



ROLE OF INFORMATION TECHNOLOGY IN THE DEVELOPMENT OF PAKISTAN

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Birth and the Growth of Information Technology in Pakistan

We may find the theoretical foundation of Information Technology/Computers in 300B.C but the practical implementation of the modern computing era started when Alan Turing named the machine as a computer in 1940 which rapidly grew and the field went into the research of building intelligent machines; resultantly in 1945 two years before the independence of Pakistan the first Neural Network Machine was created and was named as perceptron Mark I.

The computers came to Pakistan in mid 60's when second-generation computer was installed at Karachi. Presently, there are over 1800 mainframe and minicomputers, about half of which are in the government sector. The growth in the number of computers during the last ten years was over 35%. This has been possible due the governments liberal import policy and reduction/removal of duties.

It is estimated that there are roughly 450,000 new computers every year in Pakistan. While this seems a pitifully the small numbers, it represents a three-fold increase compared to 1996-1997. Analyst predicts that this number will increase 4-5 times in the next three years.

Development Factors for Pakistan

- a. Good Governance and Strategic management
- b. Economic Stability
- c. High Agricultural Yield
- d. Industrial Energy
- e. Poverty Alleviation
- f. Positive Impact on International Foreign Policies

IT as A Tool to Achieve the Development Factors

No invention has ever influenced the human beings as computer has. In less than seven decades of its existence it has managed, materializing the concept of a global village. Technologies like Computational Intelligence, Neural Networks, Genetic Algorithms, Data Communication & Networks, Telecommunication, Databases, and Evolutionary Computing etc; collectively offer the business community a broad set of tools capable of addressing problems that are much harder or virtually impossible to solve using the more traditional techniques from statistics to operations research.

Country running and putting it on the track of the development is very complex task and might requires the decisions making on the basis of the country's past experience and present situation which is obviously available in the form data.

Today's best technology to manage and process data is the Information Technology. Information Technology implementation is one of the ways to fulfill and execute the development factors on the right way, which will help the nation to grow in peace and prosperity, which will create a momentum that will result the development of Pakistan.

Good Governance and Strategic management

IT must be seen as an investment and not an expense. It requires vision and bold leadership to employ IT as a tool, but it must be coupled with sincere commitment to good governance since without that IT can be detrimental to the freedom and well being of the citizens. Globally, IT and good governance has come to stay and any delay in its adoption can only be at the cost of the development of the country, thus the choice must be made sooner rather than later.

IT trends and technology directions have brought in applications and solutions for socio-economic development and have greatly contributed to good governance. Before deliberating on these contributions, let us turn to the second but most important part of today's subject - good governance. Governance is the manner in which power is exercised by government in the management of the country's social and economic resources, while good governance is the exercise of power by various levels of government that is effective, honest, equitable, transparent, and accountable, thereby leading the way to "the greatest happiness of the greatest numbers".

A state, often has three separate branches under a constitution, namely: **Legislature**, **Judiciary** and **Executive**. In anticipation that each of the branches might go wrong from time-to-time and when that happened, the other two branches of state - individually or together - could use their power to get the offending branches back on the constitutional track.

Legislative, an important institution of the state provides - for the benefit of citizens - the information regarding what is being said, debated and legislated for them. Towards this, IT has been employed to record all the speeches as well as all laws presented and enacted by the legislature basically in the form of texts and scripts but given the current available technology as voice or video recording available on the Internet. This information is of value not only to citizens but also to the new legislatures for learning history as well as preparing their own presentations in the legislative assembly, thus improving the quality of debate as well as avoidance of repetitive statements or time consuming checks and references towards achieving good governance.

Judiciary has long benefited from IT by having case laws available to judges and to lawyers. Libraries for any professions are extremely important in terms of quality of work. The electronic library has revolutionized the world and professionalism. The central database for various reference laws has provided the service to professionals, which has in turn brought the speedy and inexpensive justice to the citizens.

In countries like ours, where the strength of courts in terms of judges is restricted and has been identified as one of the cause of inefficiency in delivering speedy justice, the use of IT for administration of the courts and the jails is a major contributor to good governance. Citizens who have been in jails for more than their possible term, if the offence was to be proved, such information when available on computers and freely accessible brings speedy justice and reduced level of administrative costs both of courts and jails. In addition, it brings accountability of institutions and officers towards rule of law. A comprehensive administrative system helps scheduling of

cases to bring efficiency and cost of litigation down, resulting in less expensive justice to citizens and making lawyers and judges more productive.

Executive, the major interface of citizens with the state has the responsibility of planning, execution and monitoring. With a large population and widespread territory, IT becomes a natural ally for planning and delivering the needed services to the citizens. Planning presupposes information about countries' resources such as human, physical and financial. Database of all citizens is therefore fundamental to sound planning and delivery of social services like education and health, utility services like water and electricity, infrastructure like roads network are best provided by IT. In addition, economic planning is inconceivable without IT. Economic opportunities for job market supported closely by education planning can help reduce unemployment. Citizens consider all this as their right, in return for taxes paid to the national exchequer. A comprehensive, clean and correct citizens database leads to effective electoral lists and fair elections for moving towards good governance and in implementing merit based administration where appropriate people are selected for right jobs

Economic Stability

Needless to mention that we are in groaning need of foreign exchange to cater to our many needs. At the moment our foreign exchange reserves have not yet crossed the limit of even \$2 billion and that too, is due to a number of debts and loans extended to us by a number of loan giving agencies, which in their turn would also drain our national resources to a great extent. The importance of information technology in the present world can not be underestimated as it has dominated almost all the fields of business and industry including the service sector and one having no touch with this technology would not be able to make any progress in the century to come. Instead of discussing the role of this technology in the economic development of Pakistan, it would be more appropriate to say that there would be no desired economic development of any country without fully adopting this technology

The role of IT in a financial services organization is broadly:

Supporting operational efficiencies — and that simply means doing routine tasks better, faster, or cheaper. Volumes are the key here and in financial institutions, the transactions that are usually handled in the back-office operations units need to be automated from account maintenance, billing, through processing of payments, loans, trade financing, reconciliation and so on.

Facilitating customer services delivery — increasing customer touch points, extending the duration of service, improving service delivery. Whether by automating teller functions, providing E-banking services, installing automatic teller machines (ATMs), providing PC or Internet banking. In short, making the promise to the customer — Anytime, Anywhere, Anyhow — a reality!

Risk management — providing the capability to manage identify, assess and control the bank's risk and exposure, whether related to operations, credit, assets, market risk and so on. Credit limit monitoring, dealing with interest rate and foreign exchange rate changes to manage product viability, and treasury and asset/liability management

to ensure that regulatory reserve requirements are met. Technology must facilitate management with timely and accurate information, and **Decision support** — the availability of information and tools to determine trends, make forecasts, and plan strategically. Today the tools available for decision support are mind-boggling, and data warehousing and data mining provide today's management with the power to gain deep insight into customer and transaction profiles and trends, with which to make strategic decisions in implementing products and services and also to align the business with reality

If a country adopt IT to do all of the above, it should enable the organization (country) to be effective, competitive, and hopefully, profitable.

High Agricultural Yield

"Expert Systems" is one of the important application oriented branches of Artificial intelligence. In the past decade, a great deal of expert systems had been developed and applied to many fields such as office automation, science, and medicine including agriculture. At the beginning of development of the agriculture expert systems, the areas selected are applications to diagnosis the diseases and pests of various crops. In recent years, research and development of the expert system fields of agriculture domain have been paid much attention by many countries, not only by developed countries but also developing countries. The complexity of problems confronting farmers like yield loses, soil erosion, diminishing market prices from international competition, increasing chemical pesticides costs and pest resistance and economic barriers hindering adoption of farming strategies necessitates that they become expert managers of all aspects of their farming operations. On the other hand agricultural researchers need to address problems of farm management and discover new management strategies to promote farm success. Numerical methods have failed because understanding about crop systems are qualitative based on experience and cannot be mathematically represented. Expert System are Computer programs that are different from conventional computer programs as they solve problems by mimicking human reasoning processes, relying on logic, belief, rules of thumb opinion and experience.

An Agricultural Expert System is a Decision Support System for Agricultural Extension Agents who has to decide what advice to be offered to farmers who have to decide what action to take based on it. It is one of the most efficient extension tool to take the technology from scientists to the farmers directly without any dilution of content which normally creeps in because of the number of agencies involved in normal technology transfer systems. Following are the example of expert systems that are assisting in the agriculture domain.

GRAIN MARKETING ADVISOR is an expert system for determining marketing alternatives and supports grain producers in finding optimal strategies. Individual farm conditions are considered. Information on storage and dryer availability, price level, price trend, government program eligibility, and timing, is required as input data.

COMAX provides information on integrated crop management in cotton. It is designed for use by farmers, farm managers, country and soil conservation agents.

The system uses a combination of expert derived rules and results generated by the cotton crop simulation model named.

GOSSYM. It requires external information such as weather data, soil physical parameters, soil fertility levels, and certain pest management information. Based on this input data, the system makes daily management decision recommendations.

POMME provides information about pest and orchard management of apples. This system provides knowledge about fungicides, insecticides, freeze, frost and drought damage, non-chemical care options as well as information from a disease model to the farmers

Industrial Energy

Industry is the back bone of any country. Pakistan is exporting 68% of the export from its textile industry which is obviously contributing a major part in Pakistan economy.

During the development of more and more powerful and inexpensive computers, and faster, more reliable, and less expensive communication, energy utilities has increased the use of computers in the management of energy systems. For a few a years it has economically feasible to install more or less advanced energy control systems in industries and at other large customer's premises.

Energy Load Management is the concept of managing loads at the demand side in order to run the energy system more efficiently. The very basic principle is to try to move load from expensive to less expensive time period. Time period can be expensive for many different reasons, stemming from either production or distribution.

Intelligent Multi-agent system is the answer to question of today's energy management,

Poverty Alleviation

The problem of poverty can only be solved through improving the total economic and social opportunities and equitable distributions of the benefits of growth to all particularly the poor thereby providing security to people who are unable to participate in the contribution of economic growth and governance. In the past decade, the advances particularly in the field of information technology have been so rapid that it has changed the shape of all economic activities in the world, and pushing the world towards globalization. However, in Pakistan efforts were never made to deliver the benefits to the poor, like improved basic services including education, health care, and in equipping the poor with necessary information and skills to bring them into the mainstream of society so that they can be the productive partners.

A dramatic transition in the global economy is taking place. The globalization movement, which involves new economic world order and trade arrangements, has put developed and industrialized nations in the forefront of commerce. Then there is the shift-taking place from the oil-powered economy to the technology-driven economy followed by digital economy. In both movements, the wealthy economies and affluent sections of society in these economies will control the origination, maintenance and continuous growth in the decades to come. Now is the opportunity, to open up a corridor of empowerment for the poor. Otherwise, the poor will suffer even worst, resulting in a potential hot lid of social unrest.... if left to market forces of digital economy, the poor will be left behind in light years, creating tension and potential disturbance to society.

Information technology can open up this corridor of opportunity and shall be used as a key to empowering the poor and thereby gaining information to shape better decisions to determine their own destiny. Information technology can empower the poor like never before.

Positive Impact on International Foreign Policies

In a major foreign-policy speech at the University of Nebraska on December 8, 2000, President Clinton pointed out that there are 700 high-tech companies in Silicon Valley headed by Indians, and called for an end to the "cold war estrangement" between the US and India, and the start of a systematic, committed relationship. Indian IT, in other words, is even making a positive impact on US foreign policy, at least as perceived through Indian eyes!

There are, of course, many IT companies in the US headed by Pakistanis as well, and the IT sector in Pakistan too is flourishing. However, Pakistan seems to have lagged behind in its marketing of these skills. This is surely an area that we could cooperate in, particularly since the Indian IT industry is starved of qualified people.

One area in both countries that does need special attention is IT education. The IT sector is highly labor-intensive, and the lack of trained professionals could easily squander the positive international image that we have painstakingly built up.

Pakistan and Information Technology (Present)

Government of Pakistan is making such policies that are promoting information technology. Currently, Pakistan exports about \$35 million worth of software a year to the entire world, as compared to \$8 billion from India, \$5 billion from Ireland and \$1.5 billion from Israel. The total size of the IT services market in the world accounts for \$315 billion, and is projected to reach more than \$465 billion by the year 2004.

Conclusions

Meanwhile, Pakistan economy is still largely based on the low-tech, low-value industries that have long been fully mechanized and running very efficiently in developed nations and, therefore, do not attract premier revenue from world markets. In order to put its economy on track to compete with the growing economies of the world, Pakistan needs to quickly take steps to train and bring its workforce to the

international educational standards, incorporate new technologies and modern management practices into its existing industries, and bring intense focus on building an information-based economy by upgrading the technical and managerial skills of its people.

The world economy has already moved from low-value basic industries to a fast paced high-value information based economy. Many countries have taken concrete steps to rejuvenate their stagnated industrial base by rapidly moving to the new-age technologies to produce products and services that are in great demand in the world markets.

Information technology is the current choice of many developing and developed countries to upgrade their economies and become competitive in the global market place. The IT-based economies have streamlined the most complex economies of the world and enhanced the productivity to the level where an economy such as that of the US has wriggled out of the entire trillion-plus dollars national deficit and turned into a surplus in recent years.

To compete with the growing economies of the world, Pakistan needs to educate, train and bring its workforce to the international educational standards, incorporate new technologies and modern management practices into its industry, and bring intense focus on building an information-based economy by upgrading the technical and managerial skills of its people