# National Study
**on**
# Critical Indicators
# of
# Information Technology

Based on desk research, indepth interviews, focus group discussions and several surveys conducted in Karachi, Lahore, Rawalpindi/Islamabad, Faisalabad, Hyderabad, Peshawar and Sialkot in 2001

**Submitted to**

**IT & Telecommunications Division**
**Ministry of Science & Technology**
**Government of Pakistan**

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KPMG Consulting

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# EXECUTIVE SUMMARY

## 1.0 INTRODUCTION AND BACKGROUND

The Ministry of Science and Technology (MoST) is endeavoring for technological development and improvements. Its focus is on Information Technology (IT) and a number of projects have been launched under the National IT Action Plan. However, the Ministry needs baseline parameters to assess the impact of the plan and measure the direction of the change. Hence, this study.

## 2.0 OBJECTIVES

The objectives of the study were twofold:

(a) Taking a snapshot picture of the IT environment in the country (baseline statistics)

(b) Identifying critical indicators, which could be used to measure the level of implementation of the National IT Policy and assess its overall impact

# 3.0 METHODOLOGY

The research was planned and carried out in three sequential phases, as follows:

- **Desk research**
- **Exploratory research**
  - 35 In-depth interviews with industry leaders
  - 15 Focus groups of IT professionals
- **Quantitative Research**
  - Several comprehensive surveys were conducted in seven major cities of the country (namely Karachi, Lahore, Rawalpindi / Islamabad Faisalabad, Hyderabad, Peshawar and Sialkot) as follows:
    - Households (7,000 interviews to determine the incidence of computers and 2,215 interviews with computer literates in computer owning households)
    - 35 Internet Services Providers (ISPs)
    - 48 Software Houses
    - 110 Hardware Vendors
    - 303 User Organizations (with atleast ten employees and 4 PCs)
    - 406 Educational Institutions (also) imparting IT training
    - 391 Senior Computer Professionals belonging to above sectors

# 4.0 UNIVERSE

As per the specification given by the sponsors, the surveys were conducted in Karachi, Lahore, Rawalpindi / Islamabad, Faisalabad, Hyderabad, Peshawar and Sialkot.

# 5.0 TIMINGS

All the above surveys were conducted between February to 30 August 2001.

# 6.0 LIMITATIONS

6.1 This report takes a bold step to provide estimates of certain basic indicators on the state of Information Technology in the country. Our readers would recognize that we ventured into a territory whose contours were totally unknown. Although, we have endeavoured to provide accurate estimates based on interviews of professionals and a variety of surveys there is a possibility of these being off the mark in some cases. The readers may keep that in mind while reading the report. This is the first but hopefully an important step in coming up with Estimates on the IT sector in the country. We expect that the estimates will be refined though this process in due course.

6.2 While submitting the findings we have avoided our own comments and presented the findings as these emerged out of the surveys.

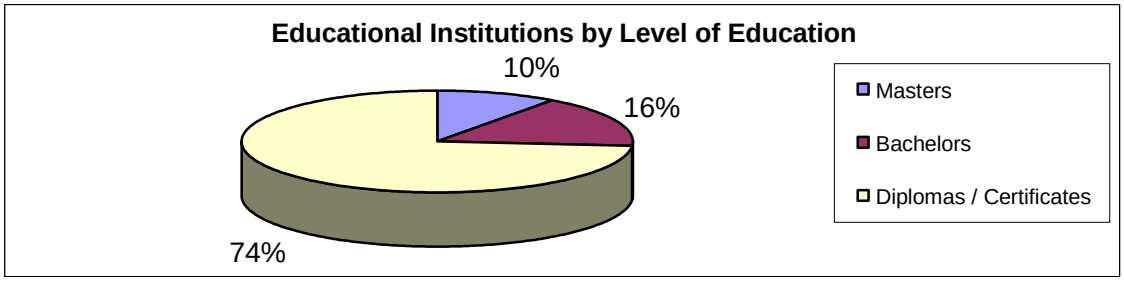
# 7.0 MAJOR FINDINGS

## 7.1 Educational Institutions

The number of institutions imparting IT education is estimated to be 1,615

The level of education being offered by them is as follows:

| Level | Government | Private | Total |
|---|---|---|---|
| Masters | 35 | 125 | 160 |
| Bachelors | 60 | 205 | 265 |
| Diplomas / Certificates | 110 | 1,080 | 1,190 |
| **Total** | **205** | **1,410** | **1,615** |




Each campus has been considered as a separate institution. The count includes institutions awarding degrees in their own rights and also those awarding degrees in affiliation with local / foreign institutions.

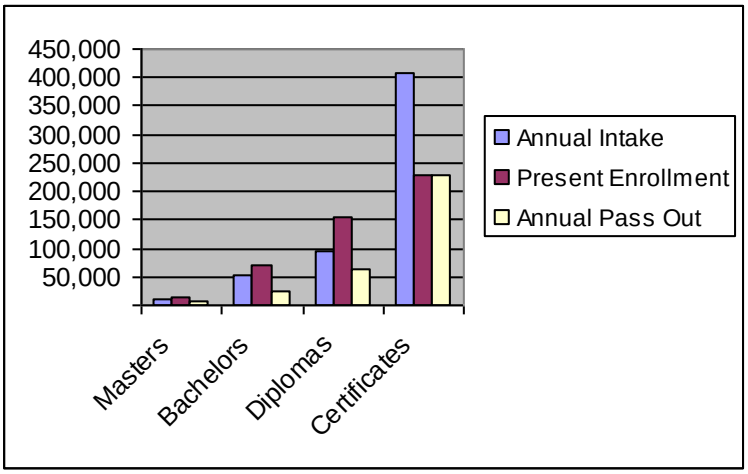
The ratio of private and public institutions thus becomes:

- Masters 3.6 :1
- Bachelors 3.4 :1
- Diplomas / Certificates 9.8 :1

The annual intake, present enrollment and the annual pass out figures from these institutes are estimated to be:

| Level | Annual Intake | Present Enrollment | Annual Pass Out | Average Pass Out per institute |
|---|---|---|---|---|
| Masters | 12,180 | 13,250 | 7,595 | 47 |
| Bachelors | 51,105 | 69,095 | 26,075 | 98 |
| Diplomas | 93,735 | 154,420 | 62,015 | 52 |
| Certificates | 407,490 | 226,990 | 230,140 | 193 |
| **Total** | **564,510** | **463,755** | **325,825** | **202** |

**Annual Intake, Present Enrollment, Annual Pass Out**



The IT training institutions are affiliated as follows:

| Level | Affiliation | Local | | Foreign | | None |
|---|---|---|---|---|---|---|
| | | Universities | Institutions | Universities | Institutions | |
| Masters | Government | 77% | | | 8 | 15 |
| | Private | 36% | 33 | 7 | 3 | 21 |
| Bachelors | Government | 75% | | 25 | | |
| | Private | 30% | 48 | 13 | 0 | 9 |
| Diplomas | Government | 13% | 52 | 4 | 0 | 31 |
| | Private | 03% | 22 | 4 | 7 | 64 |

Figures are row percentages

There is general dissatisfaction about the quality of education being offered at the institutions

Factors that directly correlate quality of IT education are:

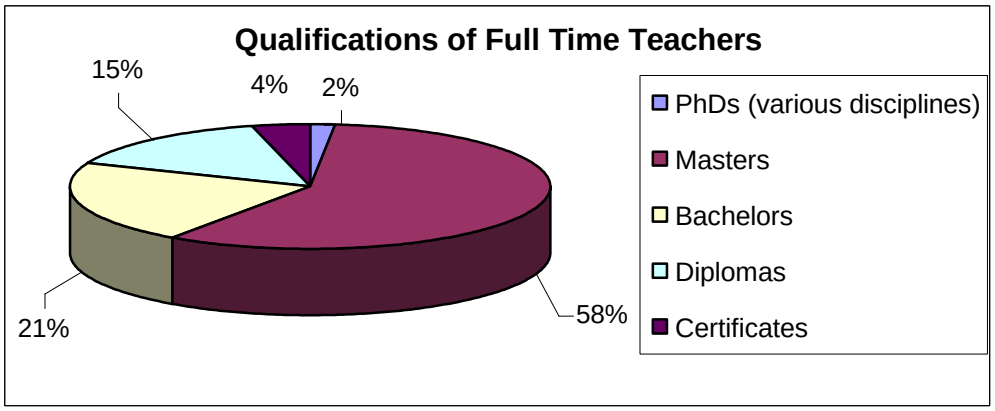
- Qualified Faculty
- Student Teacher Ratio
- Good Basic Education
- Modern Curriculum
- Effective Monitoring
- Student PC ratio

The ratio of permanent and visiting faculty in different types of institutions is as follows:

| | Permanent | | Visiting |
|---|---|---|---|
| ▪ Government Masters | 2.7 | : | 1 |
| ▪ Government Bachelors | 2.3 | : | 1 |
| ▪ Government Diplomas / Certificates | 3.5 | : | 1 |
| ▪ Private Masters | 0.75 | : | 1 |
| ▪ Private Bachelors | 1.3 | : | 1 |
| ▪ Private Diplomas | 1.3 | : | 1 |
| ▪ Private Certificates | 2 | : | 1 |

The number of full time teachers with different qualifications in the IT educational institutions is as follows:

| | |
|---|---|
| PhDs (various disciplines) | 160 |
| Masters | 6,075 |
| Bachelors | 2,245 |
| Diplomas | 1,555 |
| Certificates | 415 |
| ***Total*** | **10,450** |



## 7.2 Human Resources

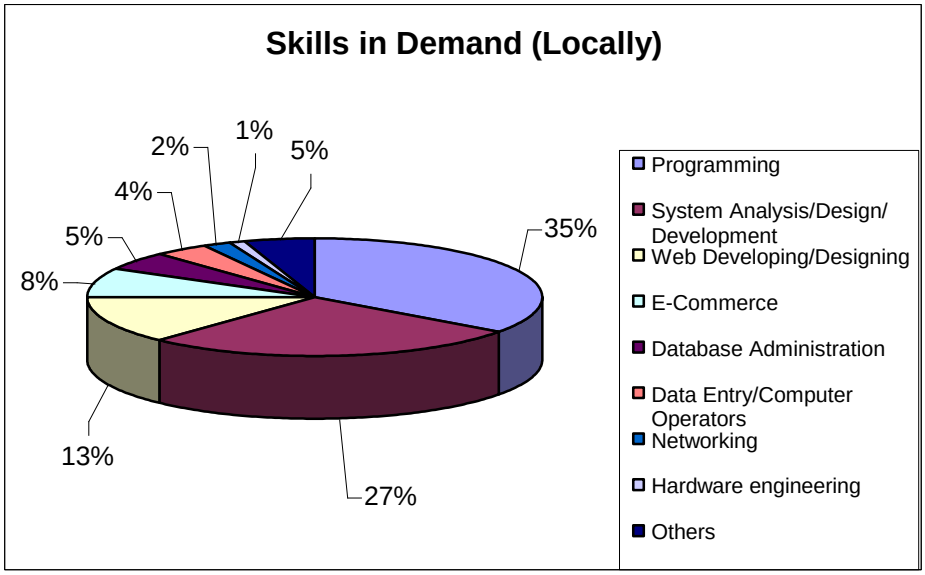
To the question where would the computer professionals find employment should their current jobs be terminated, the most plausible alternate was said to be:

| | | |
|---|---|---|
| ● Pure Computer related Sectors | | 53% |
| ▪ Software Houses | 18 | |
| ▪ Educational Institutions | 15 | |
| ▪ ISPs | 12 | |
| ▪ Hardware / Vendors | 8 | |
| ● Other Sectors | | 47 |
| ● Manufacturing | 28 | |
| ▪ Pharmaceuticals | 19 | |
| ▪ Textiles | 7 | |
| ▪ Other manufacturing | 2 | |
| ● Service Sector | 14 | |
| ▪ Financial | 8 | |
| ▪ Other Services | 6 | |
| ● Trade and Business | 5 | |

## ◆ Skills in Demand (locally)

IT Professionals considered following skills as the most demanded ones in the country:

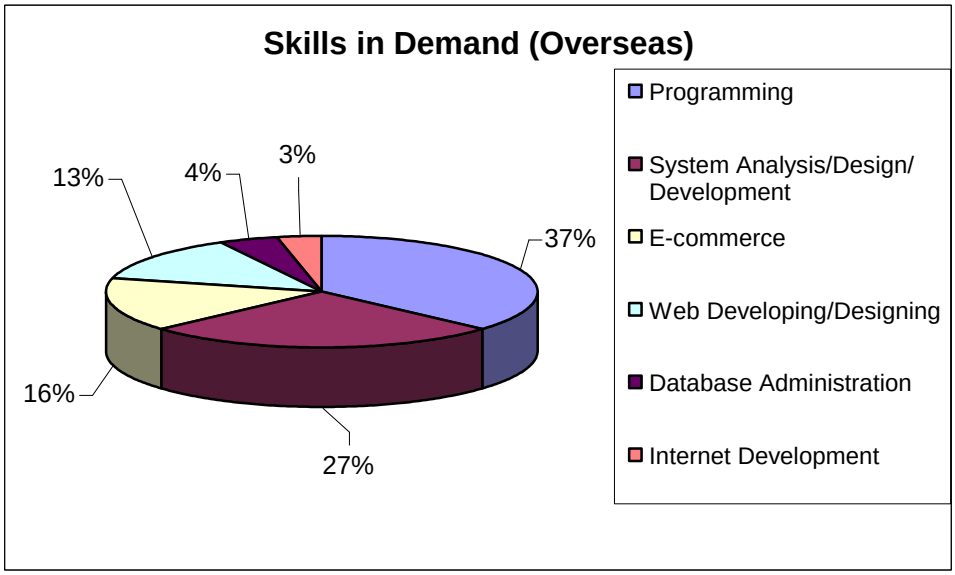
| S. # | *Skills* | IT Professionals |
|---|---|---|
| | | |
| 1. | Programming | 35% |
| 2. | System Analysis/Design/Development | 27 |
| 3. | Web Developing/Designing | 13 |
| 4. | E-Commerce | 08 |
| 5. | Database Administration | 05 |
| 6. | Data Entry/Computer Operators | 04 |
| 7. | Networking | 02 |
| 8. | Hardware engineering | 01 |
| 9. | Others | 05 |



## ◆ Skills in Demand (Overseas)

IT professionals considered the following as the most demanded skills abroad:

| S. # | *Skills* | *Perceived by* |
|---|---|---|
| | | |
| 1. | Programming | 33% |
| 2. | System Analysis/Design/Development | 24 |
| 3. | E-commerce | 14 |
| 4. | Web Developing/Designing | 12 |
| 5. | Database Administration | 04 |
| 6. | Internet Development | 03 |
| 7. | Miscellaneous | |



## ◆ Number of IT Professionals / Employed Computer Users

The estimated number of IT professionals / computer users employed in the country are as follows:

| | |
|---|---|
| Software Houses | 5,000 |
| Internet Service Providers | 1,000 |
| Hardware Vendors | 9,000 |
| Educational Institutions | 10,450 |
| User Organizations | 521,430* |
| **Total** | **546,880** |

* It is estimated that about 375,000 people in User Organizations are heavy users of PCs including 266,480 personnel engaged in simple office work and data entry jobs. 150,000 employees of User Organizations are light users.

## ◆ Experience

The overall average experience of the personnel in the IT field is about five years.

## ◆ Qualification of IT Manpower

The number of IT professionals / Employed Computer Users with different qualifications in the industry is as follows:

| S. # | Qualification | Total |
|---|---|---|
| 1. | Ph. Ds (Various disciplines) | 175 |
| 2. | Masters | 23,375 |
| 3. | Bachelors | 30,264 |
| 4. | Diplomas | 34,082 |
| 5. | Certificates | 61,441 |
| 6. | Experience only | 397,543 |
| **Total** | | **546,880** |

## ◆ Proficiency and Skills

Knowledge, current usage, competency and experience claimed by IT Professionals were as follows:

| S. # | *Skills* | Can do** | Current Usage** | Competency** (Fully Competent)* | Experience (Years) |
|---|---|---|---|---|---|
| 1. | Programming | 59% | 43% | 65% | 3.5 |
| 2. | Data Entry | 53 | 32 | 57 | 2.5 |
| 3. | Software Designing & Developing | 52 | 38 | 58 | 3 |
| 4. | System Analysis and Design | 43 | 29 | 51 | 3.1 |
| 5. | Database Administration | 38 | 22 | 50 | 2.9 |
| 6. | Internet Development | 30 | 16 | 37 | 1.8 |
| 7. | E-Commerce | 30 | 17 | 30 | 1.3 |
| 8. | Network Protocol/Topologies | 29 | 21 | 50 | 2.1 |
| 9. | Hardware Engineering | 28 | 18 | 45 | 2.9 |
| 10. | Project Management | 25 | 15 | 43 | 2.5 |
| 11. | Internet Telephony | 16 | 7 | 26 | 1.7 |
| 12. | Knowledge Management | 13 | 6 | 35 | 1.8 |

* Percentage of all those who claim to have these skills as per column 3 (Can do)

** Multiple responses were permitted. Hence the total can be more than 100.

## ◆ Salaries

The salaries of different professionals in different types of organizations were reported as follows:

| | | *AVERAGE REPORTED MONTHLY SALARY (Rs.'000)* | | | |
|---|---|---|---|---|---|
| **S. #** | ***Job Function*** | **ISPs** | **SWHs** | ***Vendors*** | **Users** |
| 1. | Project Managers | 35 | 38 | - | - |
| 2. | System Analysts | 29 | 24 | - | 11 |
| 3. | Programmers | 15 | 13 | - | 8.5 |
| 4. | Web Developers | 12 | 15 | - | 8.5 |
| 5. | Internet Engineers | 13 | 11 | - | - |
| 6. | Network Specialists | 13 | 17 | 7 | 10 |
| 7. | Data Communication Specialists | 19 | 22 | - | 11.5 |
| 8. | Telecommunication Specialists | 19 | 16 | - | 9 |
| 9. | Hardware Engineers | 10 | 17 | 6 | 9.5 |
| 10. | Multimedia Specialists | 12 | - | - | 9.5 |
| 11. | Data Entry Operators | 5 | 5 | - | 9.5* |
| 12. | Operators for Call Centers | 5 | - | - | 5 |
| 13. | Computer Operators | - | - | - | 5 |

*Including overtime

## ◆ Quality Perception

User Organizations rated the competency level of IT Professionals at 6 on a scale of 0 to 10. Interestingly, IT Professionals also rated themselves at 6 on the same scale.

## 7.3 Software House

There are 170 Software Houses active in the organized sector. Another 360 operate in the unorganized sector

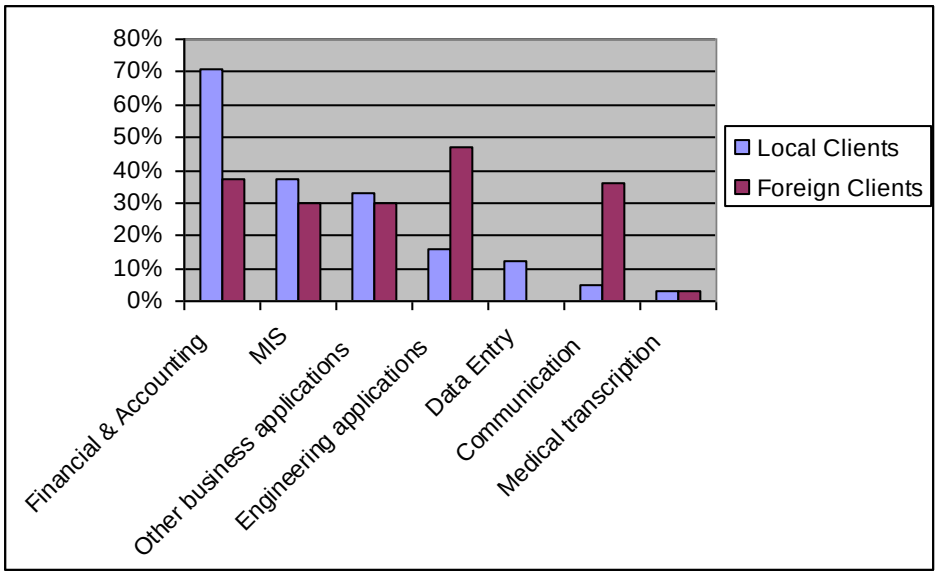
It is estimated that the number of Software Houses will increase by 33% over the next two years

The different types of Customized Products offered by these Software Houses to the local and foreign clients are as follows:

| Customized Products | Offered to | |
|---|---|---|
| | Local Clients* | Foreign Clients* |
| Financial & Accounting | 71% | 37% |
| MIS | 37 | 30 |
| Other business applications | 33 | 30 |
| Engineering applications | 16 | 47 |
| Data Entry | 12 | - |
| Communication | 05 | 36 |
| Medical transcription | 03 | 03 |

* Multiple responses were permitted. Hence the total can be more than 100.

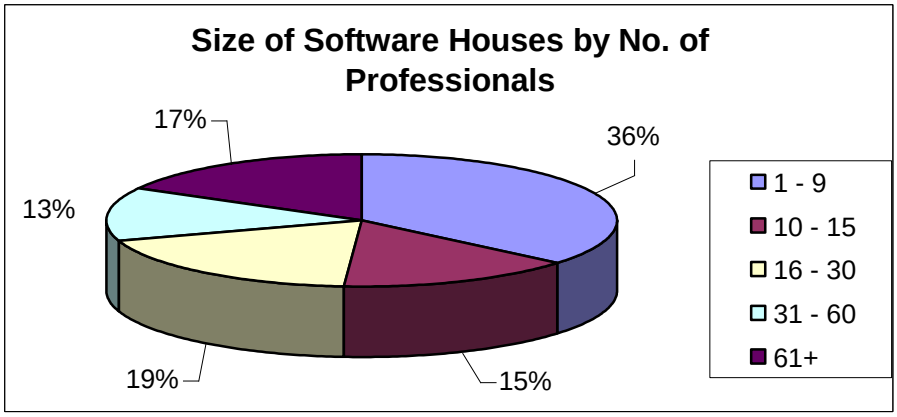
**Types of Customized Products Offered**




## ◆ Sizes of Software Houses

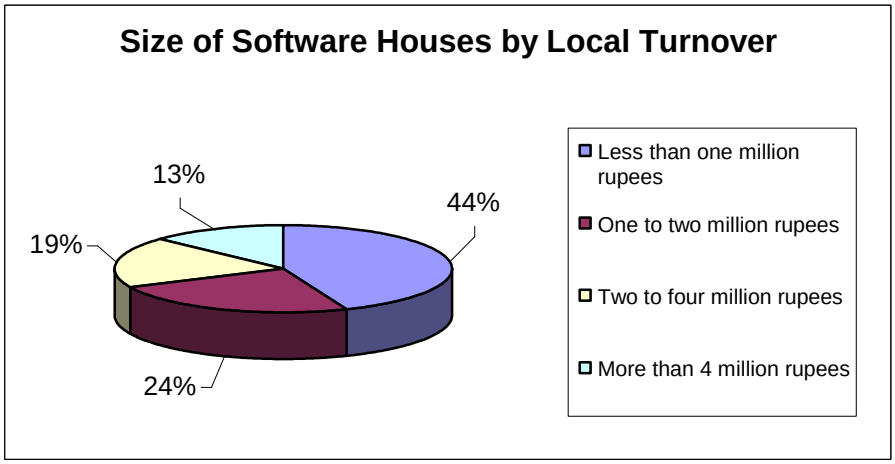
On the basis of number of professionals employed, Software Houses can be grouped as follows:

| No. of Professionals | SWHs |
|---|---|
| 1 – 9 | 36% |
| 10 – 15 | 15 |
| 16 – 30 | 19 |
| 31 – 60 | 13 |
| 61+ | 17 |
| ***Total*** | **100** |


Size of Software Houses by No. of Professionals
17%
36%
13%
19%
15%
1 - 9
10 - 15
16 - 30
31 - 60
61+

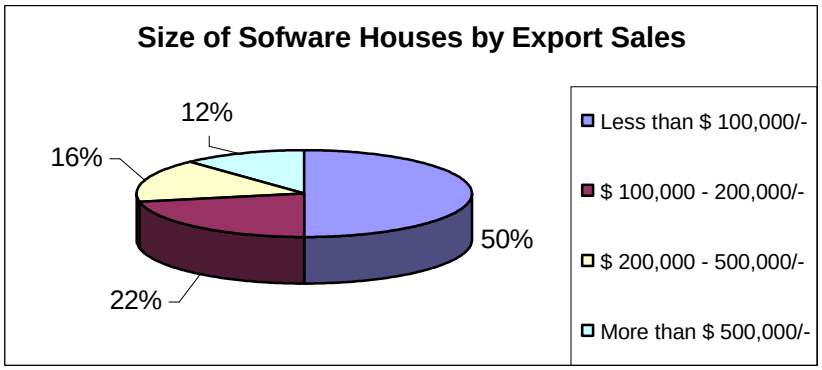
According to their local turnover, Software Houses can be categorized as follows:

| Annual Turnover | SWHs |
|---|---|
| Less than one million rupees | 44% |
| One to two million rupees | 24 |
| Two to four million rupees | 19 |
| More than 4 million rupees | 13 |



According to Export sales the classes of Software Houses are as follows:

| Annual Turnover | SWHs |
|---|---|
| Less than $ 100,000/- | 50% |
| $ 100,000 – 200,000/- | 22 |
| $ 200,000 – 500,000 | 16 |
| More than $ 500,000/- | 12 |

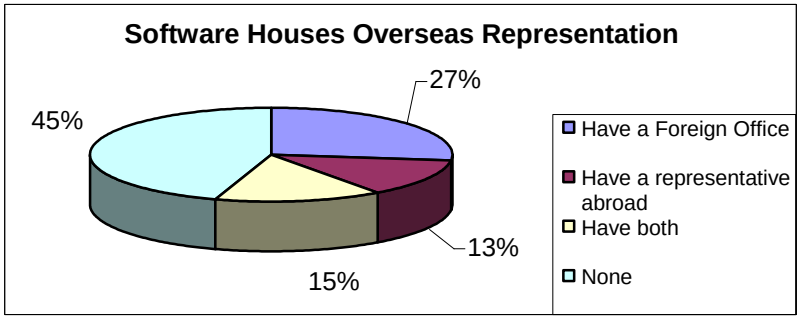



- Export earnings are estimated at US$23 million per annum

## ◆ Foreign Offices

About half of the Software Houses have no representative or office in foreign lands. The details are as follows:

| | |
|---|---|
| Have a Foreign Office | 27% |
| Have a representative abroad | 13 |
| Have both | 15 |
| None | 45 |
| **Total** | **100** |




- 31% Software Houses work only for the local market
- 15% Serve foreign clients only
- 54% Serve both local and foreign clients

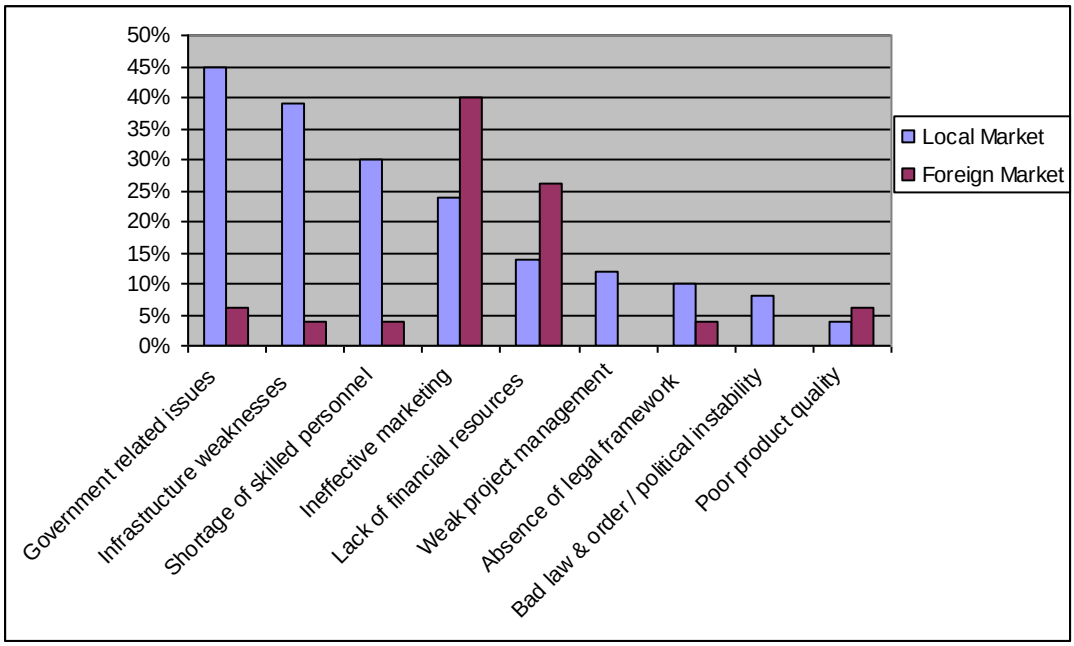
## ◆ Problems being faced

The main problems being faced by the Software Houses in servicing their local and foreign markets are as follows:

| Problems | Local market* | Foreign market |
|---|---|---|
| Government related issues | 45% | 06% |
| Infrastructure weaknesses | 39 | 04 |
| Shortage of skilled personnel | 30 | 04 |
| Ineffective marketing | 24 | 40 |
| Lack of financial resources | 14 | 26 |
| Weak project management | 12 | Zero |
| Absence of legal framework | 10 | 04 |
| Bad law & order / political instability | 08 | Zero |
| Poor product quality | 4 | 06 |

* Multiple responses were permitted. Hence the total can be more than 100.

**Problems being faced by Software Houses**



# 7.4 Internet and Communication Network

- **The number of Internet connections and the cities covered**

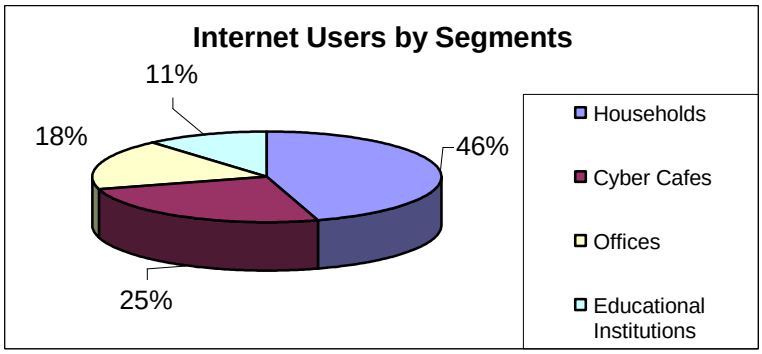
The total number of Internet connections and the active Internet connections in the cities where surveyed ISPs operated are as follows:

| Cities | CONNECTIONS | |
|---|---|---|
| | **Total** | **Active** |
| Karachi | 249,912 | 168,714 |
| Lahore | 121,295 | 72,743 |
| Islamabad | 22,550 | 12,496 |
| Rawalpindi | 15,610 | 9,310 |
| Multan | 7,510 | 5,410 |
| Faisalabad | 7,116 | 5,118 |
| Hyderabad | 4,500 | 2,799 |
| Gujrat | 3,400 | 2,700 |
| Sialkot | 3,612 | 2,112 |
| Gujranwala | 5,815 | 2,015 |
| Other Cities (Jehlum, Sargodha, Kharian, Thatta, Peshawar, Sheikhupura, Abbottabad, Nowshera, Rahim Yar Khan, Mardan Sahiwal) | 5,140 | 3,440 |
| **Total** | **446,460** | **286,857** |

- About 6.6% of the population above five years of age in the given seven cities is currently using the Internet

- The number of users is estimated to be as follows:

| | |
|---|---|
| Households | 586,000 |
| Cyber Cafes | 325,000 |
| Offices | 233,000 |
| Educational Institutions | 147,000 |
| **Total** | **1,291,000** |

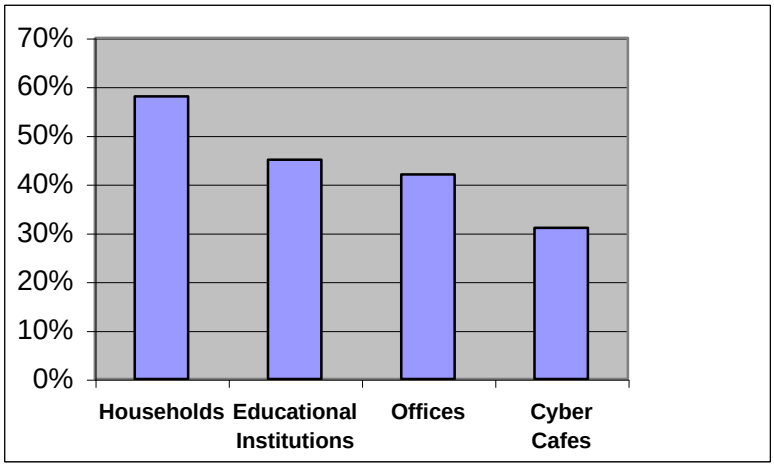


## ◆ Growth Rate

The expected annual growth rates of the active Internet connections in different sectors are estimated to be as follows:

| | |
|---|---|
| Households | 58% |
| Educational Institutions | 45 |
| Offices | 42 |
| Cyber Cafes | 31 |

**Expected Annual Growth Rate of Internet Connections**

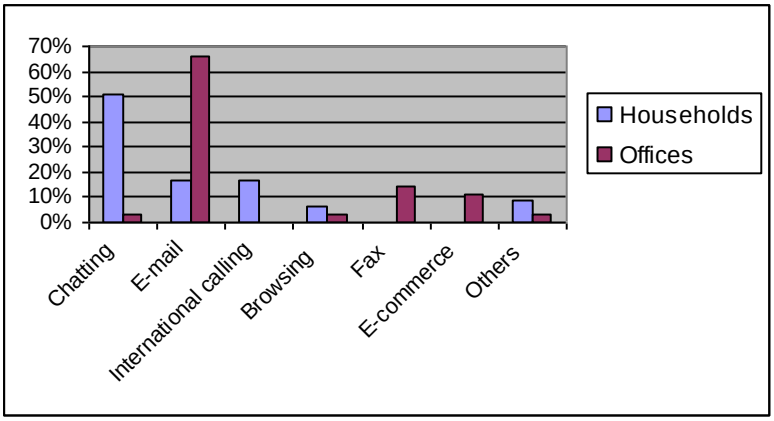


## ◆ Uses of Internet

Most frequent uses of Internet in Households and Offices are as follows:

| Most Frequent Use | *Households* | Offices |
|---|---|---|
| Chatting | 51% | 03% |
| E-mail | 17 | 66 |
| International calling | 17 | 0 |
| Browsing | 6 | 3 |
| Fax | 0 | 14 |
| E-commerce | 0 | 11 |
| Others | 9 | 3 |

**Most Frequent Use of Internet**



Other uses of Internet are as follows:

| All Uses | Households* | Offices* |
|---|---|---|
| E-mail | 71% | 77% |
| International calling | 66 | 14 |
| Chatting | 54 | 09 |
| E-commerce / Shopping | 23 | 46 |
| Surfing | 20 | 34 |
| Fax | 14 | 69 |

* Multiple responses were permitted. Hence the total can be more than 100.

- **Average Hours Sold**

The average number of telephone lines with each ISP is 673. Assuming that each line is used for 20 hours in a day, the average hours used by Internet users in a month work out to 14,133,000 hours. If average rate is Rs.16/hr then each of the 286,857 Internet connections is paying Rs. 788/month as Internet usage charges (Domestic users spend on average Rs. 715/pm for Internet usage).

## 7.5 Computers

The average ratios of branded and unbranded PCs in different types of organizations are estimated to be as follows:

| *Organization* | Average Number of Computers | | |
|---|---|---|---|
| | **Branded** | **Unbranded** | **Total** |
| Internet Service Providers | 16 (40%) | 24 (60%) | 40 (100%) |
| Software Houses | 18 (42%) | 25 (58%) | 43 (100%) |
| Educational Institutions | 12 (36%) | 21 (64%) | 33 (100%) |
| User Organizations* | 7 (41%) | 10 (59%) | 17 (100%) |
| Households | 0.01(8%) | 0.15 (92%) | 0.16 (100%) |

- **Total PC's population**

Following are the estimated number of PCs in different types of organizations:

| Type of Organization | Branded | Unbranded | Total |
|---|---|---|---|
| Internet Service Providers | 560 | 840 | 1,400 |
| Software Houses | 3,060 | 4,250 | 7,310 |
| Educational Institutions | 19,380 | 33,915 | 53,295 |
| User Organizations* | 210,000 | 300,000 | 510,000 |
| Households | 34,100 | 511,500 | 545,600 |
| ***Total*** | **267,100** | **850,505** | **1,117,605** |

* Organizations with at least 10 employees and 4 PCs

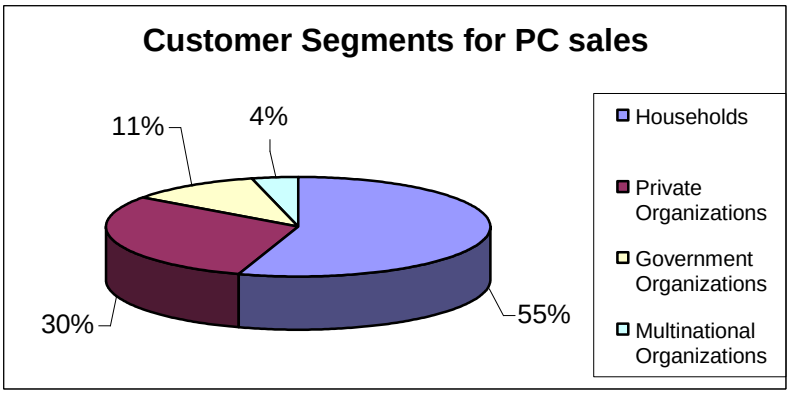
- The vendors reported 36% growth in sales in the year 2000 as compared to 1999.

- 23.89% of the PCs in the country are branded machines

- **Customer Segments for PC Sales**

Vendors report the following shares for each type of their customers in their total sales:

| Segment | Share of sales |
|---|---|
| Households | 55% |
| Private Organizations | 30 |
| Government Organizations | 11 |
| Multinational Organizations | 4 |
| **Total** | **100** |



- The shares in sales of sectors other than households are estimated to be as follows:

| ***Business Sectors*** | ***Share*** |
|---|---|
| Trade & Business | 43% |
| Educational Institutions | 20 |
| Other Govt. / Semi govt. Organizations | 12 |
| Hardware Vendors | 11 |
| Other Manufacturing | 6 |
| Internet Service Providers | 3 |
| Software Houses | 2 |
| Financial Services | 2 |
| Other Services | 1 |

- 37% vendors reported that they sell old PCs as well.

- 93% of the PCs sold in 2000 were Pentium based machines.

- The types of Processors sold in the year 2000 were as follows:

| **Processor** | **Share** |
|---|---|
| Pentium I | 26% |
| Pentium II | 29 |
| Pentium III | 38 |
| Others | 7 |

| Total | 100 |
|---|---|

- **Share of Main and Miniframes**

The percentage of organizations having mainframes and miniframes is estimated as follows:

| Sector | Main* | Mini |
|---|---|---|
| User Organizations | 7% | 6 |
| Internet Service Providers | 20% | 17 |
| Software Houses | 4% | 6 |
| Educational Institutions | 0% | 4 |

* Figures are row percentages

- **Level of Networking**

The levels of networking in different types of organizations are as follows:

| Type of Organization | Full | Partial | None |
|---|---|---|---|
| Software Houses | 90% | 10 | Zero |
| Internet Service Providers | 89% | 11 | Zero |
| Trade & Business | 57% | 9 | 34 |
| Educational Institutions | 52% | 30 | 18 |
| Financial | 51% | 17 | 32 |
| Other Manufacturing | 48% | 32 | 20 |
| Textiles | 40% | 24 | 36 |
| Other Services | 29% | 29 | 42 |
| Government / Semi | 17% | 36 | 47 |

| | | | |
|---|---|---|---|
| Government | | | |

* Figures are row percentages

- **PCs sold with Internet Connection**

  In the year 2000, about one third new PCs were sold with Internet Connections.

- **Number of Network Servers sold in the year 2000**

  35% Vendors reported selling network servers. Estimated number of servers sold comes to 6,672. The types of servers sold are as follows:

| Servers | Vendors* |
|---|---|
| Windows NT | 90% |
| Windows 2000 | 13 |
| UNIX | 5 |
| LINUX | 3 |
| Ap Net Server E60 | 3 |
| NOVEL | 3 |
| Proxy Server | 3 |

* Multiple responses were permitted. Hence the total can be more than 100

## 7.6 Contribution of the IT Sector

- The total revenue earned by the sector is estimated at Rs.29.835 billion per annum

- The IT sector contributes Rs.6.608 billion to the GDP of the country

- Furthermore, User Organizations pay approximately Rs.47.8 billion as salaries to IT personnel

- About 208,000 direct jobs are expected to be created domestically by 2005 in this sector

## 7.7 Future Direction and Trends

- Software spending are increasing globally by 15% a year, and influencing investments of another $800 billion in hardware and services

- Software will continue to be at the core of most innovations during the next several decades

- Web based products are expected to grow exponentially

- P2P technology will not only facilitate Instant Messaging (IM) but also open the door to distributed computing, the sharing of unused computing resources across an Internet network, the Web and the World

- Emerging core technologies (Quantum computing, nanocomputers or massively parallel processing) will change the world of hardware and software over the next 10 years and cause a dramatic change in the economics of computing

- The density of chip to double at fixed costs every 18 to 24 months

- By 2010 a single advanced IP network will handle the majority of the world's communication need.

- Enterprises will rely more on network computing services than their internal data center operation.

- The key technologies that will enable mobility through 2011 will include location sensing, telematics, wearable devices, new portable sources of electric power and mini disk storage

- Most users will shift from PCs to more nimble network based mobile devices. However, the trade off between the power and the memory capacity of the PC versus mobility will permanently keep desktop machines in the computer equation

# 8. CRITICAL INDICATORS

The following emerged as the broad parameters against which the level of implementation and the overall impact of the National IT Policy can be measured:

- Number of PCs in the country (as the total number cannot be determined easily, the surrogate is the number of branded PCs which can be determined relatively easily)

- Coverage of ISPs and the number of active Internet connections

- Number of IT Professionals in the Software Houses (Annual turnover figures, both local and exports, are ideal critical indicators. However, as these figures cannot be determined easily, we have recommended the number of IT Professionals in the Software Houses as a surrogate)

- The level of computerization in the Government departments especially those involved in public dealing

# INTRODUCTION
# AND
# BACKGROUND

# 1 INTRODUCTION AND BACKGROUND

The Ministry of Science and Technology (MoST) is the enabling arm of the Government of Pakistan for planning, co-ordinating and directing efforts to initiate and launch scientific and technological programmes and projects for the economic development of the country.

MoST is endeavoring for technological development and improvements linked with higher economic growth rates and higher standards of living in a wide array of fields-industrial development, telecommunications and IT, renewable energy and rural development. Its principal agenda is building Pakistan's technological competence in the 21st century by leap frogging into new markets, developing a larger pool of human resource for reversing brain drain, integrating the soft technology infrastructure into a hard modern technological base, strengthening technology institutions, making Science and Technology (S&T) governance effective and enhancing the capacity of indigenous innovation systems.

In its pursuits of the national agenda for a sound and sustainable S&T, MoST has refurbished the national focal point for information technology (IT) by creating an Information Technology and Telecommunications division (IT&TC) under which all telecom and IT related organisations have been placed.

MoST has launched a number of projects under its National IT Action Plan. The plan envisages project formulation and implementation in some of the key areas of the IT industry. The plan has been designed to help MoST fulfill its commitment to formulate and regularly review the S&T policies necessary to promote R&D endeavors, and inventions and innovations in diversified fields of technology needed for the socio-economic development of the country and raising living standards of the common people.

However, to determine the direction of the change and to measure the impact of the plan, baseline parameters were needed to be defined. Hence this study.

# OBJECTIVES

# 2. OBJECTIVES

The goal of this study was to support the IT&TC Division's "National IT Action Plan" in some of the key areas of the IT industry in the country. More specifically, the objectives were:

a. To take a snapshot picture of the IT environment in the country (baseline statistics).

b. To identify critical indicators, which could be used to measure the level of implementation of National IT Policy and its overall impact.

As a first step the Division intended to establish the baseline on the fundamental IT indicators in the country, as they existed. It was seeking answers to questions such as:

## 2.1 Educational Institutions

a. What is the number of training institutes that are imparting IT education in Pakistan?

b. What is the level of education being offered in these institutions?

c. What is the yearly intake of students and number of degrees being awarded?

d. What is the current enrollment in these institutions?

e. What is the ratio of public and private institutions?

f. Affiliation with foreign / local universities?

g. Level of quality being offered?

h. What are the factors that directly correlate to quality?

i. What is the ratio of permanent and visiting faculty?

j. What are the qualifications of the faculty?

k. Addresses and contact persons of the IT Educational Institutions

## 2.2 Human Resources

a. What are the industries and sectors that are absorbing IT professionals?

b. What skills are in demand in the Pakistani market?

c. What skills are in demand overseas?

d. What is the estimated number of ITC professionals?

e. What is the breakup in terms of experience?

f. What are the qualifications of the IT manpower in Pakistan?

g. What are the skill levels and areas of expertise of Pakistani professionals?

h. What is the quality perception of IT manpower in the Pakistani market?

i. What are the current salaries of IT professionals in Pakistani industries?

j. What percentage of IT skilled manpower migrates overseas annually?

k. What is the current growth rate of migration?

## 2.3 Software Houses

a. What is the number of active software houses in Pakistan?

b. What is the growth trend of software houses in Pakistan?

c. What type of products are they offering and their classification; data entry, medical transcription, etc.?

d. What is the size of such software houses in terms of manpower?

e. What are the problems currently being faced by these software houses?

f. Are they mainly targeting local or foreign markets?

g. What is the level of exports that these software houses are achieving?

h. How many software houses have foreign offices?

i. Addresses and contacts of software houses in Pakistan

## 2.4 Internet and Communication Networks

a. What is the number of Internet connections in Pakistan?

b. What is the city-wise distribution of Internet connections in Pakistan?

c. What percentage of the population is using the Internet?

d. What is the current growth rate?

e. What is the major purpose of using the Internet?

f. What is the coverage of communication networks in Pakistan?

g. Addresses and contacts of ISPs in Pakistan

h. What is the expected telecommunication coverage in the next five years, ten years with current plans and infrastructure?

## 2.5 Computers

a. What is the overall size of the computer market?

b. What is the current growth rate?

c. What is the percentage share of branded and unbranded computers?

d. What are the segments, such as homes, multinationals, local businesses or government agencies in which these computers are being sold?

e. What are the percentage share of Pentium based and other processors?

f. What is the percentage share of main frames, minis and PCs in the offices?

g. What is the ratio of stand alone PCs to the networked (LAN connected) PCs?

h. How many PCs are sold with Internet connection?

## 2.6 Overall IT Industry

a. What is the total contribution of the Software, Internet and IT sectors to the total GDP of Pakistan?

b. How many potential jobs will be created in the IT Sector by 2005?

c. What are the overall revenues from the IT sector?

d. Penetration of Cable TV?

## 2.7 Emerging Trends

Future direction of technology and identification of areas that are expected to play important role in dissemination of the technology and development of the manpower in this sector.

# METHODOLOGY

# 3. METHODOLOGY

To achieve the given objectives, and to get a complete picture of the situation on the ground, the research was planned and carried out in three sequential phases, as follows:

## 3.1 Phase I - Desk Research:

The available documents on the state of Information Technology in Pakistan in the form of Government papers, published reports and articles, special numbers / supplements in the national newspapers, magazines and professional journals, speeches of professionals, publications of professional bodies and any open to public or published Research Reports were reviewed to get an idea of the status of the industry and the issues involved in its functioning and growth. The help of Ministry of Science and Technology was also used in this regard, and the information available with it was perused.

## 3.2 Phase II - Exploratory Research:

### 3.2.1 In-depth Interviews

With the help of the information gleaned from the desk research, five interview protocols were developed and in-depth / unstructured interviews of the industry leaders / experts / knowledgeable people were conducted in the seven major cities (which were the universe for this study). Therefore, in all, thirty-five in-depth interviews were conducted. These interviewees / experts could be divided into following categories:

1. IT Trainers / Educators
2. Software House Executives

3. Internet Service Providers / Operators
4. Senior IT Professionals
5. Users of computers / EDP / IT (whose business was affected by IT)

Trained professional researchers, with relevant exposure to IT, interviewed these industry experts to find out their assessment of the situation and other relevant issues.

### 3.2.2 Focus Groups

Based on the information collected from the Desk Research and In-depth interviews of the experts, "Discussion Guides" were drawn for the Group Discussion with each category of professionals identified in Para (3.2.1) above.

In each Focus Group 6 – 8 professionals of the relevant category were invited, for cross-discussions and exchange of ideas. The discussions were steered with the help of the Discussion Guides, by trained and experienced moderators, assisted by professionals in the field. These discussions were recorded and transcribed for analysis.

The focus groups were conducted in three cities Karachi, Lahore and Faisalabad to capture regional differences. A total of 15 focus groups were arranged (five in each city).

## 3.3 Phase III - Quantitative Research:

It was agreed that survey research would be carried out as per the following details:

| CATEGORY | CITY | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | Khi | Lhr | Isbd | F'bd | Hyd | Pwr | Sialkot | Total |
| User Organizations | 100 | 100 | 100 | 50 | 50 | 50 | 50 | 500 |
| Internet Service Providers | 15 | 10 | 6 | 1 | 1 | 1 | 1 | 35 |
| IT Professionals* | 100 | 100 | 100 | 50 | 50 | 50 | 50 | 500 |
| Trainers/Educators | 100 | 100 | 100 | 50 | 50 | 50 | 50 | 500 |
| Software Houses | 30 | 10 | 5 | 1 | 1 | 2 | 1 | 50 |
| **Total** | **345** | **320** | **311** | **152** | **152** | **153** | **152** | **1585** |

***** Hardware vendors were also covered in this category

However, after the Phase I and Phase II i.e. Desk Research and Exploratory Research it was felt that a Household Survey was essential to determine, interalia, incidence of computer literates and Computer and Internet / Email users, in the Households. A second Household Survey was conducted in which the computer literates were interviewed in more detail. This was essentially required as dependable information on the size of the universe, which was necessary for extrapolations of the IT industry, was not available for the given sectors. Whereas the universe of the Household Surveys was

known with some degree of accuracy and, therefore, available for extrapolation. Furthermore, it was felt that the results emerging out of Household Surveys could also be corroborated with the statistics generated by sample surveys of other IT sectors to come up with more dependable estimates.

### 3.3.1 General Household Survey

Respondents / households were selected in the said seven cities through multistage stratified random sampling, and a short interview of an adult male member of the household was conducted with the help of a semi-structured questionnaire to determine, besides other things, the number and gender of computer literates and incidence of PCs in the households.

### 3.3.2 Second Household Survey (of Computer Literates)

A sub sample of homes with computer literates, identified in the preceding survey, were contacted and extensive information about all computer literates in the household were collected through interviewing one of the computer literates in the household with the help of a semi-structured questionnaire.

The samples of household surveys were as follows:

| Survey | CITY |
|---|---|

| | Khi | Lhr | Isbd | Pwr | Hyd | Fbd | Sialkot | Total |
|---|---|---|---|---|---|---|---|---|
| Incidence | 2300 | 1500 | 900 | 500 | 600 | 700 | 500 | 7000 |
| Computer Literates | 935 | 569 | 379 | 110 | 76 | 108 | 38 | 2215 |

## 3.3.3 Trainers / Educators Survey

Owners or senior trainers / educators in the computer training organizations, in the designated seven cities, were interviewed with the help of a semi-structured questionnaire. The IT training institutions were divided into following categories:

i) Govt. Institutions awarding Masters degrees ( n = 13 )

ii) Govt. Institutions awarding Bachelors degrees ( n = 4 )

iii) Govt. institutions awarding Diplomas / Certificates ( n = 23 )

iv) Private Institutions awarding Masters degrees ( n = 58 )

v) Private Institutions awarding Bachelors degrees ( n = 23 )

vi) Private institutions awarding Diplomas / Certificates ( n = 249 )

vii) Institutions awarding High Level Certificates ( n = 36 )

The selection of institutions was done with the help of directories, yellow pages, advertisements and through snowballing.

## 3.3.4 Software Houses Survey

48 leading Software Houses in the given seven cities were covered in a survey in which the owner or some senior official of the company was interviewed with the help of a semi-structured questionnaire. The names of the organizations were picked from the list compiled by Pakistan Software Houses Association (PASHA).

### 3.3.5 ISPs Survey

Almost all functioning Internet Service Providers (n=35) in the said seven cities were contacted and interviewed with the help of a semi-structured questionnaire.

### 3.3.6 Vendors Survey

110 Vendors, selling PCs and other systems, belonging to the given seven cities, were interviewed with the help of a semi-structured questionnaire. As no exhaustive list was available, the Directories, Yellow pages, etc. were relied upon. The sample was biased towards bigger vendors.

### 3.3.7 IT Professionals Survey

391 Computer professionals, working in organizations heavily using computers, were interviewed with the help of a semi-structured questionnaire, in the given seven cities (one professional from each organization).

## 3.3.8 User Organizations Survey

Organizations with a minimum of 10 employees and 4 PCs were covered in this survey. However the bias was towards large organizations. The users were divided into the following categories:

| | | |
|---|---|---|
| i) | Financial Services | (n= 65) |
| ii) | Other Services | (n= 69) |
| iii) | Textiles | (n= 42) |
| iv) | Other Manufacturing | (n= 62) |
| v) | Trade and Business | (n= 23) |
| vi) | Govt. / Semi Govt. Organizations | (n= 42) |

As exhaustive lists of the user organizations / above sectors were not available, help of telephone directories, yellow pages, list of chamber members, associations, other trade bodies etc. was sought to select the respondents. Efforts were made to interview the senior most member of the company wherever possible. The interviews were conducted with the help of a semi-structured questionnaire.

# SUMMARY OF FINDINGS

# HOUSEHOLDS

# 4. FINDINGS OF HOUSEHOLDS SURVEYS

Following are some of the major findings emerging out of the two household surveys conducted in the seven major cities of Pakistan in the months of February / March 2001.

## 4.1 The Universe

The surveys were conducted in Karachi, Lahore, Rawalpindi/Islamabad, Faisalabad, Hyderabad, Peshawar and Sialkot comprising about half of the urban population of the country (i.e. about 22 million out of 46 million). The number of households in these cities is 3.41 million. The number of citizens of 5 year or more age are 19.55 million and the citizens of 15 years or more age are 13.6 million.

## 4.2 Computer Literacy

There are about 2.38 million Computer Literates in these cities; about 84% of these are males and 16% are females. Their professional breakdown is as follows:

| Profession | Among 5+ | | Among 15+ | |
|---|---|---|---|---|
| Students | 59% | 1,404,000 | 53% | 1,037,000 |
| Unemployed | 6 | 143,000 | 6 | 138,000 |
| Employed | 35 | 833,000 | 41 | 800,000 |
| **Total** | **100** | **2,380,000** | **100** | **1,975,000** |

Their age breakdown is as follows:

| Age (5+) | Number | |
|---|---|---|
| 5 – 14 yrs | 17% | 405,000 |
| 5 – 20 yrs | 31 | 738,000 |
| 21 – 25 yrs | 26 | 619,000 |
| 26 – 30 yrs | 15 | 357,000 |
| 31 – 40 yrs | 8 | 190,000 |
| > 41 yrs | 3 | 71,000 |
| **Total** | **100** | **2,380,000** |

It is estimated that more than one million Computer Literate people will enter the job market during the next five years (where as about 208,000 jobs would be created in the IT sector over next four years).

## 4.3 Level of Skills / Involvement

The level of skills of the employed Computer Literates and their level of involvement with computers is as follows:

| Skill / Involvement | | Employed (n=800,000) |
|---|---|---|
| a. | Low level (typing documents, e-mail / Internet etc.) | 33.31% |
| b. | Moderate level (additionally using some package) | 17.42% |
| c. | High (additionally programming, networking, hardware etc.) | 12.52% |
| d. | Hard core (high skills with experience of 3 years or more) | 5.10% |
| e. | No formal / regular use | 31.64% |

## 4.4 Place of Use

The students use computers mostly at their schools and homes. The places where other Computer Literates (above the age of 15 years n=938,000) use computers is as follows:

| Place of use (15+) | Most often | All places* |
|---|---|---|
| Homes | 35% | 50% |
| Educational Institutes | 18 | 30 |
| Offices / Businesses | 19 | 26 |
| Friends etc. | 08 | 20 |
| Cyber Cafes | 04 | 11 |
| Others | 00 | 01 |
| No response | 16 | 09 |

* Multiple responses were permitted. Hence the total can be more than 100.

It is estimated that about 375,000 computer literates use computers most often at their offices / business places. However, 256,000 employed Computer Literates do not use Computers at their offices / or for professional work.

## 4.5 Capabilities of Employed Computer Professionals

The types of work employed Computer Literates claim that they can do, or are doing and those with 3 years or more experience in those jobs are as follows:

| S No. | Activity | Can do* (n=800,00 ) | Are doing* (n=800,00 0) | Experience d (≥ 3 years) |
|---|---|---|---|---|
| 1. | Typing/Office work | 95% | 84% | 175,000 |
| 2. | Games/Music/Movi es | 83 | 63 | 111,000 |
| 3. | Data Entry | 70 | 56 | 83,000 |
| 4. | Email/Internet/Chatt ing | 62 | 48 | 54,000 |
| 5. | Programming | 33 | 25 | 40,000 |
| 6. | Hardware repair etc. | 25 | 17 | 39,000 |
| 7. | Graphic designing | 26 | 18 | 36,000 |
| 8. | Page composing | 25 | 17 | 30,000 |
| 9. | International calling | 33 | 23 | 29,000 |
| 10. | Database management | 25 | 18 | 29,000 |
| 11. | Web page designing/developin g | 18 | 11 | 18,000 |
| 12. | Networking | 12 | 07 | 12,000 |
| 13. | Software designing | 11 | 08 | 17,000 |

* Multiple responses were permitted. Hence the total can be more than 100.

## 4.6 E-mail / Internet

The estimated number (unduplicated) of people who avail of E-mail / Internet facilities is as follows:

| Place of use (5+) | Number (Unduplicated) |
|---|---|
| Homes | 586,000 |
| Offices / College etc. | 380,000 |
| Cyber Cafes | 325,000 |

It is estimated that about 1,291,000 people (5+ age group) use E-mail / Internet facilities.

An estimated number of 890,000 Computer Literates (of 15 years or more of age) are using e-mail / Internet facility.

## 4.7 Source of IT knowledge

The sources of education / training of the Computer Literates who consider themselves to be professionals, are as follows:

| Source of Education / Training | | Percentage |
|---|---|---|
| 1. | Computer Institutes | 38% |
| 2. | Schools / Colleges / Universities | 14 |
| 3. | Friends / Relatives | 18 |
| 4. | On the job training | 6 |
| 5. | Others | 9 |
| 6. | No response | 15 |

## 4.8 Languages / Packages (Employed Computer Literates)

The following figures are based on the perceptions / claims of the people about the languages / packages with which they can work or are currently working, and language / package in which they claim to have experience of three years or more:

| S No. | Language / Package | Can work* (n=800,000) | Working* (n=800,000) | Experienced ≥ 3 Years |
|---|---|---|---|---|
| 1. | MS Office (any part) | 64% | 57% | 26% **(119,000)** |
| 2. | MS Word | 27 | 24 | 32 **(61,000)** |
| 3. | MS Excel | 22 | 17 | 26 **(35,000)** |
| 4. | MS Power Point | 12 | 08 | 24 **(15,000)** |
| 5. | C++ | 11 | 07 | 19 **(11,000)** |
| 6. | Visual Basic | 08 | 06 | 26 **(12,000)** |
| 7. | Fox Pro | 12 | 07 | 18 **(10,000)** |
| 8. | Basic | 07 | 04 | 32 **(10,000)** |
| 9. | Oracle | 08 | 06 | 25 **(12,000)** |
| 10. | Java | 05 | 04 | 6** **(2,000)** |
| 11. | Internet/Explorer/Netscape | 04 | 04 | 14 **(4,000)** |

| | | | | |
|---|---|---|---|---|
| 12. | COBOL | 06 | 04 | 5 **(1,600)** |

(Figures in the last column are percentages of the second last column)

* Multiple responses were permitted. Hence the total can be more than 100.
** With some experience

## 4.9 Operating Systems

The Computer Literate population claimed to have been working on the following operating systems:

| *Operating System* | **Employed*** | **Students*** |
|---|---|---|
| Windows | 90% | 87% |
| DOS | 44 | 40 |
| Unix | 05 | 03 |

* Multiple responses were permitted. Hence the total can be more than 100.

## 4.10 Extent of Usage

One fourth of Computer Literates are light users of computers (upto 4 days per week), the rest are heavy users; average number of usage days for all Computer literate being 5.4 days.

Similarly 61% Computer Literates claim to use the Computers for less than or equal to 3 hours a day, and 27% use it for more than 3 hours a

day. On average, Computer Literates use computers for 2.8 hours in a day. (This figure is 4.12 hours in Computer owning households).

## 4.11 Working abroad

1.4% of all households, report that at least one member of their family is working abroad in the computer field. On this basis, the number of IT professionals working abroad is estimated to be 50,000. 14% of the households report that at least one member of their family is planning to go abroad in next one year to work in the computer field. 500,000 Computer Literates (+15 yrs) are seriously considering going abroad within the next one year. These include students as well as people employed in other professions.

## 4.12 Profile

It is estimated that out of about two million Computer Literates / Users (15+ yrs), about one million are students, 800,000 are employed and the rest are either unemployed, retired, or housewives. About 40,000 employed Computer Literates have Credit Cards and 88,000 own mobile phones.

# EDUCATIONAL INSTITUTIONS

# 5. FINDINGS OF EDUCATIONAL INSTITUTIONS SURVEY

The findings are based on the face to face interviews of owners / senior employees of IT / Computer training institutes in the given cities.

## 5.1 Number of IT Educational Institutions

The number of IT educational institutions in the given seven cities are estimated as follows:

| | | |
|---|---|---|
| 1. | Govt. Institutions awarding | |
| | Masters Degrees (MCS, MSc, MBA, MIT etc) | 35 |
| | | |
| 2. | Govt. Institutions awarding | |
| | Bachelors Degrees (BCS, BSc, BIT, etc) | 60 |
| | | |
| 3. | Govt. Institutions awarding | |
| | Diplomas/Certificates (DIT, DBA, CIT etc) | 110 |
| | | |
| 4. | Private Institutions awarding | |
| | Masters Degree (MCS, MIT, MBA etc) | 125 |
| | | |
| 5. | Private Institutions awarding | |
| | Bachelors Degrees (BCS, BSC, BIT etc) | 205 |
| | | |
| 6. | Private Institutions awarding | |
| | Diplomas/Certificates (DIT, DBA, CIT etc) | 1080 |
| | | |
| **Total** | | **1615** |

Each campus has been considered as a separate institution. The count includes institutions awarding degrees in their own rights and also those awarding degrees in affiliation with local / foreign institutions / Universities.

## 5.2 Ratio of Private And Public Institutions

The number of different levels of institutions in Private and Public sector is as follows:

| S. # | *Level* | Private | Public | Ratio |
|---|---|---|---|---|
| | | | | |
| 1. | Masters | 125 | 35 | 3.6:1 |
| 2. | Bachelors | 205 | 60 | 3.4:1 |
| 3. | Diplomas / Certificates | 1080 | 110 | 9.8:1 |

## 5.3 Affiliation

The affiliation status of IT training institutions is reported to be as follows:

| S. # | Affiliations / Institution | Local Universities | Local Institutes | Foreign Universities | Foreign Institutes | None |
|---|---|---|---|---|---|---|
| | | | | | | |
| 1. | Govt. Masters Degrees | 77% | | - | 8 | 15 |
| 2. | Govt. Bachelors Degrees | 75% | 0 | 25 | 0 | 0 |
| 3. | Govt. Diplomas/Certificates | 13% | 52 | 4 | 0 | 31 |
| 4. | Private Masters Degrees | 36% | 33 | 7 | 3 | 21 |
| 5. | Private Bachelors Degrees | 30% | 48 | 13 | 0 | 9 |
| 6. | Private Diplomas | 03% | 24 | 02 | 6 | 65 |

| | | | | | | |
|---|---|---|---|---|---|---|
| 7. | Private Certificates | 03% | 19 | 06 | 8 | 64 |

Figures are row percentages

## 5.4 Number of Shifts

The number of shifts run by different types of institutions is as follows:

**Institution**

- Govt. Masters 2
- Govt. Bachelors 2
- Govt. Diplomas 3
- Private Masters 2
- Private Bachelors 3
- Private Diplomas 3
- Private Certificates 3

## 5.5 Number of Admission / Sessions Per Annum

Number of times admissions are opened in each year by different institutions is as follows:

**Institution**

- Govt. Masters 2
- Govt. Bachelors 2
- Govt. Diplomas 3

- Private Masters 3
- Private Bachelors 3
- Private Diplomas 3
- Private Certificates 6

## 5.6 No. of Terminal Examination Conducted in a Year

The number of times terminal exams are conducted each year by different institutions is as follows:

**Institution**

- Govt. Masters 2
- Govt. Bachelors 2
- Govt. Diplomas 3
- Private Masters 3
- Private Bachelors 3
- Private Diplomas 3
- Private Certificates 6

## 5.7 Average Annual Intake

The average per annum (per institute) intake of students at different levels in different type of institutions is as follows:

| S. # | Type of Institution | Level of Admission | | | |
|---|---|---|---|---|---|
| | | **Masters** | **Bachelors** | **Diplomas** | **Certificates** |
| 1. | Govt. Institutions giving | | | | |
| | Masters Degrees etc | 123 | 186 | 91 | 111 |
| 2. | Govt. Institutions giving | | | | |
| | Bachelors Degrees etc | - | 139 | 70 | 219 |
| 3. | Govt. Institutions giving | | | | |
| | Diplomas/Certificates etc | - | - | 113 | 180 |
| 4. | Private Institutions giving | | | | |
| | Masters Degrees etc | 63 | 108 | 70 | 174 |
| 5. | Private Institutions giving | | | | |
| | Bachelors Degrees etc | - | 111 | 94 | 147 |
| 6. | Private Institutions giving | | | | |
| | Diplomas / Certificates etc | - | - | 51 | 803 |

| | | | | | |
|---|---|---|---|---|---|
| | **Total** | **186** | **544** | **489** | **1,634** |

## 5.8 Average number of Degrees / Certificates Awarded Annually

The average number of students acquiring degrees / diplomas / certificates per year (per institute) from different types of institutions is as follows:

| | | Level of Passing Out | | | |
|---|---|---|---|---|---|
| **S. #** | **Type of Institution** | **Master** | **Bachelor** | **Diploma** | **Certificate Courses** |
| | | | | | |
| 1. | Govt. Institutions giving | | | | |
| | Masters Degrees etc | 92 | 152 | 71 | 42 |
| | | | | | |
| 2. | Govt. Institutions giving | | | | |
| | Bachelors Degrees etc | - | 96 | 73 | 154 |
| | | | | | |
| 3. | Govt. Institutions giving | | | | |
| | Diplomas/Certificates etc | - | - | 65 | 163 |
| | | | | | |
| 4. | Private Institutions giving | | | | |
| | Masters Degrees etc | 35 | 56 | 49 | 86 |
| | | | | | |
| 5. | Private Institutions giving | | | | |
| | Bachelors Degrees etc | - | 39 | 55 | 70 |
| | | | | | |
| 6. | Private Institutions giving | | | | |

| | | | | | |
|---|---|---|---|---|---|
| | Diplomas etc | - | - | 34 | 408 |
| | **Total** | **127** | **343** | **347** | **923** |

## 5.9 Current Enrollment

The institutions run several shifts in a day. Several batches of students are inducted in a year. Similarly the final exam is conducted several times in a year. The average number of students of different levels in different types of institutions is as follows.

| | | **Level of Current Enrollment** | | | |
|---|---|---|---|---|---|
| **S. #** | **Type of Institution** | **Masters** | **Bachelors** | **Diplomas** | **Certificates** |
| | | | | | |
| 1. | Govt. Institutions giving | | | | |
| | Masters Degrees etc | 175 | 339 | 63 | 74 |
| | | | | | |
| 2. | Govt. Institutions giving | | | | |
| | Bachelors Degrees etc | - | 143 | 91 | 160 |
| | | | | | |
| 3. | Govt. Institutions giving | | | | |
| | Diplomas / Certificates etc | - | - | 81 | 117 |
| | | | | | |
| 4. | Private Institutions giving | | | | |
| | Masters Degrees etc | 57 | 108 | 61 | 83 |
| | | | | | |
| 5. | Private Institutions giving | | | | |
| | Bachelors Degrees etc | - | 173 | 464 | 159 |
| | | | | | |

| | | | | | |
|---|---|---|---|---|---|
| 6. | Private Institutions giving | | | | |
| | Diplomas / Certificates etc | - | - | 39 | 421 |
| | **Total** | **232** | **763** | **799** | **1014** |

## 5.10 Overall Figures

| S. # | *Level* | Annual Intake | Present Enrollment | Annual Pass out |
|---|---|---|---|---|
| | | | | |
| 1. | Masters | 12,180 | 13,250 | 7,595 |
| 2. | Bachelors | 51,105 | 69,095 | 26,075 |
| 3. | Diplomas | 93,735 | 154,420 | 62,015 |
| 4. | Certificates | 407,490 | 226,990 | 230,140 |
| ***Total*** | | **564,510** | **463,755** | **325,825** |

It may however be noted that not all students come into the market after passing out. Several take admission in higher classes. It may further be noted that several employed people take up the diploma / certificate courses to enhance their capacities (mid career courses).

## 5.11 Course Duration and Total Fees

The average course duration and the average fees paid for completion of a specific level course is as follows:

| *Qualification* | *Duration Months* | *Fees* |
|---|---|---|

| | | |
|---|---|---|
| ▪ Masters | 20 | Rs.76,000/- |
| ▪ Bachelors | 32 | 95,000/- |
| ▪ Diplomas | 11 | 12,000/- |
| ▪ High Level Certificates (HLCs) | 5 | 9,000/- |
| ▪ Short Certificates | 3 | 3,000/- |

## 5.12 Ratio of Permanent and Visiting Faculty

The average number and ratio of permanent and visiting teachers in different types of institutions is as follows:

| | | FACULTY | | |
|---|---|---|---|---|
| **S. #** | **Kind of Institution** | Permanent | Visiting | Ratio |
| | | Number | Number | |
| 1. | Govt. Masters Degrees | **25** | **09** | **2.7:1** |
| 2. | Govt. Bachelors Degrees | **16** | **07** | **2.3:1** |
| 3. | Govt. Diplomas/Certificates | **07** | **02** | **3.5:1** |
| 4. | Private Masters Degrees | **12** | **16** | **0.75:1** |
| 5. | Private Bachelors Degrees | **09** | **07** | **1.3:1** |
| 6. | Private Diplomas Degrees | **04** | **03** | **1.3:1** |
| 7. | Private Institutions offering certificate courses | **06** | **03** | **2:1** |

# 5.13 Qualification (Full Time Teachers)

The percentage of teachers holding qualifications of different levels is as follows:

| S. # | Institution | PhDs (All Disciplines) | Masters | Bachelors | Diplomas | *Certificates* |
|---|---|---|---|---|---|---|
| 1. | Govt. Masters | 4% | 80 | 12 | 4 | 0 |
| 2. | Govt. Bachelors | - | 81% | 19 | 0 | 0 |
| 3. | Govt. Dip/Cert. | - | 43% | 29 | 14 | 14 |
| 4. | Private Masters | 8% | 59 | 17 | 8 | 8 |
| 5. | Private Bachelors | - | 67% | 22 | 11 | - |
| 6. | Private Dip/Cert. | - | 50% | 25 | 25 | - |
| 7. | HLCs | - | 29% | 38 | 21 | 12 |

Figures are row percentages

**Qualification (Full Time Teachers)**

The number of teachers holding different qualifications in different institutions is as follows:

| S. # | Institution | PhDs (All disciplines) | Masters | Bachelors | Diplomas | *Certificates* |
|---|---|---|---|---|---|---|
| 1. | Govt. Masters | 35 | 700 | 105 | 35 | - |
| 2. | Govt. Bachelors | 0 | 780 | 180 | - | - |
| 3. | Govt. Dip/Cert. | 0 | 330 | 220 | 110 | 110 |
| 4. | Private Masters | 125 | 875 | 250 | 125 | 125 |
| 5. | Private Bachelors | - | 1230 | 410 | 205 | - |
| 6. | Private Dip/Cert | - | 2160 | 1080 | 1080 | 180 |

| | | | | | |
|---|---|---|---|---|---|
| ***Total*** | 160 | 6075 | 2245 | 1555 | 415 |

**~ 10,450**

## 5.14 Average Experience

The average experience of staff at different levels of qualifications is as follows:

| | | *AVERAGE EXPERIENCE* | |
|---|---|---|---|
| **S. #** | **Qualification** | ***Full Time*** | ***Visiting*** |
| | | | |
| 1. | Ph. Ds (All Disciplines) | 13 years | 10 years |
| 2. | Masters | 4 | 5 |
| 3. | Bachelors | 3 | 3 |
| 4. | Diplomas | 3 | 3 |
| 5. | HLCs | 3 | 2 |
| 6. | Short Courses | 3 | 2 |
| 7. | Experience Only | 5 | 2 |

## 5.15 Employment scene

Several teachers left the country in search for greener pastures during last one year. The overall impact is as follows:

| *S. #* | **Type of Institution** | **Net Induction** | **Went Abroad** | **In flow / Out flow** |
|---|---|---|---|---|
| 1. | Govt. Masters Degrees | 105 | 140 | -35 |
| 2. | Govt. Bachelors Degrees | 0 | 60 | -60 |
| 3. | Govt. Diplomas/Certificates | 0 | 110 | -110 |
| 4. | Private Masters Degrees | 625 | 125 | 500 |
| 5. | Private Bachelors Degrees | 205 | 205 | - |

| | | | | |
|---|---|---|---|---|
| 6. | Private Diplomas / Certificates | 1,440 | 180 | 1260 |
| **Total** | | **2,375** | **820** | **1,555** |

## 5.16 Yearly Exodus / Brain Drain

The percentage of teachers leaving the educational institutions annually to seek employment abroad is estimated as follows:

| *Type of Institution* | |
|---|---|
| ▪ Govt. Masters | 14% |
| ▪ Govt. Bachelors | 23 |
| ▪ Govt. Diplomas | 5 |
| ▪ Private Masters | 8 |
| ▪ Private Bachelors | 7 |
| ▪ Private Diplomas | 5 |
| ▪ Private Certificates | 4 |
| *Average* | *6%* |

## 5.17 Availability

In the opinion of the management of educational institutions teachers for following languages were not so easily available:

- Java
- Oracle
- C++

## 5.18 Quality Parameters

Factors that directly correlate to quality of education were said to be:

- Qualified Faculty
- Student Teacher Ratio
- Good Basic Education
- Modern Curriculum
- Effective Monitoring
- Student PC Ratio

## 5.19 Quality Perceptions of Different Sectors of IT Industry

IT Professionals' opinion about their own competency level on a scale of 0 – 10 (where '10' means fully competent and '0' means not at all competent), was as follows:

| *IT Professionals with:* | *Rating* |
|---|---|
| ▪ Internet Service Providers | 7 |
| ▪ Software Houses | 6 |
| ▪ Vendors | 6 |
| ▪ Educational Institutions | 6 |
| ▪ Other Users | 6 |
| *Average* | *6* |

Opinion of Internet Service Providers about competency level of their own employees / IT Professionals in different fields, on a scale of 0-10 was as follows:

| *Field* | *Rating* |
|---|---|
| ▪ Network Engineering | 4.1 |
| ▪ Hardware Engineering | 3.5 |
| ▪ Web Page Designing | 5.0 |

Opinion of Software House Operators about competency level of their own employees / IT Professionals in different fields on scale of 0-10 was as follows:

| *Field* | *Rating* |
|---|---|
| ▪ Programming | 5.6 |
| ▪ Software Designing | 4.2 |
| ▪ Database Administration | 5.8 |

Opinion of Hardware Vendors about competency level of their own employees / IT Professionals in different fields on scale of 0-10 was as follows:

| *Field* | *Rating* |
|---|---|
| ▪ Networking | 5.2 |
| ▪ Hardware Engineering | 5.0 |

Users rated the competency of IT Professionals in the country on a scale of 0-10 at 6.1

## 5.20 Salaries (Teaching Staff)

Based on the interviews with a sample covering a variety of IT educational Institutions the reported salaries of the faculty were as under:

| | | Average Reported Monthly Salary / Honorarium | |
|---|---|---|---|
| **S. #** | **Qualification** | **Full Time** | **Visiting** |
| 1. | PhDs (Various disciplines) | Rs.41,000 | Rs.14,000 |
| 2. | Masters | Rs.10,000 | Rs.8,000 |
| 3. | Bachelors | Rs.6,000 | Rs.6,000 |
| 4. | Diplomas | Rs.5,000 | Rs.4,000 |
| 5. | High Level Certificates | Rs.7,000 | Rs.7,000 |
| 6. | Short Courses | Rs.3,000 | Rs.4,000 |

## 5.21 Migration

- 66% IT Professionals have a desire to go abroad for employment. They expect to leave the country within two years.

- Software House Operators reported in their interviews that on average 4 professionals from each of their organizations left the country annually.

- Internet Service Providers reported that on average 5 people leave their organization annually to seek employment abroad.

- About 310 IT Professionals teaching in government institutions leave the country annually for better prospects. This figure is 510 for private institutions.

- Vendors reported that very few of their employees have gone abroad for employment

## 5.22 Overall Ranking

In the opinion of IT educational institution operators, the following were the best IT institutions:

| S. # | Best Institution | Respondents |
|---|---|---|
| 1. | FAST | 28% |
| 2. | Petroman | 26 |
| 3. | LUMS | 14 |
| 4. | Nicon (Lahore / Isbd) | 12 |
| 5. | Karachi University | 10 |
| 1. | Brain (Peshawar) | 9 |
| 2. | Fitsun (Peshawar) | 8 |
| 3. | Sir Syed | 7 |
| 4. | SZABIST | 7 |

| | | |
|---|---|---|
| 5. | NED | 7 |

* Multiple responses were permitted. Hence the total can be more than 100.

## 5.23 Reasons for slow progress of IT in the country

The most important reasons for the slow progress of IT industry in the country in the opinion of the Educators were the following:

| | | |
|---|---|---|
| 1. | Expensive Technology | 49% |
| 2. | Lack of job opportunities | 32 |
| 3. | Low standards of general education | 8 |
| 4. | Others | 11 |

## 5.24 Steps to produce high caliber IT professionals

The Educators proposed following steps to produce high caliber IT Professionals:

| | | |
|---|---|---|
| 1. | Improve teaching facilities / infrastructure | 53% |
| 2. | Offer financial incentives | 37 |
| 3. | Increase government patronage | 35 |

* Multiple responses were permitted. Hence the total can be more than 100.

## 5.25 Reasons for Unemployment of Computer professionals

The Educators forwarded following reasons for unemployment of computer-educated individuals:

| | | |
|---|---|---|
| 1. | Low standard of IT education | 47% |
| 2. | Absence of IT Industry | 42 |
| 3. | Low level of computerization in the country | 12 |
| 4. | No hands-on experience | 5 |

* Multiple responses were permitted. Hence the total can be more than 100.

## 5.26 Desired Quality Initiatives

Educators proposed following steps to improve the quality of education at IT Training institutes:

| | | |
|---|---|---|
| 1. | Induct qualified faculty | 30% |
| 2. | Increase government patronage | 19 |
| 3. | Standardize syllabus | 18 |
| 4. | Effective monitoring of IT institutions | 17 |
| 5. | Provide financial help | 8 |
| 6. | Universalize primary education | 7 |
| 7. | Improve Infrastructure | 7 |

* Multiple responses were permitted. Hence the total can be more than 100.

## 5.27 Steps to Evaluate Performance of Institutions

Educators proposed following steps to evaluate the performance of IT institutions:

| | | |
|---|---|---|
| 1. | Regular Inspections | 80% |
| 2. | Evaluate Faculty | 26 |
| 3. | Standardize Syllabus | 24 |
| 4. | Regular Tests / Examinations | 17 |

* Multiple responses were permitted. Hence the total can be more than 100.

## 5.28 How Internet is helping in computer education

In the Educators' opinion following are the ways in which Internet is helpful in furtherance of IT education:

| | | |
|---|---|---|
| 1. | A valuable source of information | 44% |
| 2. | Helps in communication | 10 |
| 3. | Facilitates research | 10 |
| 4. | Provides opportunities for distance learning | 4 |
| 5. | Grants access to new softwares | 3 |
| 6. | Others | 29 |

# HUMAN RESOURCES

# 6. HUMAN RESOURCES

These findings are based on personal interviews of individuals attached with the industry in different sectors.

## 6.1 Sectors Employing IT Professionals

IT Professionals considered the following sectors to be the probable potential employers for their services:

| Sector | * |
|---|---|
| | |
| Software Houses | 72% |
| Educational Institutions | 69 |
| Internet Service Providers | 64 |
| Financial Services | 57 |
| Other Services | 55 |
| Textiles | 52 |
| Pharmaceuticals | 48 |
| Trade & Business | 45 |
| Other Manufacturing | 42 |
| Govt. / Semi Govt. Organizations | 25 |

* Multiple responses were permitted. Hence the total can be more than 100.

## 6.2 Skills in Demand (Local)

IT Professionals considered following skills as the most demanded in the country:

| S. # | *Skills required in the country* | **IT Professionals** |
|---|---|---|
| 1. | Programming | 35% |
| 2. | System Analysis/Design/Development | 27 |
| 3. | Web Developing/Designing | 13 |
| 4. | E-Commerce | 08 |
| 5. | Database Administration | 05 |
| 6. | Data Entry/Computer Operators | 04 |
| 7. | Networking | 02 |
| 8. | Hardware Engineering | 01 |
| 9. | Others | 05 |

## 6.3 Skills in Demand (Overseas)

IT professionals considered the following as the most demanded skills abroad:

| S. # | *Skill required abroad* | *Perceived by* |
|---|---|---|
| | | |
| 1. | Programming | 33% |
| 2. | System Analysis/Design/Development | 24 |
| 3. | E-Commerce | 14 |
| 4. | Web Developing/Designing | 12 |
| 5. | Database Administration | 04 |
| 6. | Internet Development | 03 |
| 7. | Others | 10 |

## 6.4 Number of Employed Computer Users / IT Professionals

The estimated numbers of people using PCs on their jobs in the country are as follows:

| | |
|---|---|
| Software Houses | 5,000 |
| Internet Service Providers | 1,000 |
| Hardware Vendors | 9,000 |
| Educational Institutions | 10,450 |
| User Organizations | 521,430* |
| **Total** | **546,880** |

* It is estimated that about 375,000 are heavy users of PCs including 266,480 individuals engaged in low key jobs on computers such as typing, data entry, email/Internet surfing etc. About 150,000 people of User Organizations are light users of computers on their jobs.

6.4.1 The estimated numbers of IT Professionals working with Internet Service Providers are as follows:

| | |
|---|---|
| Project Managers | 70 |
| System Analysts | 105 |
| Programmers | 175 |
| Web Developers | 105 |
| Internet Engineers | 140 |
| Network Specialists | 105 |
| Data Communication Specialists | 35 |
| Telecom Specialists | 35 |
| Hardware Specialists | 70 |
| Multimedia Specialists | 35 |
| Data Entry Operators | 45 |
| Call Centre Operators | 80 |

| | |
|---|---|
| **Total** | **1000** |

6.4.2 The types of IT Professionals estimated to be available in Software Houses are as follows:

| | |
|---|---|
| Project Managers | 400 |
| System Analysts | 800 |
| Programmers | 1600 |
| Web Developers | 400 |
| Internet Engineers | 50 |
| Network Specialists | 250 |
| Data Communication Specialists | 50 |
| Telecom Specialists | 50 |
| Hardware Specialists | 200 |
| Data Entry Operators | 400 |
| Trainees | 800 |
| ***Total*** | **5000** |

6.4.3 The numbers of IT Professionals / Computer Users estimated to be working in other User Organizations are as follows:

| | |
|---|---|
| Computer Operators | 345,430 |
| Data Entry Operators | 130,000 |
| Programmers | 8,000 |
| System Analysts | 6,000 |
| Network Administrators | 5,000 |
| Hardware Engineers | 5,000 |
| Data Communication Specialists | 2,000 |
| Telecom Specialists | 1,500 |
| Multimedia Specialists | 2,500 |
| Others | 16,000 |
| ***Total*** | **521,430** |

## 6.5 Qualification of IT Manpower / Computer Users

The number of IT professionals (and Computer Users) with different qualifications in different sectors is as follows:

| S. # | Qualification | ISPs | SWHs | Vendors | Edu. Inst. | User Organizations | Total |
|---|---|---|---|---|---|---|---|
| | | | | | | | |
| 1. | Ph. Ds (all disciplines) | 15 | * | * | 160 | * | 175 |
| 2. | Masters | 273 | 1550 | 810 | 6075 | 14,667 | 23,375 |
| 3. | Bachelors | 358 | 2600 | 3060 | 2245 | 22,001 | 30,264 |
| 4. | Diplomas | 172 | 500 | 2520 | 1555 | 29,335 | 34,082 |
| 5. | Certificates | 167 | 300 | 1890 | 415 | 58,669 | 61,441 |
| 6. | Experienced | 15 | 50 | 720 | * | 396,758 | 397,543 |
| **Total** | | **1,000** | **5,000** | **9,000** | **10,450** | **521,430** | **546,880** |

*connotes that the reported numbers were insignificant at the time of interviewing during 2001.

## 6.6 Proficiency and Skills

Usage, Competency and Experience claimed by IT Professionals were as follows:

| S. # | *Skills* | Can do* | Current Usage* | Competency* (Fully Competent)** | Experience (Years) |
|---|---|---|---|---|---|
| 1. | Programming | 59% | 43% | 65% | 3.5 |
| 2. | Data Entry | 53 | 32 | 57 | 2.5 |
| 3. | Software Designing & Developing | 52 | 38 | 58 | 3 |
| 4. | System Analysis and Design | 43 | 29 | 51 | 3.1 |
| 5. | Database Administration | 38 | 22 | 50 | 2.9 |
| 6. | Internet Development | 30 | 16 | 37 | 1.8 |
| 7. | E-Commerce | 30 | 17 | 30 | 1.3 |
| 8. | Network Protocol/Topologies | 29 | 21 | 50 | 2.1 |
| 9. | Hardware Engineering | 28 | 18 | 45 | 2.9 |
| 10. | Project Management | 25 | 15 | 43 | 2.5 |
| 11. | Internet Telephony | 16 | 7 | 26 | 1.7 |
| 12. | Knowledge Management | 13 | 6 | 35 | 1.8 |

* Multiple responses were permitted. Hence the total can be more than 100

** percentage of all those who claimed to have these skills as per columns 3 (Can do).

However the perceptions of Computer Literates (interviewed in the Households surveys) were more tilted towards low end skills.

## 6.7 Salaries

The salaries for different professionals in different types of organizations were reported as follows:

| | | *AVERAGE REPORTED MONTHLY SALARY (Rs.'000)* | | | |
|---|---|---|---|---|---|
| **S. #** | ***Job Function*** | **ISPs** | **SWHs** | ***Vendors*** | **Users** |
| 1. | Project Managers | 35 | 38 | - | - |
| 2. | System Analysts | 29 | 24 | - | 11 |
| 3. | Programmers | 15 | 13 | - | 8.5 |
| 4. | Web Developers | 12 | 15 | - | 8.5 |
| 5. | Internet Engineers | 13 | 11 | - | - |
| 6. | Network Specialists | 13 | 17 | 7 | 10 |
| 7. | Data Communication Specialists | 19 | 22 | - | 11.5 |
| 8. | Telecommunication Specialists | 19 | 16 | - | 9 |
| 9. | Hardware Engineers | 10 | 17 | 6 | 9.5 |
| 10. | Multimedia Specialists | 12 | - | - | 9.5 |
| 11. | Data Entry Operators | 5 | 5 | - | 9.5* |
| 12. | Operators for Call Centers | 5 | - | - | 5 |
| 13. | Computer Operators | - | - | - | 5 |

***** including overtime

# SOFTWARE HOUSES (SWHs)

# 7. FINDINGS OF SOFTWARE HOUSES SURVEY

The findings are based on the perceptions of owners / senior employees of software houses covered in this survey.

## 7.1 Number of Software Houses

The Software House Operators covered in this study opined that there are about 170 active software houses in the organized sector, and about 360 in the unorganized sector in the country.

## 7.2 Growth rate

83% Software House Operators felt that the number of Software Houses in the country would increase over the next two years. The increase is expected to be around 32%.

## 7.3 Clientele

7.3.1 31% software houses claimed to work only for local clients. 15% claimed to serve foreign clients only. However, 54% Software Houses claimed to work for both local as well as foreign clients.

### 7.3.2 Type of clients

The business sectors served by the Software Houses are as follows:

| Sectors Served | Local* | Foreign* |
|---|---|---|
| Trade & business | 91% | 75% |
| Textiles | 44 | 09 |
| Other manufacturing | 37 | 12 |
| Software Houses (sub contracting) | 34 | 33 |
| Educational Institutions | 34 | 15 |
| Govt. / Semi Govt. Organizations | 34 | 12 |
| Financial services | 29 | 33 |
| Pharmaceuticals | 27 | 15 |
| Other services | 20 | 21 |
| Hardware vendors | 15 | 06 |
| Telecommunications | 06 | 09 |
| Internet service providers | 05 | 09 |

* Multiple responses were permitted. Hence the total can be more than 100.

# 7.4 Types of Products offered

7.4.1 The types of products offered by Software Houses to their local and foreign clients are as follows:

| | Offered to | |
|---|---|---|
| **Product Type** | **Local Clients** | **Foreign Clients** |
| Prepackaged | 07% | 03% |
| Customized | 54 | 64 |
| Both | 39 | 33 |
| Total | **100** | **100** |

7.4.2 The types of prepackaged software being offered are as follows:

| | SWHs serving | |
|---|---|---|
| **Prepackaged** | **Local Clients*** | **Foreign Clients*** |
| Financial & Accounting | 52% | 33% |
| MIS | 31 | 32 |
| Other business applications | 26 | 08 |
| Engineering applications | 21 | - |
| Communication software | - | 17 |
| Miscellaneous | - | 32 |

* Multiple responses were permitted. Hence the total can be more than 100.

7.4.3 The different types of Customized products offered by Software Houses to their local and foreign clients are as follows:

| Customized Products | SWHs Serving | |
|---|---|---|
| | Local Clients* | Foreign Clients* |
| Financial & Accounting | 71% | 37% |
| MIS | 37 | 30 |
| Other business applications | 33 | 30 |
| Engineering applications | 16 | 47 |
| Communication software | 05 | 36 |
| Medical transcription | 03 | 03 |
| Miscellaneous | 12 | 61 |

* Multiple responses were permitted. Hence, the total can be more than 100.

## 7.5 Size of Software Houses

7.5.1 The sizes of Software Houses on the basis of number of professionals employed with them are as follows:

| No. of Professionals | SWHs |
|---|---|
| 1 – 9 | 36% |
| 10 – 15 | 15 |
| 16 – 30 | 19 |
| 31 – 60 | 13 |
| 61+ | 17 |
| **Total** | 100 |

7.5.2 The sizes of Software Houses according to their reported local turnover are as follows:

| Annual Turnover | SWHs |
|---|---|
| Less than one million rupees | 44% |
| One to two million rupees | 24 |
| Two to four million rupees | 19 |
| More than 4 million rupees | 13 |
| **Total** | **100** |

7.5.3 The sizes of Software Houses according to their reported exports are as follows:

| Annual Turnover | *SWHs* |
|---|---|
| Less than $ 100,000/- | 50% |
| $ 100,000 - 200,000/- | 22 |
| $ 200,000 - 500,000 | 16 |
| More than $ 500,000/- | 12 |
| **Total** | **100** |

## 7.6 Foreign Offices

About half of the Software Houses have no representative or office in foreign lands. The details are as follows:

| | |
|---|---|
| Have a Foreign Office | 27% |
| Have a representative abroad | 13 |
| Have both | 15 |
| None | 45 |
| **Total** | **100** |

# 7.7 Languages Used

The Software Houses claimed to be using the following languages:

| | |
|---|---|
| Visual Basic | 77% |
| Java | 60 |
| SQL | 48 |
| Oracle | 42 |
| C++ | 40 |
| HTML | 35 |
| FoxPro | 13 |
| RPG | 08 |
| Visual FoxPro | 06 |
| ASP | 06 |
| XML | 02 |
| Delphi | 02 |
| Visual C++ | 02 |

* Multiple response were permitted. Hence the total can be more than 100.

## 7.8 Problems being faced

The main problems faced by the Software Houses in servicing their local and foreign markets are as follows:

| Problems | Local market* | Foreign market |
|---|---|---|
| Government related issues | 45% | 06% |
| Infrastructure weaknesses | 39 | 04 |
| Shortage of skilled personnel | 30 | 04 |
| Ineffective marketing | 24 | 40 |
| Lack of financial resources | 14 | 26 |
| Weak project management | 12 | Zero |
| Absence of legal framework | 10 | 04 |
| Bad law & order / political instability | 08 | Zero |
| Poor product quality | 4 | 06 |
| No response | - | 10 |

* Multiple responses were permitted. Hence the total can be more than 100.

# Internet and Communication Networks

# 8. FINDINGS OF INTERNET SERVICE PROVIDERS SURVEY

These findings are based on the responses of Internet Service Providers interviewed in this survey.

## 8.1 The Number of Internet Connections and the Cities Covered

The total number of Internet connections and the active Internet connections in the cities where surveyed ISPs operated were reported to be as follows:

| | CONNECTIONS | |
|---|---|---|
| **City** | **Total** | **Active** |
| Karachi | 249,912 | 168,714 |
| Lahore | 121,295 | 72,743 |
| Islamabad | 22,550 | 12,496 |
| Rawalpindi | 15,610 | 9,310 |
| Multan | 7,510 | 5,410 |
| Faisalabad | 7,116 | 5,118 |
| Hyderabad | 4,500 | 2,799 |
| Gujrat | 3,400 | 2,700 |
| Sialkot | 3,612 | 2,112 |
| Gujranwala | 5,815 | 2,015 |

| | | |
|---|---|---|
| Other Cities (Jehlum, Sargodha, Kharian, Thatta, Peshawar, Sheikhupura, Abbottabad, Nowshera, Rahim Yar Khan, Mardan, Sahiwal) | 5,140 | 3,440 |
| **Total** | **446,460** | **286,857** |

## 8.2 Cities to be covered

During the survey conducted in middle of 2001, ISPs surveyed showed their intention to extend their services to the following cities in next few years:

- Quetta
- Sukkur
- Bahawalpur
- Mirpurkhas
- Muzzaffarabad
- Mirpur (AJK)
- Narowal
- Bhalwal
- Lodhran
- Hafizabad
- Kasur

## 8.3 Percentage of Population Using Internet

8.3.1 It is estimated that the total number of Internet Connections is around 450,000. The breakdown is as follows:

| Sector | Share | Number |
|---|---|---|
| Households | 56% | 252,000 |
| Offices | 19 | 85,500 |
| Cyber Cafes | 13 | 58,500 |
| Educational Institutions | 12 | 54,000 |
| **Total** | **100** | **450,000** |

8.3.2 The number of Internet / Email users is estimated to be as follows:

| | |
|---|---|
| Households | 586,000 |
| Cyber Cafes | 325,000 |
| Offices | 233,000 |
| Educational Institutions | 147,000 |
| **Total** | **1,291,000** |

## 8.4 Growth Rate

The expected annual growth rate of the active Internet connections in different sectors is estimated to be as follows:

| | |
|---|---|
| Households | 58% |
| Educational Institutions | 45 |
| Offices | 42 |
| Cyber Cafes | 31 |

## 8.5 Uses of Internet

8.5.1 As per perceptions of ISPs most frequent uses of Internet in Households and Offices is as follows:

| **Most Frequent Use** | ***Households*** | **Offices** |
|---|---|---|
| Chatting | 51% | 03% |
| E-mail | 17 | 66 |
| International calling | 17 | 0 |
| Browsing | 6 | 3 |
| Fax | 0 | 14 |
| E-commerce | 0 | 11 |

| | | |
|---|---|---|
| Others | 9 | 3 |

8.5.2 Other uses of Internet were said to be as follows:

| All Uses | Households* | Offices* |
|---|---|---|
| E-mail | 71% | 77% |
| International calling | 66 | 14 |
| Chatting | 54 | 09 |
| E-commerce / Shopping | 23 | 46 |
| Surfing | 20 | 34 |
| Fax | 14 | 69 |

* Multiple responses were permitted. Hence the total can be more than 100.

However the perception of IT Professionals and Users in Households and in Users Organizations are at variance to the above.

## 8.6 Average Hours Sold

As reported by the ISPs the average number of telephone lines with each of them is 673. Assuming that each line is used for 20 hours in a day, the average hours used by Internet users in a month works out to 14,133,000 (hours). If average rate is Rs. 16/hr then each of the 286,857 Internet connection is paying Rs. 788/- per month as Internet usage charges (Domestic users spend on average Rs. 715/pm for Internet usage).

## 8.7 Routers Used

The Routers used by Internet Service Providers are as follows:

- Cisco 91%
- IBM 9
- Sun 6

## 8.8 Development Plans

The development plans of the telecommunications sector are summarized in Annexure 'B'.

# SIZE OF THE COMPUTER MARKET

# 9. FINDINGS OF HARDWARE VENDORS SURVEY

The figures presented in this section are, by and large, based on the estimates of Vendors covered in this survey and corroborated with information collected from other sectors.

## 9.1 Ratio of Branded and Unbranded Computers

The average ratios of branded and unbranded PCs in different types of organizations are estimated to be as follows:

| *Organization* | Number of Computers | | |
|---|---|---|---|
| | **Branded** | **Unbranded** | **Total** |
| Internet Service Providers | 16 (40%) | 24 (60%) | 40 (100%) |
| Software Houses | 18 (42%) | 25 (58%) | 43 (100%) |
| Educational Institutions | 12 (36%) | 21 (64%) | 33 (100%) |
| User Organizations | 7 (41%) | 10 (59%) | 17 (100%) |
| Households | 0.01(8%) | 0.15 (92%) | 0.16 (100%) |

## 9.2 Total Population

Following are the estimated numbers of PCs in different types of organizations:

| Type of Organization | Branded | Unbranded | Total |
|---|---|---|---|
| | | | |
| Internet Service Providers | 560 | 840 | 1,400 |
| Software Houses | 3,060 | 4,250 | 7,310 |
| Educational Institutions | 19,380 | 33,915 | 53,295 |
| User Organizations* | 210,000 | 300,000 | 510,000 |
| Households | 34,100 | 511,500 | 545,600 |
| ***Total*** | **267,100** | **850,505** | **1,117,605** |

***** Organizations with at least 10 employees and 4 PCs

## 9.3 Average Growth Rate (PCs purchased during the last 12 months)

The average number of PCs bought during last 12 months by different types of organizations is estimated to be:

| Organization | Number of Computers | | |
|---|---|---|---|
| | Branded | Unbranded | ***Total*** |
| Internet Service Providers | 03 | 07 | 10 |
| Software Houses | 03 | 07 | 10 |
| Educational | 03 | 05 | 08 |

| | | | |
|---|---|---|---|
| Institutions | | | |
| User Organizations | 02 | 02 | 04 |
| Households | 0.01 | 0.06 | 0.07 |

## 9.4 Sales

Average sale of each Vendor for the calendar year 2000, was reported as follows:

- Branded PCs 58
- Unbranded PCs 218
- Total 276

In addition following were also sold:

- Laptops 2.2
- Miniframe 0.5
- Mainframes 0.2

## 9.5 Average sales growth reported by vendors

When average sales figures of a vendor for 1999 and 2000 were compared, the following growth was noted:

| Type | 1999 | 2000 | Growth |
|---|---|---|---|
| Unbranded | 166 | 226 | 36% |
| Branded | 4 | 6 | 50 |

| | | | |
|---|---|---|---|
| Laptop / Note book | 2 | 2.2 | 10 |
| **Total** | **172** | **234.2** | **36%** |

The number of Hardware Vendors in the given cities is estimated to be 1833. So the average number of PCs sold per year is estimated as follows:

| Type | 1999 | 2000 |
|---|---|---|
| | | |
| Unbranded | 304,278 | 414,258 |
| Branded* | 7,332 | 10,998 |
| Laptop / Note book | 3,666 | 4,033 |
| Total | 315,276 | 429,289 |
| Annual Growth Rate | | 36% |

*****The highest sale of branded PCs were noted in Rawalpindi / Islamabad.

## 9.6 Customer Segments for PC Sales

Vendors reported the following shares of each type of customers in their total sales:

| Segment | Share of sales |
|---|---|
| Households | 55% |
| Private Organizations | 30 |
| Government Organizations | 11 |
| Multinational Organizations | 4 |
| **Total** | **100** |

The share in sales of sectors other then households was estimated to be as follows:

| ***Business Sectors*** | |
|---|---|
| Trade & Business | 43% |
| Educational Institutions | 20 |
| Government / Semi Government Organizations | 12 |
| Hardware Vendors | 11 |
| Other Manufacturing | 6 |
| Internet Service Providers | 3 |
| Software Houses | 2 |
| Financial Services | 2 |
| Other Services | 1 |

## 9.7 Sale of Old PCs

37% vendors reported that they sold old PCs as well.

## 9.8 Share of Processors

The types of Processors sold in the year 2000 was as follows:

| Processor | Share |
|---|---|
| Pentium I | 26% |
| Pentium II | 29 |
| Pentium III | 38 |
| Others | 7 |
| **Total** | **100** |

## 9.9 Share of Main and Miniframes

The percentage of organizations having mainframes and miniframes was estimated as follows:

| Sector | Main | Mini |
|---|---|---|
| User Organizations | 7% | 6 |
| Internet Service Providers | 20% | 17 |
| Software Houses | 4% | 6 |
| Educational Institutions | 0% | 4 |

*Figures are row percentages

## 9.10 Level of Networking

The levels of networking in different types of organizations are as follows:

| Type of Organization | Full | Partial | None |
|---|---|---|---|
| Software Houses | 90% | 10 | - |
| Internet Service Providers | 89% | 11 | - |
| Trade & Business | 57% | 9 | 34 |
| Educational Institutions | 52% | 30 | 18 |
| Financial | 51% | 17 | 32 |
| Other Manufacturing | 48% | 32 | 20 |
| Textiles | 40% | 24 | 36 |
| Other Services | 29% | 29 | 42 |
| Government / Semi Government | 17% | 36 | 47 |

*Figures are row percentages

## 9.11 PCs sold with Internet Connections

In the year 2000, about one third of new PCs were sold with Internet Connections.

## 9.12 Number of Network Servers sold in the year 2000

35% Vendors reported selling network servers. Estimated number of servers sold came to 6,672. The types of servers sold were as follows:

| Type of Server | No Sold |
|---|---|
| Windows NT | 5,645 |
| Windows 2000 | 449 |
| UNIX | 192 |
| LINUX | 64 |
| NOVEL | 322 |
| **Total** | **6,672** |

## 9.13 Share in Revenue

The share of different products in vendors' revenue was reported as follows:

| Product | Share |
|---|---|
| PCs | 58% |
| Accessories | 18 |
| Hardware support | 17 |
| Computer stationery | 07 |

## 9.14 Age of Outlets

Average age of vendors outlet covered in the study was reported to be six years.

# IT PROFESSIONALS (ITPs)

# 10. FINDINGS OF IT PROFESSIONALS SURVEY

The senior most IT person in the Organization was interviewed with a view to assess the status of his profession in the country. Findings, other than those reported elsewhere in this report, are summarized below:

## 10.1 Impediments in the growth of e-commerce

According to perceptions of IT Professionals, following were the main obstacles in the growth of E-Commerce in the country:

| | |
|---|---|
| Lack of awareness | 34% |
| Bureaucratic hurdles | 13 |
| Low computer literacy | 13 |
| Lack of trust and confidence | 9 |
| Absence of infrastructure | 8 |
| High costs | 5 |
| Absence of merchant accounts | 4 |
| Absence of legal framework | 1 |
| Others | 13 |

## 10.2 Steps to promote local software house services

IT Professionals proposed following steps to market the services of Software Houses in the country:

| | |
|---|---|
| Lower software prices | 22% |
| Improve work quality | 20 |
| Improve marketing | 12 |
| Offer financial incentives | 9 |
| Spread computer literacy | 8 |
| Increase computerization in the country | 5 |
| Enforce copy-right laws | 4 |
| Increase government support | 2 |
| Others | 18 |

## 10.3 Steps to improve standard of IT education

IT Professionals proposed following steps to improve the standard of IT education in the country:

| | |
|---|---|
| Make IT education economical | 33% |
| Improve faculty | 24 |
| Offer financial incentives / support | 16 |
| Improve infrastructure | 16 |
| Monitor IT institutions | 4 |
| Standardize curriculum | 4 |
| Create more jobs | 3 |

## 10.4 Steps to improve standard of computer professionals

IT Professionals proposed following moves to improve the standard of Computer Professionals in the country:

| | |
|---|---|
| Improve training facilities | 95%* |
| Offer financial incentives | 38 |
| Make IT education more economical | 14 |
| Create job opportunities | 12 |
| Reduce hardware / software costs | 8 |

* Multiple responses were permitted. Hence the total can be more than 100.

## 10.5 Uses of the Internet

IT Professionals thought that the principal uses of Internet in the country were as follows:

| | |
|---|---|
| Email | 92%* |
| Research | 66 |
| Data transfer | 50 |
| E-commerce | 26 |

* Multiple responses were permitted. Hence, the total can be more than 100.

## 10.6 Sectors where job opportunities exist

To the question where would the computer professionals find employment should their current jobs be terminated, IT professionals said that the most plausible alternates could be:

| | |
|---|---|
| Educational Institutions | 60%* |
| Software Houses | 53 |
| Internet Service Providers | 45 |
| Trade and Business | 45 |
| Financial Services | 35 |
| Pharmaceuticals | 31 |
| Hardware Vendors | 30 |
| Other services | 28 |
| Textiles | 25 |
| Other manufacturing | 16 |
| Government and semi government organizations | 10 |

* Multiple responses were permitted. Hence, the total can be more than 100.

## 10.7 Job Security

IT Professionals rated the Job Security they enjoyed as follows:

| | |
|---|---|
| Highly secured | 18% |
| Somewhat secure | 31 |
| Appropriate | 39 |
| Somewhat unsecured | 8 |
| Highly unsecured | 4 |

## 10.8 Chances of growth

IT Professionals felt that the chances of their growth in their current field were as follows:

| Chances of growth | In Pakistan | Abroad |
|---|---|---|
| Very high | 21% | 57% |
| High | 23 | 20 |
| Appropriate | 35 | 14 |
| Low | 15 | 4 |
| Very low | 6 | 5 |

## 10.9 Satisfaction with the present job

The levels of satisfaction of IT Professionals with their jobs were as follows:

| | |
|---|---|
| Very much satisfied | 47 |
| Some what satisfied | 40 |
| Neither satisfied nor dissatisfied | 8 |
| Somewhat dissatisfied | 3 |
| Very dissatisfied | 2 |

## 10.10 Basic educational qualification of the respondents

The basic educational qualifications of (the senior) IT Professionals covered in the survey were as follows:

| | |
|---|---|
| Graduates | 50% |
| Post graduates | 29 |
| Other professional qualifications (doctors, engineers etc.) | 7 |
| Intermediates | 12 |

| | |
|---|---|
| Others | 2 |

## 10.11 Professional Training received during last year

About half of the IT Professionals got IT training during last one year.

| | |
|---|---|
| Got training | 46% |
| No training | 54 |

## 10.12 Who paid for the expenses of training?

76% IT Professionals paid for their own training.

| | |
|---|---|
| Self | 76% |
| The organization | 19 |
| Self & organization | 5 |

## 10.13 Type of Training and its duration

Following were the courses / skills whose training were offered:

| **Type** | **ITPs** *Trained* | **Duration (Months)** |
|---|---|---|
| Java | 22% | 6 |
| Oracle | 15 | 6 |
| E-commerce | 11 | 6 |
| Net Work Administration | 11 | 6 |
| Visual Basic | 9 | 5 |
| Others | 32 | Various |

The average length of training imparted was about six months.

## 10.14 Most Demanded Language in Pakistan / Abroad

The most demanded languages, as per the perceptions of IT professionals, were as follows:

| Language | In Pakistan* | Abroad* |
|---|---|---|
| Java | 93% | 94% |
| Visual Basic | 82 | 71 |
| Oracle | 76 | 79 |
| C++ | 66 | 66 |
| HTML | 37 | 36 |
| SQL | 25 | 25 |
| RPG | 5 | 10 |

* Multiple responses were permitted. Hence, the total can be more than 100.

# User Organizations

# 11. FINDINGS OF USER ORGANIZATIONS SURVEY

11.1 Organizations having at least 10 employees and a minimum of 4 PCs were covered in the survey. An effort was made to interview the senior most person in the Organization. Sample had a biased towards larger organizations. Findings, other than those reported elsewhere in the report, are summarized below:

## 11.2 E-Commerce

Organizations of different types engaged in E-commerce were reported to be as follows:

| Type of Organization | Using E- Commerce* |
|---|---|
| Trade and business | 26% |
| Financial services | 9% |
| Other services | 3% |
| Textiles | 2% |
| Other manufacturing | 2% |
| Government and semi government organizations | 0% |

*Figures are row percentages

## 11.3 Intention to use E-Commerce

The percentages of organizations not using E-commerce who expressed intentions to use it in the next 12 months were as follows:

| | **Planning to use E-commerce In next 12 months*** |
|---|---|
| Financial services | 37% |
| Textiles | 32% |
| Other services | 28% |
| Trade and business | 18% |
| Other manufacturing | 13% |
| Government and semi government organizations | 10% |

*Figures are row percentages

## 11.4 Uses of Internet

The respondents felt that the uses of Internet in their organizations were as follows:

| | |
|---|---|
| Email | 77%* |
| Fax | 48 |
| Surfing | 25 |
| International calling | 21 |
| Chatting | 12 |
| E-commerce | 06 |
| Research | 05 |
| Internet Shopping | 04 |
| Information | 04 |

* Multiple responses were permitted. Hence, the total can be more than 100.

## 11.5 Software purchased during last 12 months

The type of organizations which bought Software during the last 12 months were as follows:

| Type of Organization | Bought Software* | Average expense (Rs.'000) |
|---|---|---|
| Financial services | 31% | 601 |
| Other services | 36% | 498 |
| Textiles | 31% | 109 |
| Other manufacturing | 19% | 1,050 |
| Trade and business | 39% | 198 |
| Government and semi government organisations | 40% | 434 |

*Figures are row percentages

## 11.6 New Software Agreements

Agreements for purchase of softwares were signed with:

| Type of Organization | Agreement Signed with | | |
|---|---|---|---|
| | With Local Companies | With Foreign Companies | None |
| Financial services | 15% | 06 | 79 |
| Other services | 10% | 4 | 86 |
| Textiles | 5% | 0 | 95 |
| Other manufacturing | 5% | 3 | 92 |
| Trade and business | 4% | 0 | 96 |
| Government and semi | 7% | 5 | 88 |

| | | | |
|---|---|---|---|
| government organizations | | | |

*Figures are now percentages

## 11.7 Training Imparted

The percentage of User Organizations which have arranged training for their employees is as follows:

| | |
|---|---|
| Financial services | 42% |
| Other services | 30 |
| Textiles | 12 |
| Other manufacturing | 13 |
| Trade and business | 26 |
| Government and semi government organizations | 40 |

Figures are row percentages

It may be noted that (senior) IT professionals said that 46% of them attended some training during last one year, but 76% of those who got training paid for their own training.

## 11.8 Fields in which training imparted

The percentage of User Organizations which arranged training in different fields were as follows:

| | |
|---|---|
| Microsoft Office | 29% |
| Oracle | 15 |
| MCSE | 15 |
| Software Engineering | 10 |
| E-commerce | 8 |
| Others | 23 |

## 11.9 Training to be imparted next year

68% User Organizations had no plans for training in the next 12 months. Others intended to arrange training in the following fields:

| | |
|---|---|
| Oracle | 8% |
| E-commerce | 7 |
| MS Office | 5 |
| MCSE | 4 |
| Java | 3 |
| Software Engineering | 3 |
| Others | 2 |

## 11.10 One week or more Computer Training during last one year

The average number of employees trained by the User Organizations and the total amount spent by them on their training:

| Type of Organization | No of employees Trained | Average amount spent on training |
|---|---|---|
| Financial services | 4 | Rs.31,750 |
| Other services | 5 | 73,650 |
| Textiles | 3 | 57,625 |
| Other manufacturing | 9 | 53,000 |
| Trade and business | 4 | 86,600 |
| Government & semi government organizations | 4 | 57,611 |

## 11.11 Most demanded skills

According to users / employers most demanded computer skills were as follows:

| Skills in demand | |
|---|---|
| Computer operators | 49% |
| Data entry operators | 17 |
| Programmers | 10 |
| Database administrators | 9 |
| Others | 15 |

## 11.12 IT professionals Turnover

The number of IT Professionals inducted by various types of organizations and those who went abroad from these organizations during the last 12 months were as follows:

| Type of Organization | Inducted in last twelve months | Gone abroad in last twelve months |
|---|---|---|
| Financial services | 1 | 0 |
| Other services | 1 | 1 |
| Textiles | 1 | 0 |
| Other manufacturing | 1 | 0 |
| Trade and business | 2 | 0 |
| Government and semi government organisations | 1 | 1 |

## 11.13 Expected increase in next 2 years in skilled IT work force

The average number of IT Professionals to be inducted in next 2 years in different sectors was estimated to be as follows:

| Sector | Average recruitment No |
|---|---|
| Financial services | 2 |
| Other services | 6 |
| Textiles | 6 |
| Other manufacturing | 3 |

| | |
|---|---|
| Trade and business | 2 |
| Government and semi government organisations | 7 |

## 11.14 Number of employees using Internet personally

Average number of employees using Internet in different types of organizations was as follows:

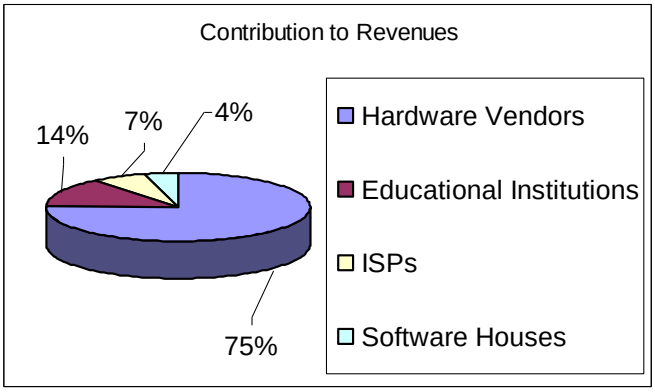
| **Type of Organization** | Avg. No. |
|---|---|
| Financial services | 8 |
| Other services | 10 |
| Textiles | 9 |
| Other manufacturing | 6 |
| Trade and business | 4 |
| Government and semi government organisations | 4 |
| **Average** | **7** |

# CONTRIBUTION OF THE IT SECTOR

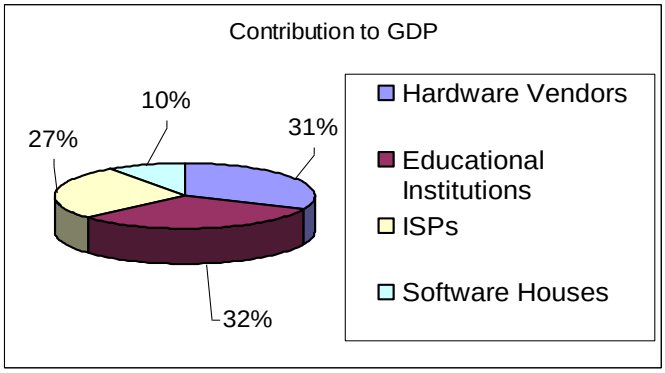
# 12. CONTRIBUTION OF THE IT SECTOR

The contribution of different sectors of IT Industry towards the revenue (gross income) and toward GDP.

| **Revenue Generated** | **(Rs. Million)** |
|---|---|
| | |
| Hardware Vendors | 19,531 |
| Educational Institutions | 5,860 |
| ISPs | 2,751 |
| Software Houses | 1,693 |
| **Total** | 29,835 |




| **Contribution to GDP** | **(Rs. Million)** |
|---|---|
| | |
| Hardware Vendors | 1,123 |
| Educational Institutions | 2,536 |
| ISPs | 2,174 |



| | |
|---|---|
| Software Houses | 775 |
| **Total** | 6,608 |

Additionally, it is estimated that User Organizations pay annually Rs. 47.8 billion as salaries to IT professionals / computer users employed with them.

# 12.1 Major Assumptions

## 12.1.1 Hardware Vendors

The total number of Hardware Vendors in the seven cities is estimated to be 1,833. Based on the level of sales achieved by the vendors in 1999 and 2000, as reported by vendors covered in the study, the average number of PCs sold in the country in a year have been estimated.

The average sale price of an unbranded PC is assumed to be Rs.30,000, whereas that of branded PCs is assumed to be Rs.60,000.

As the population of mainframes and minis in the country is very small, these have not been considered.

A margin of 10% has been assumed for PCs and 15% for accessories, stationery etc.

Salaries and other costs are based on the estimates reported by the vendors surveyed.

## 12.1.2 Educational Institutions

The total number of educational institutions imparting IT education in the seven cities has been estimated at 1,615.

Revenues have been calculated by multiplying the annual intake in various programs by the estimated annual fee charged for these programs.

Salaries and other costs are based on the estimates reported by the educational institutions surveyed.

## 12.1.3 ISPs

Active ISPs are estimated to be 35.

Revenues have been calculated as follows:

**Hours sold**

Average no. of telephone lines per ISP (673) x No. of ISPs (35) x average utilization (20 hours per day) x 365

**Rate**

An average rate of Rs.16 per hour has been assumed.

Salaries and other costs are based on the estimates provided by the ISPs surveyed.

### 12.1.4 Software Houses

The number of Software Houses in the organized sector is estimated to be 170.

Based on the sales level achieved by the Software Houses surveyed, the total revenues of all the Software Houses in the country have been projected.

Salaries and other costs are based on the estimates provided by the Software Houses.

Software Houses in the unorganized sector have not been considered.

## 12.2 Employment Potential

By the year 2005 the employment opportunities are expected to be as follows:

| Sector | Present Employment | Annual Compounded Growth Factor | Projected Employment |
|---|---|---|---|
| User Organizations | 521,430 | 8% | 709,400 |
| Educational Institutions | 10,450 | 15% | 18,277 |
| Hardware Vendors | 9,000 | 15% | 15,741 |
| Software Houses | 5,000 | 16% | 9,053 |
| Internet Service Providers | 1,000 | 25% | 2,441 |
| **Total** | **546,880** | | **754,912** |

It is expected that about 208,000 job would be created in the IT sector over the next four years.

# FUTURE DIRECTION AND TRENDS

# 13. FUTURE DIRECTION AND TRENDS

During the course of our desk research*, in-depth interviews, and focus groups discussions the following directions and trends in the use of technology were noted:

- Software is one of the world's largest and fastest-growing industries. According to IDC, a market research company, the sector sold programs worth $180 billion in 2000. Furthermore, software spending is increasing by 15% per annum, and influences investments of another $800 billion in hardware and services.

- Software will continue to be at the core of most innovation during the next several decades. The Web based products are expected to grow exponentially as more and more minds interconnect to use them.

- New Internet standards will allow computers not only to autonomously fetch data from other computers, but also to share processing power and split up software tasks between them. The Internet will therefore, become a vast computational grid that shares processing power between computers, instead of being a mere digital printing press

* Including analysis provided by the SIIA Trends Report 2001 and Gartner Research

- P2P technology will open the door to distributed computing, the sharing of unused computing resources across an internal network, the Web, and the world. It will also facilitate the spread of Instant Messaging (IM).

- Most corporation and consumers will shift from PCs to more nimble, network-based mobile devices. This shift is as inevitable as the one from floppies to CD-ROMs.

- Mobile devices capable of real-time voice and data communications are without question the wave of the future. Millions of people globally are already buying handheld devices that provide increased functionality and greater access to software services. Within two to five years, a similar number of businesses will have built mobile computing into their business model to achieve greater efficiency and cost savings. However, the tradeoff between the power and memory capacity of the PC versus mobility will permanently keep desktop machines in the computing equation.

- In the next 12 months, a majority of software publishers and content providers will not only offer existing versions but also create new ones for the mobile platform, accompanied by rapid increases in mass-market adoption.

- Companies will accelerate partnerships in the next 12 months to produce education technology products and services that fulfill the increasing need for accountability in formal education settings and further enhance the ability for learners at any stage of life to benefit anytime, anywhere.

- Quantum computing, nanocomputers or massively parallel processing (Emerging core technologies) will not only change the world of hardware or software over the next 10 years but also cause a dramatic shift in the economics of computing. Most experts are of the view that current emerging technologies will mature. However current base technologies will continue to dominate the decade.

- The density of chips will double — at a fixed cost — every 18 to 24 months.

- Software Industry will continue to lag behind the hardware advances over the planning horizon.

- By 2010 a single advanced IP network will handle the majority of the world's communications needs. Legacy networks, such as public switched telephone networks (PSTNs) will, however, still exist. IP network, will interconnect these older environments. Converged, broadband, intelligent network will extend well beyond voice and data, local and long distance, supporting an ever-widening range of services, and blurring distinctions among networking, computing and applications.

- By 2010, enterprises will rely more on networked computing services than their internal data center operations. Driven by e-business requirements and facilitated by technological advances such as e-switching and next-generation satellites, the increasing externalization of networking (from intraenterprise to interenterprise) will give rise to an environment where applications, content and data reside in the network and are dynamically handled by network service providers in real time, without user intervention.

- Content delivery networks are projected to penetrate 80 percent of Global 2000 enterprises by 2006.

- More than 35 percent of all enterprises that deploy Internet content will use Digital Rights Management by 2010.

- By 2010 Digital asset management will to be used by more than 45 percent of all enterprises with commercial Internet operations.

- Supranet will be one of the most-intriguing and pervasive phenomena of the decade. It will provided online connectivity between mobile users and physical objects (such as products, documents or bank notes) enrolled in the virtual world.

- The key technologies that will enable mobility through 2011, including location sensing (location-based services are projected to be used by 90 percent of enterprises by 2010), telematics, wearable devices (by 2010, more than 75 percent of the U.S. and European Union population aged 15 to 50 will wear one or more such devices at least six hours a day), new portable sources of electric power and mini-disk storage.

- Billions of physical objects — products, clothing, jewelry, house furniture and cars — will be tagged with uniquely identifiable programmable and networked sensors. The environment surrounding us will interact — via the Internet — with computer software residing on remote computers. In most cases, we will not realize that interactions are occurring.

# 14. CRITICAL INDICATORS TO MEASURE THE LEVEL OF IMPLEMENTATION OF NATIONAL IT POLICY AND ITS OVERALL IMPACT

The following measures are considered to determine the level of IT in the country:

- Number of Personal Computers
- Number of Internet users
- Number of ISPs operative
- Number of cities with direct Internet access
- Number of cities to be connected with Internet via Universal Internet Access Scheme
- Digital/optic fiber based telecom network
- International optic fiber connectivity: on SEE-ME-WE-3
- Cities connected with Digital Cross Connect Network
- Number of phone lines installed
- Teledensity
- International bandwidth used for Internet
- Number of software houses
- Total Software exports
- Domestic software market business
- Market capitalization of ISPs
- Computer Science Graduates produced
- Total enrollments in Computer Sciences Graduates Program
- Number of IT degree awarding Institutions and Universities
- Number of IT Training Institutions (non degree awarding)
- Number of Software Technology Parks

However, based on our desk research, in-depth interviews, focus group discussions and sectorial surveys, the following emerged as the principal parameters against which the level of implementation and the overall impact of the National IT Policy can be measured:

- Number of PCs in the country (as the total number cannot be determined easily, the surrogate is the number of branded PCs which can be determined with relative ease and total number of PCs bought can be determined by applying the ratio).

- Coverage of ISPs and the number of active Internet connections.

- Number of IT Professionals in the Software Houses (Annual turnover figures, both local and export, are ideal critical indicators. However, as these figures cannot be determined easily, we recommend the number of IT Professionals in the Software Houses as a surrogate).

- The level of computerization in the Government departments especially those involved in public dealing.

Annexure A

# HOUSEHOLD INCIDENCE

# AND

# PENETRATION

# TABLES

# 15. TABLES

## Incidence of Computer Usage and Penetration of Computers in Households

*Table 15.1*

| | Among 7 cities | |
|---|---|---|
| | **%age** | **Estimated numbers in ('000') Projected figure** |
| **Households having computer literate members** | | |
| Computer literate households | 35% | 1190 |
| Computer Non-literate households | 65 | 2220 |
| **Computer users (5+) in computer literate HHs** | | |
| Average number of males + females (5+) | 2.0 | 2380 |
| As a %age of All 5+ population | | 12% |
| Average number of males (5+) | 1.6 | 1900 |
| As a %age of Male 5+ population | | 18% |
| Average number of females (5+) | 0.4 | 480 |
| As a %age of female 5+ population | | 5% |
| **Computer Ownership among All HHs** | | |
| Computer owning HHs | 16% | 550 |
| Non-owning HHs | 84 | 2860 |
| **Computer users (5+) in Computer Owning HHs** | | |
| Average number of M+F (5+) users in computer owning HH | 2.49 | 1370 |
| Average number of Males (5+) users in computer owning HH | 1.96 | 1078 |
| Average number of Females (5+) users in computer owning HH | 0.53 | 292 |
| **Computer was present in past** among | | |

| | | |
|---|---|---|
| non-owning Hhs | | |
| Yes | 2% | 60 |
| No | 98 | 2800 |
| **Base :** No. of HHs in 7 selected cities | | 3410 thousands |
| **Base :** Population of 7 selected cities (all ages) | | 22470 thousands |
| **Base :** 5+ population of 7 selected cities (87% of above) | | 19550 thousands (10360 males, 9190 females) |

* This study was carried out in major cities namely Karachi, Hyderabad, Lahore, Sialkot, Faisalabad, Rawalpindi / Islamabad and Peshawar.

** A straight forward growth rate of 2.61% per annum was applied on the 1998 population figures of these 8 selected cities to get the projected figures for year 2001.

*Table 15.2*

**Reasons of Not Acquiring (Owning) Computers and Purchase Intent in Households among Computer Using HHs**

| | Among 7 cities | |
|---|---|---|
| | **%age** | **Estimated numbers in ('000') Projected figure** |
| **Reasons among non-owing but computer literate Households** | | |
| Computer is expensive | 20% | 128 |
| Less buying power / resources | 42 | 269 |
| Do not feel the need | 30 | 192 |
| Others | 4 | 26 |
| No response | 4 | 26 |
| | | |
| **Purchase intent in next 1 year among non - owing households** | | |
| Definitely would buy | 13% | 370 |
| Probably would buy | 25 | 720 |
| Definitely would not buy | 59 | 1770 |
| | | |

| | |
|---|---|
| **Base :** Computer literate but non-owning Households | 640 thousands |
| **Base :** Computer non-owning Households | 2860 thousands |

*Table 15.3*

## Computer Education, Literacy and Migration

| | Among 7 cities | |
|---|---|---|
| | **%age** | **Estimated numbers in ('000') Projected figure** |
| **Willing to give computer education to children** | | |
| Yes | 78% | |
| No | 22 | |
| | | |
| **Households with atleast one member working abroad among all households** | | |
| In Computer field / business | 1.4% | 50 |
| In other fields / business | 6.6 | 230 |
| No one abroad | 92 | 3130 |
| | | |
| **Households with atleast one member planning to go abroad in Computer field in next 1 year** | | |
| Yes | 14% | 480 |
| No | 86 | 2930 |

| | |
|---|---|
| **Base :** Total number of households in 7 selected cities | 3410 thousands |

*Table 15.4*

**Media and Lifestyle of Computer literate**

**And Computer Owning Households**

| | Among All HHs | Among Computer literate HHs | Among Computer Owning HHs |
|---|---|---|---|
| **Newspaper** | | | |
| Purchasing Hhs – Daily | 32% | 50% | 63% |
| Purchasing Hhs – Occasionally | 20 | 26 | 22 |
| Non-purchasing Hhs | 48 | 24 | 15 |
| **TV Ownership** | | | |
| Owning Hhs | 82% | 91% | 95% |
| Non-owning HHs | 18 | 9 | 5 |
| **Satellite channels source Among TV owning Hhs** | | | |
| Cable | 24% | 32% | 38% |
| Dish | 7 | 9 | 13 |
| Lead | 5 | 4 | 3 |
| None | 64 | 55 | 46 |
| **Telephone Ownership** | | | |
| Land Phone | 42% | 65% | 76% |
| Mobile Phone | 1 | 2 | 2 |
| Both Land & Mobile Phone | 3 | 7 | 11 |
| None | 54 | 26 | 11 |
| **Credit Card Ownership** | | | |
| Credit Card owning Hhs | 4% | 9% | 14% |
| Non-owning Hhs | 96 | 91 | 86 |
| ***Any Persons Working Abroad*** | | | |
| Yes | 8% | 15% | 19% |
| No | 92 | 85 | 81 |

| | | | |
|---|---|---|---|
| Average no. of persons working abroad | 1.5 | 1.5 | 1.5 |
| **Children's Education** | | | |
| All in English medium | 32% | 45% | 49% |
| All in Urdu medium | 29 | 17 | 9 |
| Some in English & some in Urdu medium | 7 | 8 | 5 |
| No child or children not of school going age | 32 | 30 | 37 |
| | | | |
| **Base :** Number of households in 7 selected cities | 3410 thousands | 1190 thousands | 550 thousands |

*Table 15.5*

**Profile of Computer Literate and computer owning households**

| | **Among All HHs** | **Among Computer literate HHs** | **Among Computer Owning HHs** |
|---|---|---|---|
| **No. of Earners at home** | | | |
| One | 51% | 48% | 47% |
| Two | 29 | 30 | 30 |
| Three or more | 17 | 19 | 21 |
| No response | 3 | 3 | 2 |
| Average | 1.8 | 1.8 | 1.9 |
| **Household Monthly Income** | | | |
| Upto Rs. 6,000 | 36% | 15% | 6% |

| | | | |
|---|---|---|---|
| Rs. 6,001 – 10,000 | 29 | 29 | 20 |
| Rs. 10,001 – 20,000 | 20 | 33 | 37 |
| > Rs. 20,000 | 7 | 12 | 24 |
| Refused | 8 | 11 | 13 |
| **Average Monthly Income** | **Rs. 9983** | **Rs. 14027** | **Rs. 17978** |
| | | | |
| **Base :** Number of households in 7 selected cities | 3410 thousands | 1190 thousands | 550 thousands |

# Information about
# The Computer in Home

*Table 15.6*

## Type, Period, Processor, Speed and RAM of Computer in Homes

| | Among 7 cities | |
|---|---|---|
| | **%age** | **Estimated numbers in ('000') Projected figure** |
| **Type of Computer** | | |
| Unbranded | 92% | 506 |
| Branded | 8 | 44 |
| **New Vs 2nd Hand** | | |
| New | 69% | 380 |
| Second hand | 31 | 171 |
| **Period of Purchase Among New Only** | | |
| Upto 1 year | 44% | 167 |
| 1 – 2 years | 22 | 84 |
| 2 – 5 years | 25 | 95 |
| > 5 years | 9 | 34 |
| No response | -- | -- |
| **Processors** | | |
| 286 / 386 / 486 / 586 | 11% | 61 |
| Pentium – I | 31 | 171 |
| Pentium – II | 25 | 138 |
| Pentium – III | 26 | 143 |
| Pentium –IV | 0 | -- |
| Others | 5 | 28 |
| No response | 2 | 11 |
| **Processor Speed** | | |
| Upto 133 MHz | 10% | 55 |
| 133 – 233 MHz | 16 | 88 |
| 233 – 300 MHz | 6 | 33 |
| 300 – 400 MHz | 10 | 55 |
| 400 – 500 MHz | 21 | 116 |
| 500 – 600 MHz | 8 | 44 |
| > 600 MHz | 8 | 44 |
| No response | 21 | 116 |
| **RAM** | | |
| Upto 16 MB | 10% | 55 |
| Upto 32 MB | 24 | 132 |
| Upto 48 MB | 1 | 6 |
| Upto 64 MB | 39 | 215 |
| Upto 128 MB | 10 | 55 |
| More than 128 MB | 1 | 6 |
| No response | 17 | 94 |

| | |
|---|---|
| **Base :** Computer owning households in 7 selected cities | 550 thousands |

*Table 15.7*

## Computer with CD Drive and Internet / E-mail Connection

| | Among 7 cities | |
|---|---|---|
| | **%age** | **Estimated numbers in ('000') Projected figure** |
| **Computer with CD Drive** | | |
| Yes | 91% | 501 |
| No | 9 | 49 |
| | | |
| **Internet Connections when New Computer Purchased During Last Year** | **Base=167,000** | |
| Yes | 23% | 38 |
| No | 77 | 129 |
| | | |
| **Computer with Internet / E-mail Connections – Current Situation** | | |
| Only e-mail | 2% | 11 |
| Internet / both | 50 | 275 |
| None | 48 | 264 |

| | |
|---|---|
| **Base :** Computer Owning Households in 7 selected cities | **550 thousands** |

*Table 15.8*

**Internet Access, ISPs and Period of Use**

| | Among 7 cities | |
|---|---|---|
| | **%age** | **Estimated numbers in ('000') Projected figure** |
| **Internet Access** | | |
| Through Telephone lines | 97% | 277 |
| Through Cables | 3 | 9 |
| | | |
| **Top 7 ISPs** | | |
| Cybernet | 21% | 60 |
| Pak net | 20 | 57 |
| W.O.L. (World on line) | 14 | 40 |
| Brain net | 7 | 20 |
| Super net | 7 | 20 |
| Net Sole | 5 | 14 |
| Gem net | 5 | 14 |
| **Length of Using Internet** | | |
| Upto 1 year | 74% | 212 |
| 1 – 2 years | 13 | 37 |
| 2 – 5 years | 7 | 20 |

| | | |
|---|---|---|
| > 5 years | 2 | 6 |
| No response | 4 | 11 |
| Average in years | 0.9 years | |
| | | |
| **Base :** Internet / E-mail using households in 7 selected cities | | 286 thousands |

*Table 15.9*

**Monthly Charges of Internet and Average Monthly Hours Spent**

| | **Among 7 cities** | |
|---|---|---|
| | **%age** | **Estimated numbers in ('000') Projected figure** |
| **Monthly Charges** | | |
| Upto Rs. 250 | 14% | 40 |
| Rs. 251 – 500 | 29 | 83 |
| Rs. 501 – 750 | 10 | 29 |
| Rs. 751 – 1000 | 10 | 29 |
| > Rs. 1000 | 16 | 46 |
| No response | 21 | 60 |
| Average monthly expense (in Rs.) | Rs. 715 | Rs. 204 millions |

| | | |
|---|---|---|
| **Monthly Hours Spending** | | |
| Upto 10 hours | 13% | 37 |
| 11 – 20 hours | 12 | 34 |
| 21 – 30 hours | 11 | 31 |
| 31 – 50 hours | 14 | 40 |
| > 50 hours | 24 | 69 |
| No response | 26 | 74 |
| Average monthly consumption (in hours) | 44 hours | 11.4 millions hours |
| | | |
| **Base :** Internet / E-mail using households in 7 selected cities | | 286 thousands |

*Table 15.10*

**Computer and Internet / E-mail Users in Households and Average Number of Hours Computer used in Households**

| | Among 7 cities | |
|---|---|---|
| | **Average** | **Estimated numbers in ('000') Projected figure** |
| **Average Hours Computer is used in households** | | |
| In working days (Avg. per working day) | 4.12 hrs | |
| In holidays (Avg. per holiday) | 4.98 hrs | |
| **Internet / E-mail users in Internet / E-mail Owning households** | | |
| Average number of M+F users per Internet owning HHs | 2.05 | 586 |
| Average number of Males users per Internet owning HHs | 1.73 | 495 |
| Average number of Females users per Internet owning HHs | 0.32 | 91 |
| **Internet Users Using Internet in Institutions Among Computer Literate Households (Unduplicated)** | | |
| Average number of M+F users per computer literate HHs | 0.44 | 524 |
| Average number of Males users per computer literate HHs | 0.41 | 488 |
| Average number of Females users per computer literate HHs | 0.03 | 36 |
| **Internet User Using Internet Cyber Cafes (Duplicated)** | | |
| Average number of M+F users per computer literate HHs | 0.33 | 393 |
| Average number of Males users per | 0.32 | 381 |

| | | |
|---|---|---|
| computer literate HHs | | |
| Average number of Females users per computer literate HHs | 0.01 | 12 |
| **Estimated Number of Internet / Email Users (Unduplicated)** | 586+325+380 = | 1291 thousands |
| | | |
| **Base :** Computer owning households | | 550 thousands |
| **Base :** Internet / E-mail using households | | 286 thousands |
| **Base :** Computer literate households | | 1190 thousands |

*Table 15.11*

## Purpose and Use of Computers in Households

| | Among 7 cities | |
|---|---|---|
| | **%age** | **Estimated numbers in ('000') Projected figure** |
| **Use of Computers in Computer Owning Households*** | | |
| For Internet / E-mail | 52% | 286 |
| For Education purposes | 81 | 232 |
| Typing / Office work / Official purposes | 60 | 172 |
| Games | 65 | 186 |
| Film / Movie / Music | 52 | 149 |
| Others | 1 | 6 |
| **Purpose of Internet / Email in Internet / E-mail Owning HHs** | | |
| For e-mail only | 8% | 23 |
| For internet surfing only | 3 | 9 |
| For both email / internet surfing | 89 | 255 |
| **Most Often Use of Internet in Households** | | |
| Chatting | 15% | 43 |
| Surfing | 39 | 112 |
| E-mail | 42 | 120 |
| Others | 2 | 6 |
| No response | 1 | 3 |
| **2nd Most Often Use of Internet in Households** | | |
| Chatting | 17% | 49 |
| Surfing | 36 | 103 |
| E-mail | 37 | 106 |

| | | |
|---|---|---|
| Others | 1 | 3 |
| No response | 8 | 23 |
| | | |
| **Base :** Computer using households | | 550 thousands |
| **Base :** Internet / E-mail using households | | 286 thousands |

* Multiple response question therefore sum of percentages may exceed 100.

Detailed information about

**Computer Users of Age 15 or Above**

*Table 15.12*

## Places, Frequency and Per Day Duration of Using Computers (All Working + Non Working Class)

| | Among 7 cities (Among all computer users of Age 15+) | |
|---|---|---|
| | **%age*** | **Estimated numbers in ('000') Projected figure** |
| **Place of Using Computer*** | | |
| At own home | 50% | 988 |
| Friend / Relative / Neighbour's home | 20 | 395 |
| School/Colleges/University/Institution etc. | 30 | 593 |
| Office / Shop / Business place etc. | 26 | 514 |
| Internet / Cyber café etc. | 11 | 217 |
| Others | 1 | 20 |
| No response | 9 | 178 |
| **Most Often Place of Use** | | |
| At own home | 35% | 691 |
| Friend / Relative / Neighbour's home | 8 | 158 |
| School/Colleges/University/Institution etc. | 18 | 356 |
| Office / Shop / Business place etc. | 19 | 375 |
| Internet / Cyber café etc. | 4 | 79 |
| Others | 0 | -- |
| No response | 16 | 316 |
| **Frequency of Use** | | |
| Daily (7 days in a week) | 35% | 691 |
| 5 – 6 days in a week | 29 | 573 |
| 3 – 4 days in a week | 15 | 296 |
| 1 – 2 days in a week | 9 | 178 |
| No response | 12 | 237 |
| Average number of days computer is used in a week | 5.4 | |
| **Duration of Use – Per Day** | | |
| Upto 1 hour in a day | 21% | 415 |
| 1 – 2 hours in a day | 26 | 514 |
| 2 – 3 hours in a day | 14 | 277 |
| 3 – 5 hours in a day | 13 | 257 |
| 5 – 8 hours in a day | 11 | 217 |
| > 8 hours in a day | 3 | 59 |
| No response | 11 | 217 |
| Avg. hours per day | 2.8 | |
| | | |
| **Base :** Computer users / Literates (15+) in 7 selected cities | | 1975 thousand |

* Multiple response question therefore sum of percentages may exceed 100.

*Table 15.13*

## Places, Frequency and Per Day Duration of Using Computers (Working Class)

| | Among 7 cities (Among all employed computer users of Age 15+) | |
|---|---|---|
| | **%age** | **Estimated numbers in ('000') Projected figure** |
| **Place of Using Computer*** | | |
| At own home | 47% | 376 |
| Friend / Relative / Neighbour's home | 18 | 144 |
| School/Colleges/University/Institution etc. | 15 | 120 |
| Office / Shop / Business place etc. | 59 | 472 |
| Internet / Cyber café etc. | 8 | 64 |
| Others | 1 | 8 |
| No response | 3 | 24 |
| **Most Often Place of Use** | | |
| At own home | 26% | 208 |
| Friend / Relative / Neighbour's home | 8 | 64 |
| School/Colleges/University/Institution etc. | 9 | 72 |
| Office / Shop / Business place etc. | 45 | 360 |
| Internet / Cyber café etc. | 3 | 24 |
| Others | -- | -- |
| No response | 9 | 72 |
| **Frequency of Use** | | |
| Daily (7 days in a week) | 35% | 280 |
| 5 – 6 days in a week | 39 | 312 |
| 3 – 4 days in a week | 12 | 96 |
| 1 – 2 days in a week | 10 | 80 |
| No response | 4 | 32 |
| Average number of days computer is used in a week | 5.5 | |
| **Duration of Use – Per Day** | | |
| Upto 1 hour in a day | 17% | 136 |
| 1 – 2 hours in a day | 24 | 192 |
| 2 – 3 hours in a day | 14 | 112 |
| 3 – 5 hours in a day | 17 | 136 |
| 5 – 8 hours in a day | 21 | 168 |
| > 8 hours in a day | 5 | 40 |
| No response | 3 | 24 |
| Avg. hours per day | 3.8 | |
| | | |
| **Base :** Employed computer users / Literates (15+) in 7 selected cities | | 800 thousands |

* Multiple response question therefore sum of percentages may exceed 100.

*Table 15.14*

## Places, Frequency and Per Day Duration of Using Computers (Students)

| | Among 7 cities (Among computer literate students of Age 15+) | |
|---|---|---|
| | **%age** | **Estimated numbers in ('000') Projected figure** |
| **Place of Using Computer*** | | |
| At own home | 59% | 612 |
| Friend / Relative / Neighbour's home | 24 | 249 |
| School/Colleges/University/Institution etc. | 50 | 519 |
| Office / Shop / Business place etc. | 4 | 41 |
| Internet / Cyber café etc. | 17 | 176 |
| Others | 1 | 10 |
| No response | 1 | 10 |
| **Most Often Place of Use** | | |
| At own home | 45% | 467 |
| Friend / Relative / Neighbour's home | 8 | 83 |
| School/Colleges/University/Institution etc. | 29 | 301 |
| Office / Shop / Business place etc. | 2 | 21 |
| Internet / Cyber café etc. | 6 | 62 |
| Others | -- | -- |
| No response | 9 | 819 |
| **Frequency of Use** | | |
| Daily (7 days in a week) | 41% | 425 |
| 5 – 6 days in a week | 26 | 270 |
| 3 – 4 days in a week | 18 | 187 |
| 1 – 2 days in a week | 11 | 114 |
| No response | 5 | 456 |
| Average number of days computer in used in a week | 5.4 | |
| **Duration of Use – Per Day** | | |
| Upto 1 hour in a day | 28% | 290 |
| 1 – 2 hours in a day | 31 | 321 |
| 2 – 3 hours in a day | 17 | 176 |
| 3 – 5 hours in a day | 12 | 124 |
| 5 – 8 hours in a day | 5 | 52 |
| > 8 hours in a day | 2 | 21 |
| No response | 4 | 41 |
| Avg. hours per day | 2.5 | |
| | | |
| Base : Computer users / Literates students (15+) in 7 selected cities | | **1037 thousands** |

* Multiple response question therefore sum of percentages may exceed 100.

*Table 15.15*

**Able to do the Different Works / Activities Through Computers (Working Class)**

| | Among 7 cities | |
|---|---|---|
| | **%age** | **Estimated numbers in ('000') Projected figure** |
| **Activities / Works*** | | |
| Typing / Office work | 95% | 760 |
| Entertainment (Games / Movies / Music) | 83 | 664 |
| Data entry | 70 | 560 |
| Internet / Chatting / E-mail | 62 | 496 |
| Programming | 33 | 264 |
| International calling | 33 | 264 |
| Database management | 25 | 200 |
| Graphic designing | 26 | 208 |
| Page composing | 25 | 200 |
| Hardware work | 25 | 200 |
| Web page designing / Developing | 18 | 144 |

| | | |
|---|---|---|
| Networking / Network Engineering | 12 | 96 |
| Software designing | 11 | 88 |
| | | |
| **Base :** Employed computer users (15+) in 7 selected cities | | 800 thousands |

* Multiple response question therefore sum of percentages may exceed 100.

*Table 15.16*

**Able to do the Different Works / Activities Through Computers (Students)**

| | **Among 7 cities** | |
|---|---|---|
| | **%age** | **Estimated numbers in ('000') Projected figure** |
| **Activities / Works*** | | |
| Typing / Office work | 89% | 923 |
| Entertainment (Games / Movies / Music) | 90 | 933 |
| Data entry | 61 | 633 |

| | | |
|---|---|---|
| Internet / Chatting / E-mail | 61 | 633 |
| Programming | 35 | 363 |
| International calling | 27 | 280 |
| Database management | 21 | 218 |
| Graphic designing | 22 | 228 |
| Page composing | 18 | 187 |
| Hardware work | 16 | 166 |
| Web page designing / Developing | 18 | 187 |
| Networking / Network Engineering | 11 | 114 |
| Software designing | 11 | 114 |
| | | |
| **Base :** Computer users / literate students(15+) | | 1037 thousands |

* Multiple response question therefore sum of percentages may exceed 100.

*Table 15.17*

**Works / Activities Currently Doing**

(Working Class)

| | **Among 7 cities** |
|---|---|

| | %age | Estimated numbers in ('000') Projected figure |
|---|---|---|
| **Activities / Works*** | | |
| Typing / Office work | 84% | 672 |
| Entertainment (Games / Movies / Music) | 63 | 528 |
| Data entry | 56 | 360 |
| Internet / Chatting / E-mail | 48 | 384 |
| Programming | 25 | 200 |
| International calling | 23 | 184 |
| Graphic designing | 18 | 144 |
| Database management | 18 | 144 |
| Page composing | 17 | 136 |
| Hardware work | 17 | 136 |
| Web page designing / Developing | 11 | 88 |
| Software designing / Developing | 8 | 64 |
| Networking / Network Engineering | 7 | 56 |
| No response | 6 | 48 |
| | | |
| **Base :** Employed computer users (15+) in 7 selected cities | | 800 thousands |

* Multiple response question therefore sum of percentages may exceed 100.

*Table 15.18*

**Works / Activities Currently Doing**

(Students)

| | Among 7 cities | |
|---|---|---|
| | **%age** | **Estimated numbers in ('000') Projected figure** |
| **Activities / Works*** | | |
| Typing / Office work | 74% | 767 |
| Entertainment (Games / Movies / Music) | 77 | 798 |
| Data entry | 43 | 446 |
| Internet / Chatting / E-mail | 50 | 519 |
| Programming | 25 | 259 |
| International calling | 19 | 197 |
| Graphic designing | 17 | 176 |
| Database management | 13 | 135 |
| Page composing | 13 | 135 |
| Hardware work | 12 | 124 |
| Web page designing / Developing | 13 | 135 |
| Software designing / Developing | 8 | 83 |
| Networking / Network Engineering | 7 | 73 |

| | | |
|---|---|---|
| No response | 6 | 62 |
| | | |
| **Base :** Computer users / literate students (15+) in 7 selected cities | | 1037 thousands |

* Multiple response question therefore sum of percentages may exceed 100.

*Table 15.19*

**Skills Level on Different Works on Computer**

**Among Those Who are Currently Working**

**(Working Class)**

| | Estimated numbers Who are Able to work ('000') | Among 7 cities Row Percentages Skill Levels | | | |
|---|---|---|---|---|---|
| | | High | Moderate | Low | No response |
| **Activities / Works** | | | | | |
| Typing / Office work | 672 | 55% | 36 | 7 | 1 |
| Entertainment (Games / Movies / Music) | 528 | 71% | 22 | 6 | 2 |
| Data entry | 360 | 57% | 35 | 6 | 2 |
| Internet / Chatting / E-mail | 384 | 59% | 34 | 6 | 2 |
| Programming | 200 | 39% | 46 | 11 | 4 |
| International calling | 184 | 66% | 29 | 4 | 1 |
| Graphic designing | 144 | 52% | 38 | 7 | 3 |
| Database management | 144 | 36% | 53 | 6 | 4 |
| Page composing | 136 | 69% | 27 | 2 | 2 |
| Hardware work | 136 | 39% | 51 | 9 | 2 |
| Web page designing / Developing | 88 | 46% | 41 | 11 | 2 |

| | | | | | |
|---|---|---|---|---|---|
| Software designing / Developing | 64 | 48% | 42 | 10 | -- |
| Networking / Network Engineering | 56 | 54% | 38 | 8 | -- |

*Table 15.20*

**Skills Level on Different Works on Computer**

**Among Those Who are Currently Working**

**(Students)**

| | **Estimated Numbers Who are Able to Work ('000')** | **Among 7 cities Row Percentages** **Skill Levels** | | | |
|---|---|---|---|---|---|
| | | High | Moderate | Low | No response |
| Activities / Works | | | | | |
| Typing / Office work | 767 | 43% | 45 | 12 | 1 |
| Entertainment (Game /Movies / Music) | 798 | 65% | 25 | 7 | 3 |
| Data Entry | 446 | 49% | 40 | 10 | 1 |
| Internet /Chatting E-mail | 519 | 56% | 34 | 6 | 4 |
| Programming | 259 | 30% | 54 | 14 | 2 |
| International calling | 197 | 66% | 31 | 4 | 4 |

| | | | | | |
|---|---|---|---|---|---|
| Graphic designing | 176 | 27% | 56 | 16 | 1 |
| Database management | 135 | 27% | 54 | 15 | 4 |
| Page composing | 135 | 45% | 40 | 12 | 3 |
| Hardware work | 124 | 47% | 43 | 9 | 2 |
| Web page designing / Developing | 135 | 38% | 57 | 4 | 0 |
| Software designing / Developing | 83 | 35% | 45 | 21 | -- |
| Networking / Network Engineering | 73 | 45% | 39 | 14 | 2 |

*Table 15.21*

**Practical Experience Among Those Who are Currently Doing**

**Different Works of Computers**

**(Working Class)**

| | Estimated Numbers Who are Currently Working ('000') | Among 7 cities | | | | |
|---|---|---|---|---|---|---|
| | | Row Percentages | | | | Average |
| | | Upto 1 Year | 1 – 3 Years | >3 Years | None | Experience In a year |
| **Activities / Works** | | | | | | |
| Typing / Office work | 672 | 39% | 34 | 26 | 0 | 2.8 |
| Entertainment (Games/ Movies /Music) | 528 | 42% | 35 | 21 | 2 | 2.3 |
| Data entry | 360 | 46% | 37 | 14 | 3 | 2.5 |
| Internet /Chatting /E-mail | 384 | 43% | 34 | 20 | 4 | 1.9 |
| Programming | 200 | 62% | 25 | 6 | 7 | 2.3 |
| International calling | 184 | 48% | 35 | 16 | 2 | 2.0 |
| Graphic Designing | 144 | 34% | 35 | 25 | 6 | 2.6 |
| Database management | 144 | 43% | 34 | 20 | 4 | 2.3 |
| Page composing | 136 | 36% | 36 | 22 | 7 | 2.3 |
| Hardware work | 136 | 37% | 31 | 29 | 3 | 2.5 |
| Web page designing | 88 | 55% | 19 | 21 | 5 | 2.0 |
| Software designing / Developing | 64 | 39% | 25 | 26 | 10 | 2.3 |
| Networking /Network Engineering | 56 | 39% | 38 | 21 | 2 | 2.1 |

*Table 15.22*

**Practical Experience Among Those Who are Currently Doing**

**Different Works of Computers**

**(Students)**

| | Estimated Numbers Who are Currently Working ('000') | Among 7 cities | | | | |
|---|---|---|---|---|---|---|
| | | Row Percentages | | | | Average |
| | | Upto 1 Year | 1 – 3 Years | > 3 | None | Experience In a year |
| **Activities / Works** | | | | | | |
| Typing / Office work | 767 | 67% | 24 | 8 | 1 | 1.3 |
| Entertainment (Games/ Movies /Music) | 798 | 59% | 28 | 9 | 5 | 1.5 |
| Data entry | 446 | 67% | 22 | 8 | 3 | 1.3 |
| Internet /Chatting /E-mail | 519 | 63% | 26 | 5 | 6 | 1.2 |
| Programming | 259 | 62% | 25 | 6 | 7 | 1.2 |
| International calling | 197 | 60% | 30 | 3 | 7 | 1.2 |
| Graphic Designing | 176 | 61% | 30 | 5 | 5 | 1.2 |
| Database management | 135 | 62% | 22 | 9 | 7 | 1.2 |
| Page composing | 135 | 64% | 26 | 6 | 4 | 1.2 |
| Hardware work | 124 | 45% | 32 | 12 | 11 | 1.5 |
| Web page designing | 135 | 58% | 30 | 6 | 5 | 1.2 |
| Software designing / Developing | 83 | 55% | 30 | 7 | 8 | 1.3 |
| Networking /Network Engineering | 73 | 52% | 29 | 13 | 6 | 1.5 |

*Table 15.23*

**Able to Work on Different Languages /**

**Packages / Softwares etc**

**(Working Class)**

| | Among 7 cities (Among Employed Computer Users of Age 15+) | |
|---|---|---|
| | **% age** | **Estimated Numbers in ('000') Projected Figure** |
| **Language / Package / Software*** | | |
| MS Office (Any) | 64% | 512 |
| MS Word | 27 | 216 |
| MS Excel | 22 | 176 |
| MS Power Point | 12 | 96 |
| | | |
| C++ | 11 | 88 |
| Visual Basic | 8 | 64 |
| FoxPro | 12 | 96 |
| Basic | 7 | 56 |
| Oracle | 8 | 64 |
| Java | 5 | 40 |
| Cobol | 6 | 48 |
| | | |
| Internet / Internet Explorer /Netscape | 4 | 32 |

| | | |
|---|---|---|
| No response | 4 | 32 |
| | | |
| **Base: Employed computer users (15+) in 7 selected cities** | | **800 thousand** |

*: Multiple response question therefore sum of percentages may exceed 100.

*Table 15.24*

**Able to Work on Different Languages / Packages / Softwares etc**

**(Students)**

| | **Among 7 cities (Among All Computer Users of Age 15+)** | |
|---|---|---|
| | **% age** | **Estimated Numbers in ('000') Projected Figure** |
| **Language / Package / Software*** | | |
| MS Office (Any) | 56% | 581 |
| MS Word | 26 | 270 |
| MS Excel | 18 | 187 |
| MS Power Point | 9 | 93 |
| | | |
| C++ | 17 | 176 |
| Visual Basic | 9 | 93 |
| FoxPro | 5 | 52 |

| | | |
|---|---|---|
| Basic | 10 | 104 |
| Oracle | 6 | 62 |
| Java | 7 | 73 |
| Cobol | 3 | 31 |
| | | |
| Internet / Internet Explorer /Netscape | 7 | 73 |
| No response | 4 | 41 |
| | | |
| **Base: Computer users / literate students (15+) in 7 selected cities** | | **1037 thousand** |

*: Multiple response question therefore sum of percentages may exceed 100.

***Table 15.25***

**Languages / Packages/ Softwares**

**Currently Using (Working on )**

**(Working Class)**

| | **Among 7 cities** | |
|---|---|---|
| | **% age** | **Estimated Numbers in ('000') Projected Figure** |
| **Language / Package / Software*** | | |
| MS Office (Any) | 57% | 456 |
| MS Word | 24 | 192 |
| MS Excel | 17 | 136 |
| MS Power Point | 8 | 64 |
| | | |

| | | |
|---|---|---|
| C++ | 7 | 56 |
| Visual Basic | 6 | 48 |
| FoxPro | 7 | 56 |
| Basic | 4 | 32 |
| Oracle | 6 | 48 |
| Java | 4 | 32 |
| Cobol | 4 | 32 |
| | | |
| Internet / Internet Explorer /Netscape | 4 | 32 |
| No response | 21 | 168 |
| | | |
| **Base: Employed computer users (15+) in 7 selected cities** | | **800 thousand** |

*: Multiple response question therefore sum of percentages may exceed 100.

*Table 15.26*

**Languages / Packages/ Softwares**

**Currently Using (Working on)**

**(Students)**

| | Among 7 cities | |
|---|---|---|
| | **% age** | **Estimated Numbers in ('000') Projected Figure** |
| **Language / Package / Software*** | | |
| MS Office (Any) | 51% | 529 |
| MS Word | 23 | 239 |
| MS Excel | 15 | 156 |
| MS Power Point | 6 | 62 |
| | | |
| C++ | 13 | 135 |
| Visual Basic | 8 | 83 |
| FoxPro | 4 | 41 |
| Basic | 7 | 73 |
| Oracle | 5 | 52 |
| Java | 6 | 62 |
| Cobol | 2 | 21 |
| | | |
| Internet / Internet Explorer /Netscape | 7 | 73 |
| No response | 20 | 207 |

| | |
|---|---|
| **Base: Computer users / literate students(15+) in 7 selected cities** | **1037 thousand** |

*: Multiple response question therefore sum of percentages may exceed 100.

*Table 15.27*

**Skills Level on Different Languages / Packages / Softwares**

**Among Those Who are Currently Working on These**

**(Working Class)**

| | **Estimated Numbers Who are Able to Work ('000')** | **Among 7 cities Row Percentages Skill Levels** | | | |
|---|---|---|---|---|---|
| | | High | Moderate | Low | No response |
| **Languages /Software /Packages** | | | | | |
| MS Office (Any) | 456 | 52% | 43 | 4 | 1 |
| MS Word | 192 | 67% | 33 | 0 | -- |
| MS Excel | 136 | 41% | 55 | 4 | -- |
| MS Power Point | 64 | 46% | 49 | 4 | -- |
| | | | | | |
| C++ | 56 | 36% | 56 | 6 | 3 |
| Visual Basic | 48 | 49% | 51 | -- | -- |

| | | | | | |
|---|---|---|---|---|---|
| FoxPro | 56 | 57 | 38 | 5 | -- |
| Basic | 32 | 54% | 43 | 2 | -- |
| Oracle | 48 | 45% | 52 | 3 | -- |
| Java | 32 | 40% | 50 | 10 | -- |
| Cobol | 32 | 29% | 61 | 10 | -- |
| | | | | | |
| Internet / Internet Explorer / Netscape | 32 | 61% | 32 | 7 | -- |

*Table 15.28*

**Skills Level on Different Languages / Packages / Softwares**

**Among Those Who are Currently Working on These**

**(Students)**

| | **Estimated Numbers Who are Able to Work ('000')** | **Among 7 cities Row Percentages Skill Levels** | | | |
|---|---|---|---|---|---|
| | | High | Moderate | Low | No response |
| **Languages /Software /Packages** | | | | | |
| MS Office (Any) | 529 | 41% | 49 | 8 | 1 |
| MS Word | 239 | 43% | 45 | 12 | -- |
| MS Excel | 156 | 30% | 60 | 9 | 2 |
| MS Power Point | 62 | 36% | 56 | 9 | -- |
| | | | | | |
| C++ | 135 | 27% | 52 | 21 | -- |
| Visual Basic | 83 | 24% | 59 | 16 | -- |
| FoxPro | 41 | 13% | 67 | 20 | -- |
| Basic | 73 | 34% | 51 | 8 | 7 |
| Oracle | 52 | 45% | 72 | 3 | 1 |
| Java | 62 | 22% | 52 | 25 | -- |
| Cobol | 21 | 19% | 69 | 11 | -- |

| | | | | | |
|---|---|---|---|---|---|
| Internet / Internet Explorer / Netscape | 73 | 52% | 38 | 9 | -- |

*Table 15.29*

**Practical experience on Different Computer Languages /Packages/**

**Softwares Among Those Who are Currently Using on These**

**(Working Class)**

| | Estimated Numbers Who are Currently Working ('000') | Among 7cities | | | | |
|---|---|---|---|---|---|---|
| | | Row Percentages | | | | *Average* |
| | | Upto 1 Year | 1-3 years | >3 Years | None | Experience In a year |
| **Languages /Software /Packages** | | | | | | |
| MS Office (Any) | 456 | 42% | 31 | 26 | 2 | 2.6 |
| MS Word | 192 | 33% | 33 | 32 | 2 | 3.1 |
| MS Excel | 136 | 41% | 33 | 26 | -- | 2.6 |
| MS Power Point | 64 | 61% | 15 | 24 | -- | 2.4 |
| | | | | | | |
| C++ | 56 | 53% | 25 | 19 | 3 | 2.1 |
| Visual Basic | 48 | 22% | 48 | 26 | 3 | 2.6 |
| FoxPro | 56 | 34% | 48 | 18 | -- | 2.4 |

| | | | | | | |
|---|---|---|---|---|---|---|
| Basic | 32 | 23% | 45 | 32 | -- | 3.4 |
| Oracle | 48 | 51% | 24 | 25 | -- | 2.3 |
| Java | 32 | 69% | 25 | 6 | -- | 1.2 |
| Cobol | 32 | 69% | 26 | 5 | -- | 2.2 |
| | | | | | | |
| Internet / Internet Explorer / Netscape | 32 | 41% | 41 | 14 | 5 | 1.9 |

*Table 15.30*

**Practical Experience on Different Computer Languages /Packages/**

**Softwares Among Those Who are Currently Using on These**

**(Students)**

| | Estimated Numbers Who are Currently Working ('000') | Among 7cities | | | | |
|---|---|---|---|---|---|---|
| | | Row Percentages | | | | Average |
| | | Upto 1 Year | 1-3 years | >3 Years | None | Experience In a year |
| **Languages /Softwares /Packages** | | | | | | |
| MS Office (Any) | 529 | 68% | 23 | 5 | 3 | 1.2 |
| MS Word | 239 | 75% | 16 | 4 | 5 | 1.0 |
| MS Excel | 156 | 75% | 16 | 4 | 4 | 1.1 |
| MS Power Point | 62 | 83% | 12 | 5 | -- | 1.0 |
| | | | | | | |
| C++ | 135 | 68% | 23 | | 0 | 1.2 |
| Visual Basic | 83 | 74% | 12 | 5 | 9 | 0.9 |
| FoxPro | 41 | 85% | 15 | -- | -- | 0.6 |
| Basic | 73 | 61% | 39 | -- | -- | 1.5 |
| Oracle | 52 | 75% | 19 | -- | 6 | 0.8 |
| Java | 62 | 61% | 27 | 2 | 10 | 1.0 |
| Cobol | 21 | 54% | 36 | -- | 10 | 1.3 |

| | | | | | | |
|---|---|---|---|---|---|---|
| Internet / Internet Explorer / Netscape | 73 | 75% | 21 | -- | 4 | 0.9 |

*Table 15.31*

**Most Skilled Work / Package / Language**

**(Working Class)**

| | Among 7 cities | |
|---|---|---|
| | **% age** | **Estimated Numbers in ('000') Projected Figure** |
| **Most Skilled Work/Language/Package** | | |
| MS Office (Any) | 42% | 336 |
| MS Word | 14 | 112 |
| MS Excel | 5 | 40 |
| MS Power Point | 0.4 | 3 |
| | | |
| C++ | 3 | 24 |
| Visual Basic | 2 | 16 |
| FoxPro | 3 | 24 |
| Basic | 2 | 16 |
| Oracle | 2 | 16 |
| Java | 0.8 | 6 |
| Cobol | 0.6 | 5 |
| | | |
| Windows | 6 | 48 |
| DOS | 1.1 | 9 |

| | | |
|---|---|---|
| Internet / Internet Explorer /Netscape | 3 | 24 |
| No response | 14 | 112 |
| | | |
| **Base: Employed computer users (15+) in 7 selected cities** | | **800 thousand** |

*Table 15.32*

**Most Skilled Work / Package / Language**

**(Students)**

| | **Among 7 cities** | |
|---|---|---|
| | **% age** | **Estimated Numbers in ('000') Projected Figure** |
| **Most Skilled Work / Language / Package** | | |
| MS Office (Any) | 38% | 394 |
| MS Word | 14 | 145 |
| MS Excel | 4 | 41 |
| MS Power Point | 1.1 | 11 |
| | | |
| C++ | 6 | 62 |
| Visual Basic | 3 | 31 |
| FoxPro | 1 | 10 |
| Basic | 4 | 41 |
| Oracle | 2 | 21 |

| | | |
|---|---|---|
| Java | 1.0 | 10 |
| Cobol | 0.2 | 2 |
| | | |
| Windows | 5 | 52 |
| DOS | 1.3 | 13 |
| Internet / Internet Explorer /Netscape | 4 | 41 |
| No response | 13 | 135 |
| | | |
| **Base: computer users / literate students(15+) in 7 selected cities** | | **1037 thousand** |

*Table 15.33*

**From where the Education and Training of**

**Most Skilled Work Acquired**

| | **Among 7 cities** | | |
|---|---|---|---|
| | **All** | **Working Class** | **Students** |
| ***Institution / Place*** | | | |
| From computer institutes | 38% | 41% | 41% |
| From friends /relatives | 18 | 19 | 18 |
| From School /College /University | 14 | 7 | 23 |
| On Job training | 6 | 14 | -- |

| | | | |
|---|---|---|---|
| Others | 9 | 10 | 10 |
| No response | 15 | 9 | 9 |

*Table 15.34*

**Able to Work on Operating Systems**

**And Currently Working on Operating systems**

**(Working Class)**

| | Among 7 cities | |
|---|---|---|
| | **% age** | **Estimated Numbers in ('000') Projected Figure** |
| **Able to Work on** | | |
| Windows | 94% | 752 |
| DOS | 73 | 584 |
| Unix | 8 | 64 |
| AS 400 | 2 | 16 |
| Others | 4 | 32 |
| No response | 3 | 24 |
| | | |
| **Currently Working on** | | |
| Windows | 90% | 720 |
| DOS | 44 | 352 |
| Unix | 5 | 40 |
| AS 400 | 1 | 8 |
| Others | 3 | 24 |

| | | |
|---|---|---|
| No response | 7 | 56 |
| | | |
| **Base: Employed computer users (15+) in 7 selected cities** | | **800 thousand** |

*Table 15.35*

**Able to Work on Operating Systems**

**And Currently Working on Operating systems**

**(Students)**

| | **Among 7 cities** | |
|---|---|---|
| | **% age** | **Estimated Numbers in ('000') Projected Figure** |
| **Able to Work on** | | |
| Windows | 90% | 933 |
| DOS | 67 | 695 |
| Unix | 6 | 62 |
| AS 400 | -- | -- |
| Others | 2 | 21 |
| No response | 3 | 31 |
| | | |
| **Currently Working on** | | |
| Windows | 87% | 902 |
| DOS | 40 | 415 |
| Unix | 3 | 31 |
| AS 400 | 0 | -- |
| Others | 1 | 10 |

| | | |
|---|---|---|
| No response | 8 | 83 |
| | | |
| **Base: Computer users / literate students (15+) in 7 selected cities** | | **1037 thousand** |

*Table 15.36*

**Credit Card, Mobile Phone Ownership and Intention to Work Abroad**

**Among Computer Users (age 15+ or above)**

| | Among 7 cities | | |
|---|---|---|---|
| | **Among All Computer Literates** | **Among Working Class** | **Among Students (age 15+)** |
| **Credit Card Ownership** | | | |
| Owners | 3% | 5% | 2% |
| Non-owners | 97 | 96 | 98 |
| | | | |
| **Mobile Phone Ownership** | | | |
| Owners | 6% | 11% | 4% |
| Non-owners | 94 | 89 | 96 |
| | | | |
| **Intention to work aboard in Computer Field in Next 1 Year** | | | |
| Very much intended | 26% | 31% | 27% |
| Some what intended | 14 | 17 | 13 |
| Not at all intended | 43 | 43 | 50 |
| No response | 17 | 10 | 10 |
| | | | |
| **Base**: computer users (15+) in elected cities | **1975** | **800** | **1037** |

| | | | |
|---|---|---|---|
| | **thousands** | **thousands** | **thousands** |

*Table 15.37*

**Credit Card, Mobile Phone Ownership and Intention to Work Abroad**

**Among Computer Users (age 15+ or above)**

| | Among 7 cities | | |
|---|---|---|---|
| | **Among All Computer Users** | **Among Computer Owning Users** | **Among Computer Non-Owning Users** |
| **Credit Card Ownership** | | | |
| Owners | 3% | 4% | 2% |
| Non-owners | 97 | 96 | 98 |
| | | | |
| **Mobile Phone Ownership** | | | |
| Owners | 6% | 9% | 3% |
| Non-owners | 94 | 91 | 97 |
| | | | |
| **Intention to work abroad in Computer Field in Next 1 Year** | | | |
| Very much intended | 26% | 26% | 27% |
| Some what intended | 14 | 14 | 14 |
| Not at all intended | 43 | 45 | 40 |
| No response | 17 | 15 | 20 |
| | | | |

| | | | |
|---|---|---|---|
| **Base:** Computer users (15+) in selected cities | **1975 thousands** | **869 thousands** | **1106 thousands** |

*Table 15.38*

**Classification of Employed Computer Literate in Terms of Use of Computers in Their Official Works**

| | Among 7 cities % age | Estimated Numbers in ('000') Projected figure |
|---|---|---|
| **Classification of Users** | | |
| Low level (persons using computer for their typing / office work internet /e-mail purpose only) | 33.31% | 266 |
| **Moderate level** (beside the common use of computer like typing, internet /email, persons using any other package Software etc.) | **17.42** | **137** |
| **High level** (additional using some package or working in any language / programming etc. with experience of less than 3 years) | **12.52** | **100** |
| **Hardcore Computer Professionals** (persons working on any language, involved in software designing, programming, networking or | **5.10%** | **41** |

hardware etc with experience of 3 years or more)

**No use of computer in their official work** **31.64%** **256**

(persons not using computer for their official work)

| | |
|---|---|
| **Base:** Computer users (15+) working in any organization/business (41% of1975) | **800 thousands** |

*Table 15.39*

**Profile of Computer Users of Age 5 or More**

| | Among 7 cities | |
|---|---|---|
| | **% age** | **Estimated Numbers in ('000') Projected figure** |
| **Gender** | | |
| Male | 84% | 1999 |
| Female | 16 | 381 |
| **Age** | | |
| 5 – 10 years | 7% | 167 |
| 11 – 14 years | 10 | 238 |
| 15 – 20 years | 31 | 738 |
| 21 – 25 years | 26 | 619 |
| 26 –30 years | 15 | 357 |
| 31 – 40 years | 8 | 190 |
| >40 years | 3 | 71 |
| **Education** | | |
| Below matric | 15% | 357 |
| Matric | 13 | 309 |
| Intermediate | 26 | 619 |
| Graduate | 25 | 595 |
| Post graduate including professionals | 14 | 333 |
| **Occupation** | | |
| Service | 30% | 714 |
| Business | 6 | 143 |
| Students | 59 | 1404 |
| Unemployed | 4 | 95 |
| Housewife | 2 | 48 |

| | |
|---|---|
| ***Base: Computer users (Age 5 or above) in 7 selected cities*** | **2380 thousands** |

*: In case of Computer Education basic Education was not asked.

*Table 15.40*

**Profile of Computer Literate Households**

| | % age | Among 7 cities | |
|---|---|---|---|
| | Among all Computer Literate HHS | Among Computer Owning Literate HHs | Among Computer Non-owning Literate HHs |
| **Type of House** | | | |
| Ordinary home | 76% | 77% | 75% |
| Flat / apartments | 24 | 23 | 25 |
| | | | |
| **Own Vs. Rented House** | | | |
| Own | 78% | 79% | 77% |
| Rented | 12 | 11 | 14 |
| Others | 5 | 5 | 5 |
| No response | 5 | 5 | 4 |
| | | | |
| **Type of Family** | | | |
| Nuclear family | 42% | 44% | 41% |
| Joint family | 58 | 56 | 59 |
| **Ownership of Durables** | | | |
| Washing machine | 92% | 96% | 90 |
| Refrigerator | 84 | 89 | 79 |
| Tape recorder | 81 | 87 | 76 |
| Ordinary camera | 61 | 72 | 52 |
| Motorcycle | 54 | 61 | 48 |
| CD players | 37 | 59 | 19 |
| Food factory | 31 | 38 | 26 |
| Flat Screen TV | 29 | 37 | 22 |
| Car | 28 | 46 | 14 |
| Microwave oven | 26 | 37 | 18 |
| Deep freezer | 26 | 34 | 20 |
| Air conditioner | 25 | 42 | 12 |

| | | | |
|---|---|---|---|
| Printers | 13 | 28 | 1 |
| Scanners | 8 | 16 | 2 |
| Digital/ JPG camera | 4 | 8 | 0 |
| Refused | 4 | 3 | 6 |
| | | | |
| **Base:** No. Of households | **1190 thousands** | **550 thousands** | **640 thousands** |

Annexure **B**

# DEVELOPMENT PLANS OF THE TELECOMMUNICATION SECTOR

# 16. DEVELOPMENT PLANS OF THE TELECOMMUNICATION SECTOR

## 16.1. The Pakistan Telecommunication Authority's Annual Report for 2000 contains the 5-year development plans of the following organizations working under MoST:

1. Pakistan Telecommunication Company Limited
2. National Telecommunication Limited
3. Special Communication Organization

These plans are summarized in this section.

## 16.2. Pakistan Telecommunication Company Limited

Following are the main points of the development plan.

- Increase of tele density to 4.6% by 2003
- Installation of 300 k lines annually
- 320, 000 lines to be commissioned in 2000-01
- 225, 000 EMD lines would be replaced with digital lines
- Technology transfer and local manufacturing of digital switches
- 100% digitalization by 2003
- Rehabilitation of existing network in major cities
- Optics fiber for city network
- Revamping of billing system
- Prepaid calling card service for NWD calls
- Centralized fault management system
- Establishment of telecenters and video conferencing centers

## 16.3. National Telecommunication Corporation (NTC)

Future plans of NTC are as follows:

### 16.3.1 Phase I - Multi Service Data Network

The major components of NTC multi service data network are as follows:

**a. ATM Platform**

Three ATM switches, one each at Islamabad, Lahore and Karachi, will form the ATM platform. These switches will be capable of point to point and point to multi – point transmission in multi – service data network.

**b. Digital Access Cross Connect System (DACS)**

The DACS is planned for providing data service at Federal and Provincial capital / cities. This system will extend various data services at the customer premises.

**c. ISP Set – up**

ISP set-up will be established at Islamabad. The access to the Internet will be provided from five major cities including Islamabad, Lahore, Karachi, Peshawar, and Quetta through remote access servers (RAS).

**d. TV Transmission**

PTV transmission between Islamabad, Lahore and Karachi would be routed through ATM based optical system at PTV centers.

### 16.3.2 Phase II (In Progress)

**a. MSUs**

Total of 8 x MSUs have been planned for installation in second phase, as follows:

i) 2 MSUs for Karachi Region
ii) 4 MSUs for Lahore Region
iii) 2 MSUs for Islamabad Region

**b. RDLUs**

Total of 38 x RDLUs have been planned for installation / commissioning in second phase. Region – wise distribution of RDLUs is as follows:

i) 9 RDLUs for Karachi Region
ii) 15 RDLUs for Lahore Region
iii) 6 RDLUs for Islamabad Region
iv) 7 RDLUs for Peshawar Region

v) 1 RDLU for Quetta Region

**c. SDH Equipment**

SDH Equipment (622 M bits ) will be installed on main, alternate route and junction network in nine major cities. NTC's own transmission media interconnecting all switches and data networking equipment was likely to be commissioned by June, 2001

### 16.3.3 Phase III

**a. Wireless Local Loop System (WLL)**

Wireless Local Loop has been assessed for incorporation in NTC network for the areas where provision of UGC facility is not feasible.

**b. Digitalization of M/W**

NTC has planned to digitize its analogue M/W system / media. Studies are underway to convert analogue to digital system, in the most cost-effective manner.

**c. Video transmission**

This facility has also been planned for provision to the end users. The proposals of various vendors are under active consideration.

**d. Gateway Exchange**

Provision of Gateway exchange at different locations is under consideration. Negotiations for pre-qualification have been undertaken and modalities are being worked out.

## 16.4. SPECIAL COMMUNICATION ORGANIZATION (SCO)

The future projects under SCO are given below:

### 16.4.1 Rural Communication Uplift Project (Azad Jammu & Kashmir) - Phase-II

A total of 35000-40000 digital lines will be installed along with requisite termination media. Provision of NWD/ ISD facilities to major cities/ towns and modern facilities like Internet, Pay Phone, and Mobile Phones to Azad Jammu & Kashmir will be the hallmark of this phase. Initial planning has been completed and the project is likely to be undertaken during 2001-2003, with an estimated cost of Rs.25 billion. At present the telephone density in Azad Jammu & Kashmir is 1.009 telephones for 100 inhabitants, which is low compared with most of the developing countries/ other parts of Pakistan. After completion of the project the density is expected to increase to 2.38 telephones per 100 inhabitants.

### 16.4.2 Northern Areas Telecommunication Uplift Project- Phase-II

SCO has signed a contract on 28th June 2000 for a capital cost of approximately Rs.540 million. Provision of 13000 connections (including replacement of 3700 EMD lines in Gilgit, Skardu and Chilas), VSAT Satellite links to connect Northern Areas with rest of the world through a reliable transmission media and WLL system to cater for remote and scattered population has been planned. With the completion of this project telecommunication facilities in Northern Areas will be revolutionized. At present the telephone density in Northern Areas is 0.74 telephones for 100 inhabitants, which is low. After completion of the project the density is expected to increase to 2.23 telephones per 100 inhabitants.

### 16.4.3 Internet

Internet services to Gilgit have been extended in October 1999 and now efforts are being made to extend similar services at Skardu and Karimabad. Internet would be extended to Muzaffarabad, Rawalakot, Mirpur and Kotli in Azad Kashmir during 2000/ 2001.

### 16.4.4 Payphones

Efforts are being made to introduce Pay Phone services in 2000/ 2001 in Azad Jammu & Kashmir and Northern Areas.

### 16.4.5 Terrestrial Communication For Northern Areas

The area of operation of SCO in Northern Areas has very peculiar geographical and demographical characteristics. In Northern Areas the population centers are located along the Kara Kuram Highway and vallies. The existing arrangement for communication backbone in Northern Areas mainly depends upon DOMSAT and old-line carrier system, which are based on out dated technology and require heavy maintenance round the year. In addition to the two Microwave Surveys conducted during 1995 and 1997, a joint team of SCO and PTCL has also carried out a fresh survey in April 2000. Negotiations with the government/ other agencies are in process to obtain necessary funding for linking Dassu / Besham with Gilgit through Microwave system. This will extend the terrestrial backbone from Gilgit to Rawalpindi on modern media by 2001-2004

### 16.4.6 International Gateway

SCO and NTC are planning to establish their own Gateway during 2000/ 2001. The Project is under evaluation.

### 16.4.7 Some Other Goals / Objectives

1. Spread internet / E-mail/data/modern value added services to major cities and towns (about 10000/more population).

2. Increase revenue and social service without losing profitability.