reason in emergence of these cities. Many companies exiting there have no roots there and they are not local companies which are generating knowledge and then diffusing it. Majority of firms existing there are multinational companies who have sub offices there because of there cheap labour and other available sources and that is also a reason of their emergence.

Out side the USA Bangalore has appeared as one of the fastest and largest growing software cluster and it is not only a software related industries hub but also posses many high tech cluster for instance aeronautics and defense and think it to be the center for engineering and scientific activities of India in respect of training partly manufacturing and research. Basically when we are talking about Bangalore than Bangalore normally refers to the IT industry clustering and give help to the organizations inside the city and around it. Majority of IT firms in Bangalore are SME's (NASSCOM, 2005). In case of Karachi under the light of this study it is also seen that majority of IT firms are also SME's.

Due to the inspiring software growth rate of India and specially Bangalore they attracted the attention of researchers all over the world. For instance exports respected to this industry have grown more than 30 percent annually and on the other hand profit increases with the rate of 30 to 40 percent. Software industry development in India basically grounded on exports to worldwide markets and especially to US. For the industrial structure of the Regional Innovation System this export led growth trajectory has important implications and potential for upgrading indigenous companies. India has about 65 percent share inside the worldwide IT services off shoring sector (NASSCOM-McKinsey, 2005). On the other hand Karachi city also attracted attention of researchers

but it is not that much to Bangalore because growth of IT industry in Bangalore as compared to Karachi is very high.

So far these two nations especially India was competing worldwide due to the availability of cheap and qualified human resources there and another reason which is time zone difference with United State which permit them to work round the clock and their English language skills. But now days that development model is in danger due to increasing salaries in India and also in Pakistan and the rising of challenging nations for instance China. Substitute for the home-grown companies appears to be to move to activities with superior added value and begin competing on the foundation of innovation (D'Costa, A. 2006).

CHAPTER 6 CONCLUSIONS

A current growth in the field of information technology is certainly innovative in nature. In size and ease of access, knowledge and information are growing. Prospect decision makers in many fields will be accessible with extraordinary new tools for growth. In fields like health, agriculture, human resources, education and business improvement, transport or environmental improvement the consequences actually could be innovatory. Communication and IT have huge potential particularly for growing nations and in furthering sustainable growth.

If we look at the history of IT industry development in Pakistan and India respectively than in 1995 Digicom launched the first international internet service in Pakistan and from 1996 commercial internet service providers has been given licenses. In 1995 Digicom launched first online internet service in Karachi and the service was connected to Global Internet by 64 Kbps line. In the year 1999 there was about 21 ISPs in Karachi. From the IMRAN.AR.PK host two Pakistani computer devotees in 1991 established a UUCP email connection to global internet and as compared to this development of IT in Pakistan on 14th August 1995 first time VSNL introduce internet in India via dialup in 6 cities. In 1996 India's first cybercafé launched in a hotel at Mumbai. In 1997 first online banking site was launched by ICICI Bank. In 1998 India introduces new ISP Policy and which ends VSNL's monopoly on internet and Sify becomes India's first ISP. In 2000 IT Act 2000 passed by the Indian Parliament. In the year 2001 Indian Railways launches online ticketing site and Indian's first cyber crime police station established in Bangalore. In 2003 AirDeccan become first airline to offer online ticketing in India. In 2005 there were about 40 million net users, 200,000 cyber cafes and half a million broadband connections in India.

Software exports from Bangalore city in 2003-2004 was about Rs. 17,474 Crore and in year 2008 it was expected that software exports from Bangalore to touch 13.5 billion dollars. In the mid of 2008 there were about 248 Business Process Outsourcing (BPO's) and 183 bio technology companies with a work force of 5.5 lac technicians in Bangalore.

As compared to above IT export revenue growth rate of Pakistan which was 48 percent in 2003-2004 reached 67 percent in 2008-2009. According to State Bank of Pakistan in the year 2007-2008 the estimated total IT industry export revenue was about US\$ 1.4 billion and estimated total IT industry size was about US\$ 2.8 billion.

There are more than 1500 IT companies in Bangalore and as compared to it there is only 495 companies in Karachi. Important reason of Indian IT industry growth is the adaptation of latest methods and best practices by Indian IT houses and the most important in this type is Capability Maturity Model Integrated (CMMI). CMMI is a minimum benchmark which a software house has to achieve if that software house wants to get clients and business both in Bangalore and Karachi. India has more than 350 IT firms of that level and as compare to it Pakistan has only 20 companies that are evaluated on CMMI requirements.

Karachi city is the capital of Sindh Province, Pakistan and Sindh province has no state wise or province wise IT policy. IT industry of that province is working under National IT policy which was announced in 2000 and as compared to this province of Pakistan Karnataka state of India whose capital is Bangalore city, has its own IT policy which was introduced in 1997 and it was the first state of India who introduced its own IT policy and all the IT industry of that state is operational under this policy which is very flexible for the smooth running and growth of this industry there. Under these policies different incentives and benefits has been given to the IT industry and the people belong to this industry like tax holidays for specific period of time, availability of cheap land and electricity and other incentives and benefits.

Earlier growth of Bangalore in respect of software industry as a specialized hub could be somewhat clarified by the reality that few of the best Indian educational institutions which are famous globally are situated there like Indian Institute of Information Technology, Raman Research Institute, Indian Institute of Science, National Institute of Mental Health and Neuro-Sciences and Indian Space Research Organization. High availability of knowledge providers in the Bangalore region resulted in a significant collection of highly qualified and low cost labour force that can clarify the early interest

of United State companies in establishing their outsourcing activities in Bangalore and in case of Karachi some quality institutions are also there like Quaid-E-Azam University etc.

Without any doubt the existence of a large number of research institutions and educational institutions along with high tech clusters gives a base for the emergence of Regional Innovation System especially in Bangalore as compared to Karachi. But none of the systemic aspects of Regional Innovation system is strong in emerging Bangalore Regional Innovation System and in case of Karachi universities and industry cooperation as compared to Bangalore is not good. Universities and technology institutions are existed there and also providing quality education but their fees are very high and government spending on education sector is also low.

For such growth and development a stable and healthy system is required in respect of national or regional innovation system or cluster. From this study at some extent it looks like that IT industry of Pakistan city Karachi is working under a National Innovation System and it is not very strong and mature system and I did not find any proof for the existence of Regional Innovation System there in this study. Indian City Bangalore according to the study working through regional innovation system because of the existence of relationship among factors and conditions which required for regional innovation system. Further study can be focused on the factors which are affecting Karachi National Innovation System and the reason for it low performance in IT Industry as compared to Bangalore and how they can be improved.

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