Developments of Information Technology, Telecom and E-Commerce in Business Environment of Pakistan: An Analysis of Banking and Manufacturing Sectors

Muhammad Shaukat
Assistant Professor of Management & Human Resources,
Institute of Management Sciences
Bahauddin Zakariya University, Multan. (Pakistan)
Email: shoukatmalik@bzu.edu.pk

Abstract
Information Technology (IT) is the key enabler of change in today’s rapidly evolving business environment. IT revolution has changed the lifestyle of people in every part of the world. Today governments and private companies around the world are working on IT solutions required for their growth. This technology has emerged as a very fast growing sector in Pakistan as well and obviously IT sector is a deep resonant sound. This paper explores status of IT, telecommunication and E-Commerce in Pakistan from 1947 to 2006. It first examines IT history in Pakistan, Pakistani Government contributions to support IT diffusion in the country, IT usage in Pakistan industry, Pakistan IT infrastructure status growth and potential in Pakistan’s hardware and software industry, Internet, E-Commerce, Human Resources and Telecommunication status. Secondly, it brings into prominence the importance of IT usages in business organizations and then it discusses IT usage in Pakistan’s Manufacturing and Banking Industry over the time.

The findings of this paper reveal that IT is progressing smoothly in Pakistan. IT has been introduced in every discipline and organization of Pakistan with all government support. Like other sectors, IT has also been applied aggressively in Pakistan’s manufacturing and banking industries with all latest systems. The government is making sizeable investments in the IT sector and a huge chunk of this budget is meant for human resource development and provision of enabling infrastructure. Despite all this, the IT industry in Pakistan has not yet achieved sufficient maturity and need to be further developed with more support and backing from government side.

Keywords: Information Technology; Banking and Manufacturing IT systems; Internet; Telecommunication; E-Commerce; IT Human Resources.

I. Information Technology Status in Pakistan

Pakistan is a developing country. It got its independence on 14th August 1947 as a result of the division from the former British India. It encompasses 796,095 Square. km with about 152.53 Millions population. Pakistan is the first 5 in GDP in Asia and top 10 in total economic development in Asia. It is the 7th most populous country in the world,
stands at 147th place in the literacy rate, 128th place as per the Human Development index and 132nd position on GDP per capita basis among a total of 160 nations.

Pakistan is on the wake of its progress. In development, adoption and diffusion of technology, it has been facing the same problems like other developing countries. As it depended on the technologies mostly transferred from the developed countries. At the time of inception of Pakistan in 1947, there was no base of IT in the country. The office work was carried out manually and office documents were prepared on manual typewriters. There was not even a single electric typewriter. Post, telegram & telephone department (PT&T) established during British rule in 1885 was already working in the areas that came under the jurisdiction of Pakistan. At that time the only fastest communication link available was through telephone and telex.

The process of computerization in Pakistan started in 1957, when a company named “Packages Ltd.” started using computer for its work. It is considered the first company in Pakistan, which started using computer. The IT met slow introduction in Pakistan in beginning in 1960s then gradually it got massive attention and incentives from the government side and the government itself started using computers in all its big institutions. In 1980s, the personal computers brought a revolution not only in the world but also in computing environment of Pakistan. The technology was miniaturized and desktop computers were introduced having cheapest technology (Ghauri, 2006b). Imam(2002) demonstrates that realizing the global revolution in IT, the Government of Pakistan further liberalized the hardware & software imports in 1985. The custom duties on electronic goods were reduced drastically due to which personal computers flooded the hardware markets and people started using personal computers in offices and homes. In 1990s, the P.C servers with network technologies became stronger and stronger and started replacing Mini and Main frame computers in offices.

In 1991-92, heavy custom duties on computers were completely removed. The real quantum jump was experienced in early 90s, which can be termed as IT revolution in Pakistan as satellite communication technology was introduced. In 1991, 90% telephone lines were converted to digital. In 1995, Internet Service Providers (ISPs) started providing Internet facility to Internet users and now with rapid growth there are more than 132 ISPs in operation all over the country providing internet facility to more than 3,000,000 users.

It is all in 2000s, that the government gave a lot of emphasis to IT sector. New IT educational institutes are opened and IT professionals are hired to impart IT training in universities. Nationwide IT seminars, forums, exhibitions and competitions are being arranged to create IT awareness among the people. Computer as a subject has been introduced in schools & colleges. Cyber Cafes are opened to create awareness for Internet use. Telephone network has been enhanced and in rural areas, telecommunication facilities are being provided through small exchanges & PCOs. Links between Pakistan and other countries have been improved significantly(Imam, 2002). Pasha(2005)

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discusses that IT has become the focal point of the government now. The government has set up technology parks and IT boards in all provinces to promote economic growth in IT. Separate IT directorate at each district level has also been set up to diffuse IT in each department. The government has also started at mass level a talent hunt program to attract IT experts to work for Pakistan. A handsome budget has been allocated for the young graduates for local and overseas advance IT education and training. To promote and implement e-Government concept, computer training and education for every government employee has been made compulsory in federal ministries and record of all ministries and departments is now being computerized on priority basis. IT has now been inducted at all level of government (Kazmi, 2005).

The computerization in the country initially was monitored by the Ministry of Science & Technology (MOST) but since November 2002, a separate Ministry for Information Technology has been created and is now responsible for monitoring, growth and uplift of IT in the country. Many other departments/ institutions like Electronic Government Directorate, Pakistan Computer Bureau, Pakistan Software Export Board, Pakistan Telecommunication Authority, Computer Society Of Pakistan, Pakistan Software Houses Association (PASHA) etc. are also working side by side the Ministry of IT to help forward IT in the country (Cover Story, PAGE, 2005).

As argued by Osama (2005), the IT revolution is the fastest emerging revolution seen by the human race and the Internet surpasses all. Electricity was first introduced in 1873 and it took 46 years for its mass scale use, telephone introduced in 1876 and took 35 years for mass use. Television introduced in 1926 took 26 years for mass use. PC introduced in 1975 took 16 years, mobile phone in 1983 took 13 years for mass use while the web introduced in 1994 took only 4 years for mass use. The IT revolution thus has given a new vision of the future. Kazmi (2005) rightly noted that in Pakistan too, IT is also becoming a necessity. The market of Pakistan today buzzes with IT activities and the current boom in IT dates back to early 1996 with introduction of Internet which opened up a communication channel between Pakistan and rest of the IT world. It is estimated that in 1967 there were around 16 mainframes computers working in Pakistan but presently there are around 2,100 mainframe and minicomputers in the country with nearly half of them are in the Government sector. Liberal import policy and reduction/removal of duties have led to a burgeoning usage of PCs and servers. It is estimated that nearly half a million PCs are added each year, representing a three fold increase in annual volume over the decade straddling the 21st Century. Analysts estimate that this rate of growth could very well quadruple by end of 2010 (Ghauri, 2006a; Pasha, 2005).

II. Pakistan’s Information Technology Infrastructure

IT, as discussed earlier today encompasses a wide range of areas and covers a whole gamut of hardware, software, networking producers & services and telecommunications technologies (Long and Long, 1999). IT thus is a hybrid technology that results from a synergy between telecommunications infrastructure, software &

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5 A decision taken in the first meeting of National E-Government Council under president ship of Prime Minister of Pakistan Mr. Shaukat Aziz on April 27, 2005. (The Jang, April, 28, 2005).
6 PASHA is a representative body of software developer of Pakistan. It was found in late 1992 by 9 software hoses and now have about 350 members national wide: www.moitt.gov.pk
7 Kofi Annan, Secretary General U.N, commented on 17th May, 2004, on world telecommunication day.
hardware development, standards and human skills. Infrastructure of IT sector in Pakistan consists of following segments: 1) Hardware and Software 2) Telecommunication 3) Human Resources (Imam, 2002).

As Long and Long (1999) comment that an established IT infrastructure is a necessity for development of an organization and a country thereof, so is the case for Pakistan development. All the developed countries have well established IT infrastructure and self-sufficiency in all IT tools but underdeveloped countries like Pakistan are still striving to have most of them. Many developing countries lack the required IT and telecommunication infrastructure to become true IT user. Therefore, to cope with the rapidly advancing IT world during last ten years, Pakistan has been developing necessary IT infrastructure (Netmag August, 2005).

a. Hardware Industry in Pakistan

Gupta(2000) defines computer hardware industry as “designing, development, manufacturing and maintenance of all products, modules and components that form the building blocks of an IT infrastructure”. A thriving hardware industry is pivotal to the growth of IT infrastructure and services. Computer hardware manufacturing is extremely capital-intensive industry. This is a relatively young industry, and is facing lot of problems with regards to getting recognition in computer manufacturing in Pakistan.

Khan(2001a,b) rightly demonstrated that there is no computer hardware manufacturing activity in Pakistan in true sense. The reason is, that imported hardware components are available in abundance and on fairly cheaper rates. Especially after the emerging of China as a big computer hardware manufacturer and supplier, the prices of hardware components have been reduced. In this scenario, the computer hardware manufacturing in Pakistan is currently not feasible. Khan(2001a) further adds that hardware industry is profitable only if it works on economy of scales, which depends upon vast markets. In Pakistan, the market is negligible for hardware consumption and it will not be competitive with China, so this industry has no reasonable prospects in Pakistan to develop & flourish at present. Another researcher Ghauri(2006b) argues that there is also no much encouragement by the Government for consumption of locally manufactured IT products as China. Mostly the computer vendors are assembling the imported parts and components to produce the personal computers. Some companies like INBOX, RAFFLES, MICRO PAK etc. have developed organized assembly lines and are producing small components like casings of PCs. and M/s Enabling Technologies are doing some hardware designing activity(Khan & Shah, 2004; Money plus, 2006).

b. Software Industry in Pakistan

Software is Information Technology’s Achilles heel. Software Industry in Pakistan has developed a lot during last ten years. Due to liberalized IT policy, a mushroom growth of software houses has been registered in IT sector. The Government of Pakistan is taking very significant steps to develop IT culture in Pakistan and lots of incentives have been given to software houses to start software business(Imam, 2002).

The computer software can be grouped into two types i.e 1) Systems Software(Operating systems etc. and 2) Application Software(Business programs etc.) (Shelly et.al, 2004). In Pakistan system software for micro, mini and mainframes comes largely of the packaged variety from the vendors who supply hardware to the companies or in some case these software are imported directly from the producing firms, which all
are based in developed countries. Except one or two (Urdu version of a typing software), most of the operating systems and languages/packages are being imported from developed countries. As far as application/business software development is concerned, there are lot of development activities in Pakistan. According to conservative estimates, there are about 660 software houses based in Pakistan which are busy in developing and exporting software to the developed world in areas as diverse as database management, Internet applications, e-Commerce, CAD/CAM management systems, etc.\(^8\) In software development side the first private software company i.e. “Systems Private Limited”\(^9\) was formed by “Packages Limited” in 1977 in Lahore, Pakistan.

In the world the software industry has become one of the fastest growing industries capturing billions of dollars in the global market, its contribution to the socio-economic development of the countries is also very significant. So realizing this importance of the software, the Government of Pakistan has established Pakistan Software Export Board in 1995, with main objective of encouraging software exports in the country. Taking a step further the Government declared the Computer Software Information Technology as “Industry” by a notification in March 1997. The Software Houses, though established in the 80s, but software market in Pakistan came in the limelight in early 1996 with the introduction of Internet which opened a communication channel between Pakistan and rest of the IT world (Khan and Shah, 2004; Hussain, 2005).

The Government of Pakistan has extended very liberal fiscal and monetary incentives for software exports (Ayub, 2006). With the efforts of PSEB, software exports are now picking up and it has gone up to $70m during the financial 2005-2006 year and current no is much more\(^{10}\). Ismat and Hasan (2005) say that the ability of Pakistan to produce quality software is 1) its abundant pool of IT professionals 2) emphasis on software quality and well-managed processes. Currently though a few software companies have either ISO 9000 or CMM(Capability Maturity Model) certifications but this number is being increased.

Ghauri (2006b) says that the Government is giving significant benefits to software industry to promote investment and it has positive results and it brought many companies from North America, Europe and the Middle East to work in Pakistan. Ghauri (2006b) stresses on the need to improve quality of Pakistani software and timely completion of projects. In his survey on Pakistani software usage, he found that some companies are reluctant to use Pakistani software because in few systems, there were horrifying statistic for the number of software systems which are delivered too late for use or with so many bugs (errors) that they are unserviceable or a proportion of the systems do not carry out the task for which they are designed. According to him much of the dissatisfaction with IT is the result of software-late, inappropriate or useless and there is need to overcome these problems.

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\(^{10}\) These are estimated figure of PSEB, as State Bank of Pakistan claims with reference to PSEB that export of IT is not carried out through the formal letter of credit.
c. Internet Status in Pakistan

The Internet has been described as a “Network of Networks” or as a “Loose collection of related computers networks”. Measurement of internet diffusion are usually based on several indicators such as: Connectivity, number of hosts, no of websites, number of users and other compound indices (Shelly et. al, 2004). Based upon these indicators the following discussion gives us true status of Internet usage in Pakistan.

Hussain(2005) has investigated that though Internet entered in Pakistan in 1995 but it got real boom in the year 2000 when the government started backing e-Economy in real sense. Cyber Net and DIGICOM both are the first Internet Service Providers in Pakistan, which were established in 1996 and can rightly be termed as the most proactive ISPs in the country. Over the last one-decade, several others like Brain Net, COMSATAS, WOL Net, Pak Net, Cyber Net etc have joined the fray. Today, about 1900 cities of Pakistan have been connected through Internet. About 138 companies have been awarded ISPs license, and are providing Internet connectivity and other web-related services in the country. COMSATS Internet Services also took an initiative to train and transfer the IT workforce of Pakistan in Cisco Network Training.

The growth rate in Internet and information services in developed countries is unprecedented, varying up to 100% per annum, depending on socioeconomic level. The Internet growth rate in Pakistan is 30%, whereas IT growth rate is estimated at 50% p.a.\textsuperscript{11}

AT the end of 2005, there were more than 2.4 millions people of Pakistan had an access to Internet and other information networks of the entire world\textsuperscript{12}.

Keeping international telephone and Internet access statistics in view, Pakistan still has low access to information network. Today global ratio of public access to telephones compared to Internet is about 12:1 which is improving every year. Pakistani government also estimates explosive growth and aim at building information network capacity (Khan and Shah, 2004).

d. E-Commerce Status in Pakistan

E-Commerce stands for electronic commerce. It is new way of doing business in this IT revolution world where physical boundaries have no meaning. E-Commerce offers many inherent benefits. It enables trade efficiencies by eliminating the delays, helps cuts the documents costs by allowing trade partners to exchange transaction data digitally and reduces errors to increase productivity and efficiency. Most importantly, it removes geographical barriers to have a real time online access to international markets at affordable costs (Laudon and Laudon, 2005; SAMEDA, 2005).

Choi & Whinston(2001) argue that a firm that employs IT and especially real time networking in its various activities is called e-business firm. Thus most firms will qualify as an e-business firm in its broadest sense. E-business firms include not only those that sell products online but also those that use computer and network technologies in their manufacturing, operations, supply chain management, marketing, sales automation and customer support. In short, any firm that applies digital technologies and networking to organize itself and manage its business operations and relationships is an E-business firm.

\textsuperscript{11} Minister for Information Technology, The Jang, 15\textsuperscript{th} May, 2005.
\textsuperscript{12} World wide internet user reached 1b, India has 6M and China has 10M internet users. C.N.N 17/01/05
Rab(2004) demonstrates that commerce on the Internet reached $3 trillion globally in the year 2003 and current no is almost tripled. With the emerging dot.com culture in Pakistan, there has been a mushroom growth of information web portals, specialized search engines and commercial websites in the last couple of years. The number of Internet users in Pakistan is constantly increasing and is likely to soar manifold in the next couple of years. Internet Service Provider Association of Pakistan (ISPAK) claimed that the by the end of year 2005, number of Internet subscribers have reached about 2.4 millions and there are about 4.0 millions e-mail accounts, and current number is much more. There is huge decline in bandwidth rates for high speed internet services across the country and this will help in the growth of broadband subscriber13. On IT infrastructures side, as on November 2005, 1900 cities and towns have been connected to Internet via local PSTN loop14. Mujahid(2003) pointed out that Government of Pakistan has been on the forefront to trigger the IT and E-Commerce revolution in Pakistan through virtual and distance learning and E-Commerce enabling initiatives. The Government is taking all measures to promote commerce on Internet.15

Farooq and Mahmood(2005) highlight that with an E-Commerce plan envisaged by the government, the financial sector has become the springboard for developing b2b E-Commerce in Pakistan. By establishing an E-Commerce network, known as EC-Pak Network services about 2,487 branches of 25 local banks and all foreign banks have been connected, in 12 big cities of Pakistan. All these banks will be soon linked to the State Bank of Pakistan and, to public and private stakeholders such as the tax collecting agencies, provincial governments, national saving centers, post offices, utility companies, government bodies, money changers, trading houses, airlines, shipping lines, clearing agents and insurance companies. Kazmi(2004) posits that although a lot has been done to promote E-Commerce in the country but still much more is expected in this regard. He while narrating the E-Commerce status in Pakistani banks says that through 1-Link net (ATM network of all banks except MCB) and M-NET(ATM network of MCB) all banks links are connected since March 16, 2004. Apart from all the present achievements still lack of other E-Banking facilities have become a serious constraint in achieving the ultimate objective of E-Commerce and Pakistan has not been able to establish the network to facilitate E-Commerce in its true spirit. Kazmi(2004) terms this slow pace to the low literacy rate, lack of reading, research and development, high cost of computers, lack of basic understanding of how-to use Internet, lack of entrepreneurial spirit, unstable economic, political and legal environment, absence of regulatory frame work for E-Commerce and absence of interactive websites which allow E-Commerce transactions.

Table 1 provides a brief overview of Pakistan’s IT industry status upto December, 2005.

e. Telecommunication Status in Pakistan

Telecommunications today is a product of technology and politics. The first electronic telephone switching was installed in the United States in 1965. It used a computer for control. But with rapid growth in this sector and the use of transmission media-terrestrial copper cable, microwave radio, satellite and optical fiber now have

provided several links including LAN, WAN, MAN, ISDN, DXX, DSL, RADIO and VSAT\textsuperscript{16} etc. for connectivity (Lang, 2002).

Pakistan at the time of its inception in 1947 owned a meager telecom base with just 7000 telephone lines. Telecom service was meant just to meet the needs of country administration. The year 1962 saw the first big sector change when Post Telegraph & Telephone services were separated by establishing independent T&T and Postal Departments. Since the mid-1980s, a number of countries including Pakistan overhauled telecommunications sector, to arrange / mobilize additional capital, improve performance of operating enterprises and respond to rapidly growing pressures for more varied services.

Table 1  Pakistan’s IT Industry Status

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\textbf{STATISTICS OF THE PAKISTANI IT/ITES INDUSTRY} &  \\
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Total Number of IT companies working in Pakistan & 560 (Registered PSEB Members) \\
Number of substantial IT companies & 335 (Active PSEB Members) \\
Number of companies ISO certified & 76 with another 30 due to be certified by June 2005 \\
Number of companies CIMA Assessed & One CMM Level 5 company, One Level 4 \\
IT and IT Enabled Services Exports during 2004-2005 & Another five ready for assessment at CMM Level 3 by March 2006 \\
Percent growth in Exports & US$ 48.50 million (transacted through the State Bank of Pakistan) \\
Export target for the current fiscal year 2005-2006 & 45% over Fiscal Year 2002-2003 \\
Annual Software Industry Turnover & US$ 72 million (State Bank transactions) \\
Number of IT graduates produced per year & Around US$ 70-80 million \\
Number of Universities offering IT / CE programs & About 5,500 \\
Number of IT Professionals engaged in export oriented software development & About 6000-6500 \\
Number of Call Center agents working for international clients & About 2,500 \\
Total number of IT professionals employed in the country & About 75,000 \\
Total IT spending in fiscal year 2003-2004 & About US$ 600 million \\
Total amount of space utilized in STPs & 600,000 sq ft \\
Cost per E-1 connection (INR) & US$2000 per month \\
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Source Pakistan & Gulf Economist, December 5-11, 2005. pp 11.

The pace and scope of sector reforms have varied considerably in South, Latin America and Asia. A number of countries opted to privatize their telephone entities. In the Far East (early 1990s) there have been initiatives on partial privatization (Thailand & Malaysia etc) including liberalization of non-basic services. The results achieved were found to be beneficial. This brought the wave of change in South Asia also. To begin, Pakistan in 1990 also started taking gradual sector reform measures within the existing legal and regulatory framework. In line with emerging trends, private sector participation and deregulation initiatives were taken in between 1989-1991 and new legal framework in the form of Pakistan Telecommunication (Reorganization) Ordinance, which was later enacted by the parliament with some amendments as an act has been introduced in October 1996. Today, this new law is governing the telecommunication sector in Pakistan and under this law the Government has privatized PTCL, to help inject private capital and skills into the mainstream service business\textsuperscript{17}.

In 2003, Pakistan’s economy has witnessed yet another year of exceptional growth as telecom sector was liberalized and since then a number of multinational telecom

\textsuperscript{16} VSAT: Very Small Aperture Terminal. This proprietary network is based upon satellite technology.

\textsuperscript{17} “Private sector urged to play role in promoting IT”, The Business Recorder, 6\textsuperscript{th} May, 2001.
operators have started investing in the country. For the years, Pakistan’s telecom sector has plodded along, seemingly stuck in the mid-20th century. From 2.1 phones per 100 Pakistan in 1999, the number of fixed lines has caught up to just 3.5 per 100 today. And while cellular has been more dynamic, only about 20% of Pakistanis have cell phones. Mobile subscribers reached about 30 millions at the end of August 2006, whereby total mobile penetration reached 17.16%. The mobile sector thus grew by 195.6% in one year, which is the highest ever annual growth in the history of Pakistan’s mobile sector. Since July 2003, PTA has handed out more than 200 fixed, mobile and long distance licenses to different companies. More than 360 cities all across the country are covered by mobile operators’ services (Netmag-September 2006, Hydir, 2006).

Share of telecom sector in the gross domestic product has also touched 1.9% in 2005. Teledensity of Pakistan Jumped to 13.67% breaking a record of percentage growth of 105% in just one year. Total investments made in telecom sector after liberalizing is estimated to be US$ 1.02 billion till the end of year 2004-2005. In 2004-2005, telecom sector remained one of the major contributors in governmental revenue and the government collected Rs 20.5 billions as GST/CED from the sector. Similarly, approximately 202947 direct and 233266 indirect employment opportunities were created during the year. Share of telecom in GDP reached 1.9%. The pace of its growth is more than 100%. (Sargana, 2006).

Pakistan Telecom Authority (PTA) has shown concerted efforts to make this sector fastest growing in the region. The government awarded “Industry” status to telecom sector in 2005 on PTA proposal with the aims to bring certain benefits allied with this status, such as borrowing of foreign companies from local market, no minimum investment requirement for manufacturing, subsidized utilities etc. (NetMag-November 2005). Following its liberalization policy Pakistan has ultimately privatized its national telecommunication services i.e PTCL in 2005. Though, in 1994, 12% shares of PTCL were sold through capital market, while Etisalat a U.A.E based company won bid of PTCL on 18/6/2005 for purchase of 1.3 billion shares(26 % of total share) of PTC @ $1.96(Rs 117) per share, with PTC’s controlling management rights. The Etisalat has taken over charge of PTCL since 12th April, 2006.

The IT infrastructure covers most part of the country by using fiber optic channels, satellite systems and digital switches to create a strong, permanent and reliable IT infrastructure. This infrastructure supports private players in IT and Internet area. PTCL tariffs have been reduced keeping business needs in mind along with the future competitiveness of telecom giant. Competition among ISP’s is rising, leading to improving better and quality of service for the consumer. Internet bandwidth consumption, internet access via ISDN, DSL, services, CDML, GPRS etc. are just some of the technologies that have grown exceptionally in Pakistan (Hydir, 2006). The success story of telecom sector has been recognized world over and Pakistan has received GSM

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19 Pakistan has won the “Government leadership award 2006” for rapid progress in the field of telecommunication. After Brazil, Pakistan is the 2nd country to receive the honor: The Dawn Jan 28, 2006.
20 Pakistan Telecommunication Authority online quarterly report 2005.
award of government leadership among 60 regulators of the world in 2006 and ITU awarded G-Rex award to PTA, which is the testimony of its success (Sargana, 2006).

f. Internet Infrastructure Status

Rizvi(2005a) argues that international telecom traffic has almost been doubled in last three years (726m-minutes in 1998/99 to 1250 m-minutes in 2001/02). Initiatives were taken to increase the network capacity through up-gradation of SEA-ME-WE-3 from 0.4 m to 2.8 million MIU kms. The Pakistan second cables SEA-ME-WE-4 has also started operating since January 2006. Two more optic fiber cables are also laid down in private sector.(One by TWA Transworld Associates (Pakistan’s first private undersea optic fiber cables operator-TWA-1 has landed its cabling station in Karachi. It has also started working to meet the urgent need for reliable international connectivity)). Pakistan has direct bilateral arrangements with 52 countries, whereas connectivity to remaining countries is through transit arrangements. Pakistan is offering Internet dial-up access (local call of no time limit) for Universal Internet using numbering scheme e.g. UIN (131-XXXXX).Rapid expansion of ISPs resulted in small enterprises, to date 85 ISPs have planned services using 131 Access-Code & 65 ISP’s are in actual service(Cover story, 2005).

The Internet bandwidth obtain ability in Pakistan has increased from 35 Mbps to 410 Mbps in last three years. An educational Intranet ranging from 256Kbps to 6Mbps has been initiated for 56 HEC accredited universities. In addition to the local content, an aggregate 4 Mbps international connectivity (up-gradable to 32 Mbps) will also be provided. Optical Fiber Cables (OFC) have been laid for 16 universities, out of which six universities are ready for using Intranet/Internet facilities. About 70% reduction in long distance (NWD) and international call rates has been done during past three years. Tariff reduced thrice during the year 2003-2005 and new telephone installation charges are reduced by 50% and in some areas it has been made free. Furthermore, substantial savings on telephone shifting charges and other services is offered to customers. Tariff of domestic bandwidth/ leased lines reduced giving more incentive to ISPs and mobile operators.

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g. IT Human Resources Status in Pakistan

Human resource is the major element of success of any system. Human resource development is central to adoption of technology and promotion of sustained development. Pakistan having about 150 millions population has great talent to be used in IT projects. No doubt, it has late entry in IT. It is now at that level where its neighboring country India was 14 years before. Among others, one of the major problems as Osama(2005) indicates to this slow IT diffusion in the country is lack of trained and competent manpower in IT related field. The literacy rate and the number of skilled workers available to provide technical support in IT are comparatively low in Pakistan.

Therefore, to realize the need of time, in order to take-up the challenge and as a part of a comprehensive master plan for manpower development, an aggressive program

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to upgrade IT education at various levels has been undertaken by the government under the auspicious of IT policy and action plan. Over 200 institutions including 26 recognized universities have started different IT education programs. Free Internet connections are being extended to public sector universities under an agreement with the private sector ISPs & PTCL. The setting up of virtual university\textsuperscript{26} is one step forward in extending the frontiers of quality IT education in the country.

A large number of educational and professional institutions have been established in the country for imparting IT education and few others are on way\citep{Khan_and_Shah_2004}. Kazmi\citeyearpar{2005} argues that human resource development has been assigned the top priority for the development of local IT industry and to position Pakistan as an important player in the international IT market. Under this plan a large pool of academically as well as technically skilled IT manpower is being developed to meet the local and expert need. Hundred of millions of rupees are also being payout in upgrading existing public sector universities for IT education.

| Table 2 | exhibits an approximate no of available IT professionals in Pakistan. In this regard Hussan\citeyearpar{2005}, however, criticizes the large scale establishment of IT institutions by saying that there are serious imbalances at various skill levels and these institution are giving, low level and sub standard education and producing only lower level white-collar labor force. This has lead to critical shortage of highly skilled workers, on the one hand and surplus of while-collar labor force at lower skill levels, on the other hand. He urges that a proper policy formulation to improve IT education quality from the government side could refrain away avoid these mismatches.

Bhatti\citeyearpar{2003} and Hussain\citeyearpar{2005} also indicate the presence of following pitfalls in IT education systems going predominant in Pakistan 1) proliferations of standard in IT education 2) lack of competent IT faculty in universities 3) obsolete material is taught by most of the universalities in Pakistan 4) lack of imparting adequate analysis and design skills 5) lack of latest teaching methods with video conference concept 6) outdated text books, etc. Bhatti\citeyearpar{2003} recommend that this pathetic state of IT education can be overcome by appropriate curriculum development, faculty development, students scholarship and financial support, quality assurance through monitoring and accreditation system, market links through internships, projects and placements services. He further says that by establishing world class computer laboratories, contacts, and collaboration with other universities in the world. We can develop strong and cohesive industry oriented education and research programs to help organizations to accelerate their productivity.

\textsuperscript{26} Virtual University has been established under an ordinance promulgated by President Pervaiz Musharaf on October 11, 2002, to provide education & training in Information Technology, Business Management and emerging sciences through satellite, television & Internet.
Pakistan can also overcome IT personnel shortage by involving industry in helping IT educations like in advance country\(^\text{27}\) and to attract and retain competent IT peoples in the country by offering them high salary. Pasha(2005) also suggests that the government can assure the quality education in private and public institution by developing quality assurance tools and procedure, asking the institutions to update curriculum in the light of international recommendations, start new and demand oriented programs, maintaining academic level of excellence in light of voice of industry and developing materials and processes to propagate IT.

To sum it up, it can be said that like all other components, human capital is also indispensable for IT systems. Pakistan is rich in human resources, which matter most for economic advance, as well as other natural resources. Its’ 150 million population has enormous potential to be trained in any specialized field including IT. Pakistan has talent but there is a need to properly train and provide directions to the people. Human resources need to be developed in the right direction. The government of Pakistan now is trying at all level best to train the masses to become IT experts by upgrading the technical and managerial skills of its people to compete in the world. However, there is a need to check the quality of the IT education and the usage of the funds being reserved for IT uplift. To conclude all above, it can be said that the Government of Pakistan now is giving all-out support and push to IT sector. Millions of dollars are being invested by the Government in IT, and majority being spent on human resource development and enabling infrastructure provision.

### III. IT in Banking & Manufacturing Organizations

The Pakistani Government and the business community in the country have now fully understood the value that automation can adds to their commercial concerns, by driving down costs, improving products, reducing time to market and providing quality services to their customers. Therefore, IT is being used in almost all government and private organizations in one or the other shape. According to a study conducted by the ministry of Manpower, Labor and Overseas government of Pakistan in the year 2004, it revealed that the introduction of IT in the country has influenced positively the

\(^{27}\) In America AT & T in 2003, has committed $150 millions to provide Internet access to all schools.
organizations in term of increased productivity, marketing and reducing per unit cost. It led to varying degrees of improvements in job, living standards, fair treatment to employees, level of worker’s satisfaction, capability enhancement, balancing family life with work etc. in almost all sectors of Pakistan. All the Pakistani organizations including banking and manufacturing are the biggest beneficiary of all the IT innovations. The ensuing discussions highlight the use of IT for these sectors in detail.

a. Information Technology in Banking Organizations

Akhter (2006a) while stressing on the importance of technology in financial institutions posits that technology helps to catalyze efficiency in the provision of financial services and ultimately in determining the winners in the intensely competitive financial markets of the future. According to Akhtar (2006a) in addition to product innovation, globalization, deregulation, macroeconomic performance and priorities, universal banking, risk management, changing role of and demands on the regulator, the technological advancement is also one of these factors which are generally believed to have been the major drivers of change in the financial industry world over.

IT in banking is not new, as according to the banking world of Finland the systems and connections between banks have based on the use of IT for a long time. All over the world banks are increasingly deploying IT to their operations to improve productivity and enhance customer services. The role of IT has grown and simultaneously changed in the banking sector over time and financial institutions are one of the largest investors in information systems (IS). In 1960’s IT was used to raise the cost-effectiveness. In the 1970’s IT was used as a strategic competitive possession and in the 1980’s and onward IT became a key-factor in increasing new services. IT has now completely changed the channels of delivering financial services (Bhide, 1997).

According to a survey by Ernst and Young and the American Banker, the industry’s IT spending is expected to reach unprecedented heights in the late 2000s. Nsouli (2002) notes that IT expenditures by the US banks have recorded a compounded annual growth rate of about 8.5 per cent. He says that given the magnitude of the banking industry’s growing investments in IT over last two decades, large increases in productivity might have been expected in future. In the last decade alone, bank’s spending on IT has risen rapidly from some $14bn in 1990 to 20bn in 1995 and 30bn(approximate) in 2000(Gupta & Collins, 1997). This diffusion of IT has began to derive benefits in term of lower cost, employee productivity (Strachman, 1994), increase in transaction throughput(Karr, 1996) and overall profitability(Teixeira, 1995). A statistics shows that workers in the finance industry use computers more than any other industry.28

Mayer (1987) while narrating the history of computer usage in banking demonstrates that the use of computers in banking first began in the early 1950s, when the first large commercial computer was built for Bank of America. Initially, computers were used to process check transactions through magnetic ink character recognition. With the introduction of first automated clearing house in the early 1970’s electronic funds

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transfer (EFT) was made possible, and then ATM was introduced. Today, ATMs deliver banking service 24 hours a day, 7 days a week to more than 22 millions peoples only in USA. ATM has replaced costly transactions formerly made by tellers and reduced employment and labor cost (Martini, 1999). The banking applications have ranged from back-office (check and accounts) processing, mortgage and loan application processing, and the electronic funds transfer to more strategic innovations such as automated teller machines and new kinds of securities. Sievewright (2003) highlights that a large part of banking now is being conducted online through internet and this growth of Internet banking has also raised a host of legal issues as well, including security, authentication, consumer protection & privacy and the banks have to overcome these problems.

b. IT & Banking Sector of Pakistan

Banking industry in Pakistan has seen great transition during fifty-nine years of his history, especially since early 1970s. The banking nationalization in 1974 and then privatization and liberalization in early 1990, are termed as major restructuring years of the entire banking industry of Pakistan. At the time of inception of Pakistan in 1947, only few bank branches existed in the country, which were concentrated mainly in the urban areas. Moreover, Pakistan was without a central bank of its own till June 30, 1948. However, by early 1990s the banking sector had spread to every nick and corner of the country.

The market for banks is diverse in Pakistan comprising Nationalized Bank, Private Banks and Foreign Banks. There is a phenomenal progress in banking sector of Pakistan. It recorded an increase of 99% growth in profit in only one year i.e. 2005. NBP, HBL, MCB, ABL, UBL are still considered five large banks and are very dominant in the banking industry, in term of total number of branches, deposits and advances, collectively accounting for 78% and 77% of total deposit and advances respectively (Mahmood, 2006a). Most of the local banks are in private sector now, and many of them have started business since 1992.

In Pakistan almost all national and multinational banks are using IT to increase their performance. The introduction of computer in banks in Pakistan started in 1965 when the main commercial banks in private sector i.e. Habib Bank, United Bank and Muslim Commercial Bank started acquiring computers to regulate their banking work. Since that time there is a massive investment in IT in banking sector (Ahmad, 2003; Akhtar, 2006b). This is bore out by the fact that during fiscal year 2003-2004, over US$ 200 millions was invested by the financial services sector into IT products and services. Shafiq (2001) says that not only this but also the banking sector has dramatically increased its dependence on use of IT, and it is evident by the growth in the number of branches that are connected online. Most of the Pakistani banks (local and foreign) have launched their web sites and have uploaded many things on web including accounts opening forms and loan applications. Likewise, the number of Automated Teller Machines (ATMs) and the use of automated cheque clearing and other back end systems.

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29 Don Wetzel developed ATM in 1973 and it was first installed at Chemical Bank in New York (Shelly et al. 2004) pp5.39.
33 “Status of IT Industry Of Pakistan, The Dawn, 28th February, 2005.”
within the banking community have increased. The banks now are offering Internet and mobile banking that has made major impacts.  

There have been great advances in Pakistan banking technology in the past several years. The most recent automated banking systems like Misys, Sibel, and Fidility etc are being installed in many of the Pakistani banks (Syed, 2006; Kazmi, 2004). In banking software supply, foreign companies are the real beneficiaries of IT projects in Pakistan and about 75 per cent of all software spending on most recent 12 projects in the country, especially those by large banks, are awarded to foreign companies.

It can be concluded in a way that a lot has been achieved and lot more remains to be done and at a much faster pace in banking technology of Pakistan with encouraging and support by the regulators for complete e-banking status in Pakistan for the transition of traditional banks into virtual banks.

c. Information Technology in Manufacturing Organizations

Automation in manufacturing organizations goes back to 1900, around the year 1900, factory mechanization facilitated mass production to meet the consumers’ demands for improve products. In the year 1930, transfer lines and fixed automation were created to facilitate mass production. This resulted in the development of programmable automation. By the year 1950, numerical control (NC) was developed as an innovative approach to programmable automation. With the development of commercially available computer technology, the application of computer in manufacturing started to emerge by producing a variety of new technologies (Morisi, 1998). By the year 1955, the introduction of computer aided design (CAD) and development of NC resulted which lead to the evolution of system like computerized numerically controlled machine tools (CNC). By the year 1970, development in CAD applications and Computer Aided Manufacturing (CAM) based systems, Computer Aided Engineering (CAE), Material Resource Planning (MRP), Flexible Manufacturing Systems (FMS), which are collectively named as AMTs-Advanced Manufacturing Technologies was made. AMT provided flexibility as well as data driven computer integration for a manufacturing organization, in which the manufacturing technology utilized is intelligent enough to urge forward the activities with less human interventions. Industrial robots, automated guided vehicles, and automated storage and retrieval systems are also introduced. These applications can be connected via Local Area Networks (LAN) to form Computer Integrated Manufacturing (CIM) and externally, across organizations and space, via Electronic Document Interchange (EDI) (Sohal, et.al, 2001).

For every industry, each decade is blessed with a particular buzzword or a set thereof. In the manufacturing sector, the pride of place has been occupied by the world ‘technology’. The technology advancement in the world over is so rapid and wide spread that isolates manufacturing and technology from each other is merely an impossible proposition. The Internet based distributed systems and latest software packages have motivated the manufacturing industries to utilize IT aggressively in all areas (Ho, 1996).

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33 Approximately 1400 ATMs have been installed by different banks till July 2006 in different cities of Pakistan The Dawn, August 22, 2006.

34 The State Bank of Pakistan’s automation project (Total volume of 34 million US$) has been awarded to M/s Hyundai Information Technology Co. Ltd. That is the biggest IT projects in Pakistan: NetMag Aug05.
d. IT And Pakistan Manufacturing Sector.

Pakistan industrial sector remains a relatively small part of the total economy. The Pakistan developed a substantial industrial sector in a very short time. The share of manufacturing in GDP was 14.8% in 1999-2000 but increased to 18% in 2004-05. Almost 24% increase in six year. Pakistan’s economy, which grew at 6.4% in fiscal year 2003-2004, achieved a broad based growth of 8.4% in 2004-2005. The overall manufacturing accounting for 18.5% of GDP, registered an impressive growth of 12.5% against the target of 10.2% and last year’s achievement of 14.1%. Overall, manufacturing is growing at a much faster pace than agriculture and services and if this pace is sustained, its share in GDP is likely to rise further in the medium term35(Mahmood, 2006b). In Pakistan both large-scale multinationals, local and small scale domestic and international companies are operating which are producing goods of almost all kinds(Saeed, 2003).

Though the introduction of IT in Pakistan started in 1960’s but it’s wide spread diffusion has started in the last few years. The government also started encouraging and promoting the manufacturing sector to use IT at all levels. In manufacturing sector of Pakistan, Packages Ltd. was the first company, which started using computer in 1957. After that many other companies in this sector started using computer to increase their productivity. Now IT usage in manufacturing and industrial sector is very common(Rizvi, 2005). Within the industrial sector, the use of Enterprise Resource Planning (ERP) software packages such as SAP and Oracle has become commonplace, companies such as ICI, Caltex, PSO, Packages, Simens, KSB pumps, Pakistan Tabacco, Honda Atlas and tens of others have deployed high end ERP (SAP) solutions. All manufacturing organizations including textile are investing heavily into specialized software and IT solutions to reduce costs and improve quality. There are ongoing IT projects with ERP solutions worth millions of rupees in various manufacturing companies36.

IV. Conclusions

Information Technology has proven to be the key technology of the past three decades. Over last two decades it has developed at a breakneck speed and has brought tremendous opportunities for mankind globally. In Pakistan IT comparatively got late introduction but it is progressing smoothly to meet challenges of globalization era of 21st century. Large satellite dishes, mobile phone, Internet and cable systems have been penetrated into the Pakistani culture. The growth in Pakistan IT industry has been unleashed in the past years. Almost every organization working in Pakistan now is using IT for its work. IT has got massive attention from the government at present. The Government has liberalized its rules with regards to IT and offering different incentives to boost up IT usage. Pakistan's IT industry has a modern and rapidly expanding telecommunication system, experts from various disciplines, highly skilled and economical workforce with completely transformed telecommunication industry.

Realizing the need of time like world, in Pakistan, manufacturing and banking industries are also using IT to increase their performance in almost all areas. IT has become means of better production and services in these industries. Advancement in production and communication through IT has changed the nature of working for both

In addition, introduction of Internet and advancement in computer connectivity have given companies an opportunity to conduct their business on-line.

Despite having all this IT industry in Pakistan has not yet achieved sufficient maturity for IT to fulfill all needs and to face severe competition in the international market. A lot is required to be done in Pakistan regarding IT. The country has people with technological skills but need to be refined. Pakistan has a relative advantage for having world standard optic fiber telecommunication infrastructure but it is week in hardware and software. The IT hardware industry is facing death while its counterpart—the software industry is flourishing to some extent. It is urgent need, therefore, to create business models and new plans for growth of hardware and quality software in the country. The substandard educational institutions are imparting low quality IT education in the country and earning a bad name to it. These institutions are needed to be monitored for quality education to produce world class IT experts. Overall, it can be said however that though IT comparatively got late and slow introduction in Pakistan but the journey which it started from 1960s is still going on. The government of Pakistan now is taking each necessary step for diffusion of IT in the country at priority.

All in all, it is no secret now that Pakistan has emerged as one of the most technological enhanced nation in the region. With the continuous efforts and patronage of the government and private companies, IT is considered to be in the take off stage and is catching up with the regional and global industry. This technology has emerged as the fastest growing sector in Pakistan now. There has been the shift of the government from telecom service provider to market regulator. In this era of globalization the country is taking a tempo towards the contemporary epoch of telecom revolt. The growth rate in each and every division of IT is remarkable. But of course, the success and future IT industry in Pakistan is directly linked with the success of Pakistan’s image and stability for which the country is striving for.

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