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# **Software Exports from Pakistan**

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**December, 97**

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## 1. PREFACE

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This report is based on the premise that Pakistani professional managers in both the public and private sectors can not afford to ignore the significance of software development and its export in today's dynamic environment. The Government of Pakistan in its efforts to boost the exports of Pakistan has been emphasizing and encouraging entrepreneurs to take advantage of the trillion dollar world wide software market, keeping in mind the fact that the software industry is not a capital intensive one and that Pakistan is very rich in its low cost human resources, effective utilization of the above would significantly help reduce the country's trade deficit.

Realizing the urgency and the importance of the situation, we at the IBA have conducted a thorough research on the topic of "Software Exports from Pakistan". Having realized that some nations are far ahead in this field of expertise, the first task we set aside for ourselves was to learn about their experiences and their strategies, for which we looked into the performance of countries like India, Australia, and Japan. A parallel activity was conducted to gather information regarding all the rules, regulations and rights provided by the Government of Pakistan to all current and prospective software designers and exporters.

A thorough literature review was made and several meeting were conducted with the PSEB, EPB, and PASHA.

Another exercise was conducted to collect information on the current situation of computer training institutes. Further, two seminars were conducted to get insight on the above topics and to provide prospective software exporters, efficient guidelines to conduct their businesses. A survey was also conducted on the software houses of Pakistan to know about the current situation of software exports from Pakistan. We have also collected valuable information on the major worldwide exporters and importers of software.

The data collected for the completion of this report was an outcome of a collective effort of a group of faculty members under the valuable guidance of the Director of IBA, Professor Dr. Abdul Wahab TIM. We hope that our sincere efforts to provide the prospective exporters a complete picture of the current software export scenario and a stepwise guideline to effectively conduct their software export business, proves to be a fruitful one.

# **Software Exports from Pakistan**

**Institute of Business Administration, Karachi**

## **Executive Summary**

For Pakistan, software exports is an attractive option for creating large number of jobs in the economy and for solving the budget deficit problem through foreign exchange earnings. Experience of India and other developing countries shows that these objectives are achievable. However, this requires a concerted effort among major players in the software sector that include government, software houses, marketers, universities, educational institutions and financiers. This report details the role of each of these major players in the context of software characteristics, dynamics and trends that are driving the industry. It proposes several strategies and plans for enhancing the software exports. These include collaborations strategies among the major players, strategic plans for software houses and plan for entering foreign markets. The report contains a survey of software houses in Pakistan. It also contains case studies of prominent software exporter and importer countries. These studies were used to determine the critical success factors, strategies, and suggestions presented in this report. The report ends with a list of recommendations for boosting software exports from Pakistan.

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## **2. INTRODUCTION**

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As global economy makes a transition from industrial age to information age, several technologies are converging together creating host of new possibilities and opportunities. Technologies employed in communications, satellites, networks, telephone, video, audio systems are getting digitized and thus converging into computer technology. Through this massive transition, only those nations would progress that are appropriately poised to take advantage of these trends. Software is the glue that helps in integrating these technologies in systems that provide competitive advantage to nations as well as businesses. This section describes critical success factors for software exports, software characteristics and some major software trends and dynamics.

### **2.1 Critical Success Factors**

Critical success factors for boosting software exports are summarized below.

#### **Economy**

- Large scale computerization of the domestic industry that can act as a launching pad for exports.
- Adoption of standards and their implementation
- Computers in schools. Increased computer awareness in the general public.

#### **Universities**

- Research and development that helps software houses increase their productivity.
- Software engineering curricula tailored according to software market requirements
- Direct interaction of the universities with the industry that leads to job oriented education.

#### **Skilled labor**

- Students of computer science, engineering and software management with analytical skills and knowledge of new and upcoming technologies
- Software engineers trained and on large projects in an environment of growth and technical enrichment.
- Commitment and understanding of issues dealing with management of creative software professionals.

#### **Funding**

- Venture capital markets that are developed enough to provide seed capital for launching new concepts and innovative thrusts in software exports.



- Government contracts and grants for startups and other software houses to provide much needed exposure and experience of large projects.
- Banks that understand software and are willing to finance on the basis of valuation of intellectual capital.

#### **Support services**

- Telecommunication infrastructure that is affordable, competitive and reliable.
- Support technologies for disk-copying, printing and other services.
- Mail/express services for easy and fast communication with foreign clients.

#### **Communication networks and collaborations among major players**

- Engineers: Knowledge of software issues, trends and technologies.
- Managers: Management of large projects meeting quality standards, without cost over-runs and delays.
- Marketers: Identifying niches, winning contracts, satisfying the customers.
- Financiers: Instruments and services for software industry.

#### **Attractive Environment**

- Entrepreneurial environment that encourages risk taking.
- Problem solving culture that rewards creativity and incremental development over blind following.
- Low cost rents: Software technology parks and infrastructure facilities.
- Labor: Cheap, skilled and abundant

#### **Access to market channels**

- Joint ventures: Ease of identifying and contracting.
- Cooperative arrangements: Win-win collaborations.

#### **Marketing and Management**

- Development of expertise and products for niche markets
- Professional management and planning. Formal organization structures

## **2.2 Characteristics**

This section discusses major characteristics of software exports.

### ***2.2.1 Macro-Economic Impact of the Software Sector***

Software sector is capable of creating many jobs and providing much needed foreign exchange for countries experiencing periods of sluggish growth. The

sector represents opportunity for Pakistan that has been experiencing sluggish growth in the economy and the manufacturing sector in particular.

As the following examples illustrate, software sector can provide job and income opportunities. In the United States for example, employment in the software sector increased by over 238% during 1978-87 compared to just 36% increase in the hardware sector and 44% increase in the entire economy [Sch92]. In the state of Massachusetts there were over 800 software firms. These were responsible for over 46,000 jobs in the state and were providing over 300,000 jobs worldwide. In Japan total employment increased by 12% during 1978-87 whereas employment in the software sector increased by 157% [Sch92].

It is unlikely that the software sector would create massive job opportunities or become an important source of income until computerization spreads widely in the country and there is a greater demand for software products in the domestic market. Thus, development of domestic software market is imperative for reaping the macro-economic benefits of higher employment, and export earning from the software sector.

### ***2.2.2 Software Sector is Labor Intensive, Not Capital Intensive***

Unlike other sectors of the economy, software sector is labor intensive not capital intensive. Therefore, personnel resources are of much greater importance in software sector than capital resources like raw materials, plants and machinery.

Investment into development of personnel resources becomes crucial to the development of software sector. This requires special emphasis on education and training of the software personnel. Investment in the human resource may take several forms like:

- Setting up of more educational and vocational training institutions
- Improving quality of existing institutions
- Focusing curriculum on job oriented education and training

### ***2.2.3 Domestic Software Sector Necessary for Sustained Exports***

Unless a country has a thriving and active software sector it is difficult to sustain software export. Software sector would not create massive job opportunities or become important source of foreign exchange unless computerization spreads widely and there is greater demand for software products in the domestic market.

Countries without a relatively active and up-to-date software sector will find it increasingly difficult to catch up in terms of capital outlays, labor, skills and the growing importance of technology changes, organization and management in software production [Sch92]. They would lack software management experience to undertake increasingly large and complex software development projects.

India and Brazil have each used a different model of development. According to [Sch92] they are trying to walk on one leg. India has emphasized the export market at the expense of domestic market and Brazil has emphasized the domestic market at the expense of export market. This has resulted in different outcomes for both the countries as explained below in the case studies.

Thus, it is important that countries intending to develop their software exports should not develop one market at the expense of the other. Assimilation of technical know how required for turn-key solutions does not happen overnight. Tremendous learning is required. It typically evolves through the experiences gained in the domestic sector.

- Software exports should not be allowed to starve the domestic software market
- Government with its large purchasing power can stimulate domestic market.
- Government can generate many opportunities for local talent through judicious award of software contracts to domestic vendors.

## **2.3 Software Dynamics and Trends**

### ***2.3.1 Software Development: Progress From Art to Science***

Although there are signs of progress and maturing, software development process is still more of an art than a science. Software houses depend upon specialists with natural flair seasoned with skills acquired through experience.

- Skills and experience can not be acquired in class room settings.
- These are obtained through work experience in actual job environment which requires availability of opportunities in the domestic software sector. The biggest provider of job and experience opportunities in a country is the largest buyer of software products and services which in most of the cases is government.
- Development of natural flair and creative abilities require appropriate experience and opportunities.

However, research and development in the software sector is directed towards an incremental effort to turn the art into science.

- New methodologies, procedures, processes, tools for software development, maintenance and management are being proposed and perfected. Many of these methodologies and tools are now beginning to pay dividends. Mechanics for structuring the creative abilities and talents of the software programmers are being perfected so that they can be reapplied again and again with consistency and quality control.
- There is this window of opportunity where labor intensive economies like Pakistan can make their presence felt on the basis of software skills and labor.

- Later, as these methodologies and tools get standardized, their acquisition would require a lot of investment. It, then, would become increasingly difficult for countries like Pakistan to make a mark in this industry.

### ***2.3.2 Software Sector Growth***

Transition from industrial age to information age represents a great potential of growth in the software sector as organizations in public and private sector aggressively computerize and integrate their systems.

- Software and services market worldwide grew at the rate of 20% from 1987-1992. It was expected to grow at around 15% during the subsequent years.
- Software sector in USA has an 11% Annual growth rate. It has grown from US\$238bn in 1990 to US\$400bn in 1995.
- During 1990 - 1997, India has increased its software exports from about \$100 million to more than a billion dollars.
- Software industry in USA comprised of about half of the world market in 1993. The share of USA has declined from about 70%, share that it held during the early eighties.
- Employment in software sector has increased in periods where employment in other sectors has suffered.

### ***2.3.3 Increasing Complexity of Software***

Complexity of software is continually increasing because of increasing demands for integration among different applications and with web, demands for reliability, fault tolerance and fail safe performance; demands for security from hackers and unauthorized access; demands for user friendliness; and demands for support, maintenance and continuous upgrades.

- Increasing complexity of software has made it unfeasible to sustain large in-house software development environments in public or private enterprises.
- Several organizations have turned their IT departments into standalone software houses.
- As they are unable to handle the complexity, organizations are now increasingly outsourcing their software development.

### ***2.3.4 From In-house Development to Off-the-Shelf Packages***

Businesses know that if they require cooling they need not start manufacturing air conditioners in-house. They are, however, only now realizing that if they need software solutions then they need not start manufacturing software applications in large in-house software factories. They can get better quality software solution from a specialist vendor through outsourcing. According to UST

- Outsourcing has created demands for off-the-shelf software packages
- Off-the-Shelf packages represent industry specific niches that can be exploited by software exporters.

### ***2.3.5 From Manual Programming to Automated Tools***

Increasing complexity of software systems and shift from in-house development to outsourcing has resulted in the following trends in human skills requirements:

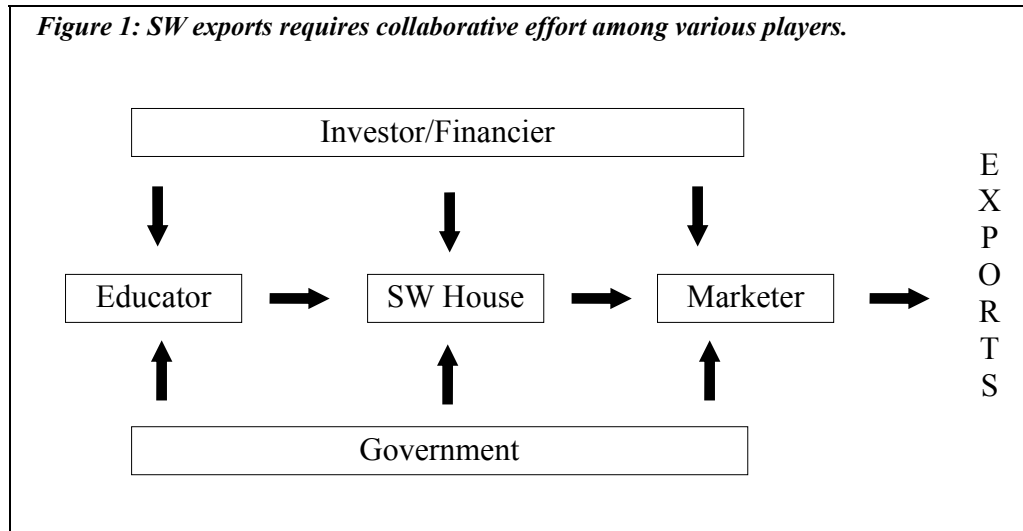
- Decline in numbers of low level programmers
- Decline in data entry operators once the back log is removed
- Sector will require more high level model builders and engineers
- The sector will need well-educated managers and project leaders.

### 3. COLLABORATION STRATEGIES FOR SOFTWARE EXPORTS

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The material in this section was presented at the “Business Opportunities In Software Exports” Seminar, arranged by Computer Society of IBA at IBA on Oct 20, 1997 [Hyd2-97].

Collaboration strategies presented in this paper provide business opportunities for all the major players of the software sector; investors, software houses, government, educators, financiers, and marketers. Several opportunities for collaborations are described. They arise from the concerns of software houses about the supply of quality software professionals, contacts with potential foreign customers, availability of finances, and continuity of the government policies. These collaboration strategies are win-win strategies in which every major player would gain business advantage. Software houses would gain quality personnel, marketing outlets and financing in an enabling environment. Government will gain the much needed foreign exchange. Educational institutions would be able to generate resources and raise their standards. Investors would be earning from a sector that is huge and doubles every two years according to Moore’s Law. Marketers would gain in a fast paced market where there are immense possibilities for innovation and differentiation in products that often become obsolete as soon as they are announced.



#### 3.1 Collaborative Advantage

Information Technology (IT) often induces opportunities for collaboration and alliances. Businesses gain more through collaborative advantage rather than competitive advantage [Mor90]. Concepts of competitive advantage assume that the size of the cake is limited and fixed. If one competitor grabs a bigger pie, the others would be left with smaller pieces. However, in Information Technology, specifically the software (SW) sector, dynamics are very different. It is a high

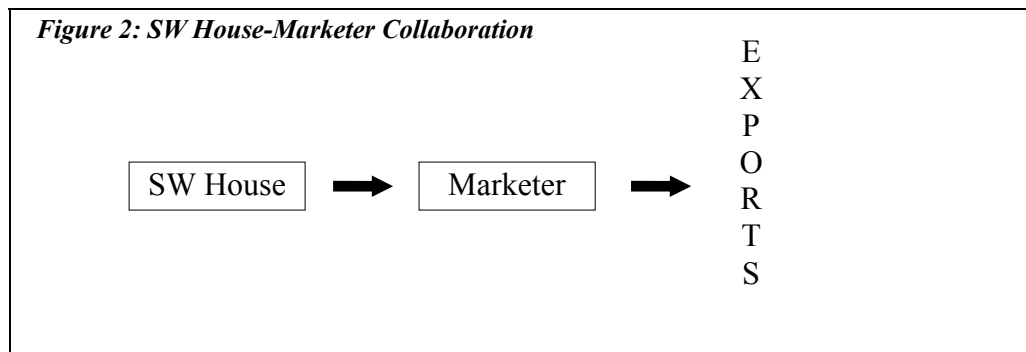
growth sector. Not only is the cake very large but it keeps getting bigger. SW houses need not be afraid of other competitor SW houses undercutting their revenues. International software market is so large that there is profit potential for every one. Larger the number of software exporters in a country, the greater is its attractiveness for the foreign software and services buyers. Hence, there are opportunities of greater gains through collaborations and alliances among software houses. There are several examples of collaborations among competitors in the IT world. For example, Motorola and IBM alliance for PowerPC, and Sun-Oracle-Netscape alliance for JAVA. More recently and more closer at home is the example of Pakistan Association of Software Houses (PASHA) that obtained policy and tax incentives from the government for software houses.

However, software houses by themselves would not be able to make much progress in exports. This requires a collaborative effort among the major players in the software sector. These are the Government, SW houses, marketers, educators, investors, and the financiers. Each one has a distinctive but an enabling role to play in software exports as shown in Figure 6. There are several possibilities of collaborations among the major players. In fact, each arrow in Figure 6 represents an opportunity for collaboration and alliance, and hence an opportunity for business advantage.

### 3.2 SW House-Marketer Collaborations

#### 3.2.1 Need for SW Houses - Marketers Collaborations

Software houses are often started by software specialists. Majority of them are SW managers, and developers. They are not professional marketers. Very often when a new software venture is started, the investors look for software specialists to run the enterprise. Software houses are thus mostly managed by software developers and managers whose presence is required locally where the software development is taking place. However, selling software internationally requires a lot of travel. It requires establishing personal contacts, stimulating those contacts, negotiations and pursuing leads in foreign countries.



Marketing strategies are required for identifying key niche markets, developing competitive strategies, measuring customer response and satisfaction. New

distribution channels are required (see Section 4.4). Pricing and promotion strategies need to be developed. This is a job for professional marketers, not software personnel working part time as marketers and part-time as developers/managers.

Moreover, as customer base in foreign countries would mostly comprise of the natives, it is better to have native marketers. Hiring marketing professionals and managing them from Pakistan would be a very expensive proposition. A professional marketer costs around \$300,000 per annum. Therefore, it may be advantageous to collaborate with foreign marketers.

### ***3.2.2 SW Houses-Marketers Collaboration Strategy***

Collaboration strategies with marketers include internal organizational structuring between a front-office and a back-office, collaboration with expatriates and with foreign software houses and marketers.

#### **Front Office- Back-Office Strategy**

Software houses need to adopt a strategy similar to that used by multinationals like IBM, and NCR. Multinationals typically keep their marketing presence in Pakistan, but have their manufacturing and development facilities elsewhere. Similarly, software houses should do their development in Pakistan, but should plan to have their marketing and sales offices in foreign countries.

Thus, software houses need to have a front-office and a back-office. Back office would be in Pakistan where research and development of software takes place. It would be responsible for the development of new versions, new features, and new extensions in addition to the regular maintenance of existing software. Front-office would be in the country of target customers. This office would be responsible for sales, marketing and after sales service. One of the major concerns of customer is the support and maintenance of software. Therefore, some technical staff would also be required in the front-office in addition to the marketing personnel. The technical staff can also be made responsible for analyzing the requirements of new customers and the initial analysis and design of software projects. It is not always financially feasible to have the technical support people shuttling between the two offices.

#### **Expatriate Associations**

A software house may contact three types of expatriate associations in North America, Europe and other countries of the world. These are regional, religious or professional associations.

Example of regional organizations are Pakistan Students Association (PSA) that is present in most campuses of foreign universities. Then, there are associations of Pakistani expatriates in each city. These are quite active in organizing cultural shows and other activities. Kashmiri associations are also quite active.



Example of religious organizations are Islamic Society of North America (ISNA) which is an umbrella organizations for most mosques in USA. There is also Islamic Circle of North America that is primarily composed of Pakistani immigrants.

Examples of professional organizations include Pakistan Medical Association (PMA). It is composed of doctors of Pakistani origin.

Through these organizations in North America and other similar organizations in Europe and elsewhere, software houses can make contacts with potential marketers.

Once contacts are established with individuals, these contacts can be stimulated on the basis of commissions and on the basis of partnerships.

### Foreign Marketers

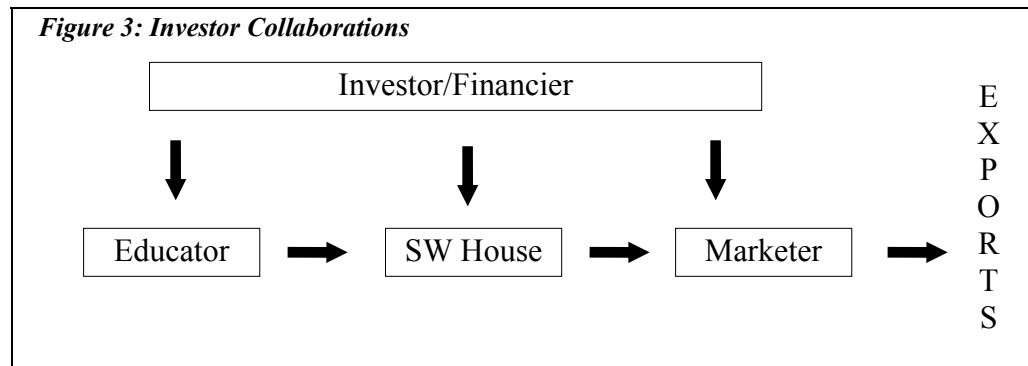
It is also possible to establish links with foreign marketers that may be interested in pushing software products and services. There is also the possibility of stimulating some distribution channels abroad. Arrangements are possible like licensing and agreements for software and services.

## 3.3 Investor Collaborations

Investors can setup marketing front-offices, educational institutions and software houses as shown in Figure 3: Investor Collaborations.

### 3.3.1 Investors-SW Houses Collaborations: Why

Foreign customers often evaluate SW houses on the basis of the skills set and experience available with the software house. History of successful projects accomplished without time and costs overruns is one of the best promotions. New startups would lack this experience and this history of successful projects.



On the other hand, in Pakistan there are several small SW houses that have been around for some time. They have skills and experience, but they lack capital required for foreign ventures and for establishing foreign marketing presence.

This indicates a win-win situation for both the investor and the small software houses. An investor that acquires partnership of a software house would get

experience and history of successful projects. Whereas, the software house will get the much needed capital. Hence there are opportunities for collaboration. Several arrangements are possible as described below.

### ***3.3.2 Investor-SW House Collaboration Strategies***

There is a range of collaboration strategies for the software houses and investors. These arrangements depend upon distinctive competencies, professional expertise and background of investors and software houses.

#### **Venture capitalist acquires a small SW house**

This strategy is beneficial for investors that are new to the software field or those that do not have expertise and skills in the area of information technology. The example of this may be the acquisition of Ultimate Solutions by the Progressive Group of companies. Ultimate Solutions was started by a group of graduates from FAST Institute of Computer Science some years ago. It gained experience and expertise in Foxpro based systems. However, it needed capital investment for growth. This came with the offer of Progressive Group to acquire a controlling interest. Currently, Progressive Systems (the new name of Ultimate Solutions) has over thirty software personnel and are poised for some good foreign contracts.

#### **A big HW vendor allies with a small SW startup**

This strategy is appropriate for hardware vendors that have name and infrastructure facilities, but do not have enough resources for starting a full-fledge software house. Example of this kind of collaboration is from NCR. NCR specializes in ATM and other banking systems. Couple of NCR employees left the company to form EDP Systems. NCR offered to collaborate with the new company by providing infrastructure and other facilities. EDP Systems has now exported to India and are now growing their customer base in Middle East. NCR on the other hand, can now offer not only computer and ATM hardware boxes but also complete solutions to its customers.

#### **A large HW vendor enters SW business**

This strategy is appropriate for hardware vendors that have adequate IT infrastructure, personnel resources and skills to start a new software subsidiary. IBM till the early part of this decade was primarily a vendor of hardware boxes. However, recently with its BankPlus initiative it has formally diversified into software development and services. Now IBM has a software division. Its BankPlus package is currently under implementation in various branches of Bank Al Habib.

#### **A Large Group Turns its IT Department into a SW House**

This type of initiative is appropriate for groups that have large IT department and experience of software projects. Many have realized the potential of software exports by making their IT departments into standalone software subsidiaries. Prominent among them is Crescent group of companies that took the lead by

establishing CresSoft some years ago. Currently, CresSoft is the largest software exporter from Pakistan. More recently, Atlas has formed its own subsidiary. Lakson group of companies formed CyberNet. It is poised to enter the software export business.

One of the major lessons to be learned from the CresSoft experience is the importance of professional management. Without professional management and adequate delegation of responsibility the enterprise may not have been successful.

### ***3.3.3 Investor-Marketer Collaborations***

Investment opportunities in software exports are not necessarily limited to starting of a new software house. Investors having foreign presence and experience of overseas operations may find it more beneficial to start front-offices for one or more Pakistani software houses. Later, once the marketing setup is successful, the option of backward integration may be considered by starting a software house. The front office would provide the facilities as described in Section 3.2.

### ***3.3.4 Investor-Educator Collaborations***

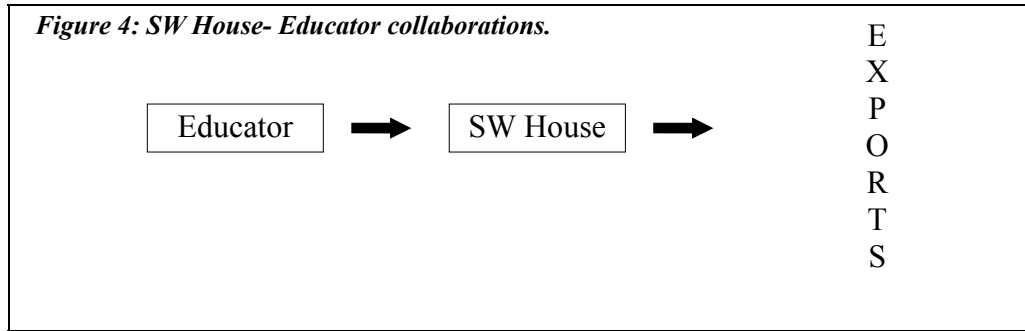
Many investors have already realized the potential of starting new educational institutions for computer education. However, it is important that (1) educational institutions be setup with a long-term perspective, and (2) the quality of graduates must satisfy the requirements of the software houses.

Investors interested in setting up of educational institutions must be prepared for the long haul. It takes typically two to three years before the graduates come to the market. It then takes another year or so before they are recognized by the job market. The potential of earnings is immense once the institute gets recognition.

Maintaining quality of education is one of the most important requirements. Software houses will simply not accept below standard output. Institutes with inferior quality of products would therefore suffer. Educational institutions should therefore have strong links with the software houses as described below.

## **3.4 SW House-Educator Collaboration**

Software sector is labor intensive. It requires highly skilled personnel with not only specialized education but also aptitude, and experience. This makes collaboration among software houses and educational institutions as one of the most important link in software exports.



### **3.4.1 Need for SW House-Educator Collaboration**

Software houses require a steady supply of quality software professionals. However, educational institutions that can guarantee this supply are short of resources, faculty, and industry exposure. There is thus a need for the software houses to collaborate with educators and provide educational institutions with much needed resources. In return they can expect a guaranteed supply of quality personnel.

There is shortage of software personnel in Pakistan. Estimates put the number of software specialists in Pakistan to only between 5000 to 10,000 [3]. Moreover, there is a high turnover of the IT specialists due to great demand in Middle East and elsewhere. It is important for software houses to ensure that there is continuous supply software personnel. Furthermore, there is great concern about the quality of the graduates being produced by many of the computer institutes. Substantial retraining is required after their hiring to meet the international demands for quality and standards.

In addition to the lack of quality SW Specialists, software houses must tackle the issue of continuously changing technology. New tools and methodologies are being announced every day. Technologies becomes obsolete as soon as they get accepted. In addition to the high costs of training in terms of money and time, personnel that are under-training become unavailable for current projects. This puts further pressure on the already short pool of software personnel.

On the other hand, computer education institutions responsible for producing quality software specialists and for running the training programs in new technologies lack resources. They are short of teachers that are qualified, experienced and well versed in new technologies. There is lack of industry exposure. Moreover, computer labs lack necessary hardware, software and training applications. Computer curriculum of these institutions does not meet job market requirements.

### **3.4.2 SW House- Educator Collaboration Strategies**

This section describes various strategies for collaboration among software houses and educational institutions. Software houses will provide funds and resources to the educational institutions and in return will get a guaranteed supply of quality

input and also participation in the decision making processes of the educational institutions. Several collaboration strategies are possible. They vary in the extent of desired coupling; tight or loose.

### **Curriculum Advisory Committees**

Software houses can have their representatives in committees advising educational institutions about the courses that would meet the job requirements of the software industry. Educational institutions would get exposure of the industry requirements and would be able to better serve the market. Example of such a collaboration is the advisory committee of the MIS program of IBA and the advisory committee of the Computer Department of the Karachi University.

### **Funds to Evaluate New tools, Methodologies**

Instead of evaluating new technologies, tools and methodologies at large costs, software houses can fund collaborative projects with the educational institutions to evaluate these new technologies. Students would then be used for testing and evaluating the strengths and weaknesses of the new technologies. Business program students can be used for doing various marketing surveys, for identifying new niche markets and for evaluating the customer response. This would be cheaper for software houses to learn about the practical implementation difficulties and advantages of these technologies. Educational institutions would get funds for new hardware and software and would be able to keep abreast of new trends.

### **Part-time Teachers**

One of the major problems that educational institutions are facing is the dearth of qualified teachers. It is in the interest of the software houses to improve the quality of teaching of these institutes by providing experienced teachers either on deputation full time or on a part-time basis. The software professionals would also be able to brush up their academic and presentation skills.

### **Scholarships**

Software houses can provide scholarships to students on need cum merit basis. In return the students may be asked to fill a bond for x number of years to work for the software house. Many students who have the aptitude but who can not afford the education would, then, be able to acquire skills and excel in software development and management.

### **Adopt a Computer Institution or a Specific Program**

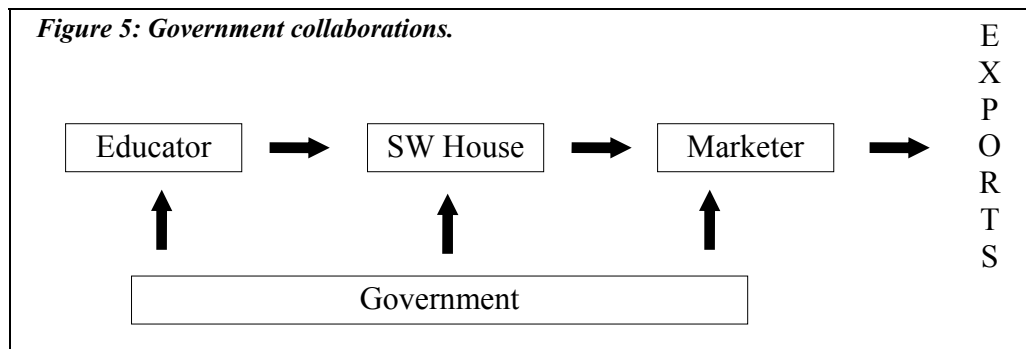
Software houses can also have a much tighter coupling with a computer institution. A software house can adopt one of the computer education program at an institute. For example, CitiBank sponsoring the program of Marketing of Financial Services at IBA, Karachi. It is also possible to adopt/acquire the institute itself. Example of such a coupling is the NCR Education Center started by the NCR.

### Software House Starts an Education Center

Example of a software house starting its own computer education center is AceAims that started running its own education center. Other examples are that of OraTech, Tec and SysNet. This is the maximum coupling possible. However, managerial considerations in such enterprises include addressing the issue of what is the business and mission of the company. Are we a software house or a software education institution. There is often the possibility of losing focus in such enterprises.

### 3.5 Government Collaborations

Government has a large stake in the promotion and the development of software exports. The only hope for resolving the balance of payment problem and deficit reduction appears to be a significant boost in software exports earning. For this purpose, government has been proactive and has already announced several incentives, tax breaks and initiatives. There are still areas where collaboration is



needed for promoting domestic software industry and its export potential.

#### 3.5.1 Government-Educators- SW Houses Collaboration

Several needs of the IT industry require collaboration among the SW houses, educational institutions and the Government. These include need for quality control, a coherent IT policy with continuity, and copyright legislation.

##### Need for Quality Control and Arbitration

Software exports to a large extent depend upon quality and standardization. Foreign customers are very anxious about the procedures, methodologies, quality assurance and after sales support. It is possible that one bad export can tarnish the image of the entire Pakistani software initiative. This is especially serious in the light of existing Western biases and prejudices for Muslim countries.

There is a need for a strong professional association for monitoring the quality of exports. The association may also help in arbitration of disputes which can arise because of the inherent ambiguity of the specifications that customers often provide for their software requirements.

### **Need for Coherent IT Policy**

There is need for a coherent IT policy. There are several associations comprising of educators, software houses and government officials. There is a need for coordination and preparation of coherent policy that has continuity and coherence.

Some examples of existing collaborative efforts include the President's Task Force on IT, the IT Commission, Computer Society of Pakistan. There are several Government departments working in this area like Pakistan Computer Bureau of the Cabinet Division and departments of Ministry of Science and Technology. There is a need to have an integrated policy and approach among these organizations.

### **Need for Copyright and Intellectual Property Laws**

Foreign investors and customers are often concerned about the copyright and intellectual property protection. Customers often treat their software as a strategic investment and would like to be sure that it does not get to their competitors or is copied easily. Similarly, software houses will not like to see their investment in R&D being copied and distributed freely. There is therefore a need for appropriate copyright and intellectual property protection legislation.

### ***3.5.2 Government-Educators Collaboration***

Many of the high-level educational institutions are under government control. There is a need for greater coordination among the government and the educational institutions in educating and training personnel that would meet the projected software exports requirements. The personal interest of the President and the Governors has resulted in the activation of the committees of the Vice Chancellors and Chancellors in the provinces of Sindh and Punjab. In response, many of the universities like Karachi University, Sindh University and others have started short training courses for the Millennium bug problem. Similarly, at the Matric board, Inter-board and technical board level there is need for greater coordination among the Provincial Secretary of Education and the officials of the boards. Some such committees are already working. The objective being to create greater computer awareness at the school level, and to tailor the computer curriculum at the intermediate and the technical board level according to the software export requirements.

## **3.6 Other Collaborations**

### ***3.6.1 SW House-SW House Collaboration Strategies***

There are possibilities of collaboration among the local software houses and also between the local and foreign software houses.

### **Among Local Software Houses**

For example, Pakistan Association of Software Houses (PASHA) obtained a number of concessions and incentives from the government.

There are other business opportunities. For example, a number of software houses may decide to team up to have a single front-office for marketing, sales and after sales support. They can keep their individual back-offices for development. It will be a win-win situation if the software houses have distinctive competencies. For example, one software house may decide to specialize in remote banking applications, another specializes in banking transaction applications and the third one may specialize in the decision making support for banking executives. Similarly, three other software houses may decide to collaborate where one specializes in the networking and web based interfaces, the other specializes in the back end databases for web applications and the third one focuses on R & D of tools and environments for such applications.

It is important that software houses should each have a distinctive advantage and a specialty otherwise there may be conflicts of interest in such an arrangement.

### **Local-Foreign Software Houses Collaboration**

Foreign software houses may be interested in outsourcing some of their development work to off-shore companies. They may do the higher level analysis and design of the software, and can then send the detailed specifications for the writing of the programs to Pakistan.

## ***3.6.2 Educator - Educator***

There are several possibilities for collaboration among the educational institutions.

### **Affiliations**

Universities can offer affiliations to the computer institutes to raise their standards and for distinguishing between genuine and spurious institutions. For example, IBA, Karachi recently invited applications for affiliations. The objective was to strengthen the computer institutes by raising their standards. Institutions desirous of getting recognition and serious about raising their standards would gain from such affiliations.

### **Unified Curriculum**

The fast pace of change in information technology renders the curriculum obsolete every few months. There is thus a need to update the curriculum on a regular basis. To avoid duplication and wastage of precious faculty resources, it is prudent for the educational institutions to coordinate in this effort and develop a unified curriculum.



**Exchange Programs**

There is a need for faculty exchange programs where educational institutions gain by sharing faculty resources. The programs can be started within the Pakistani institutions or in collaboration with foreign universities.

**Dovetailing of Programs**

Computer programs at different levels can be dove-tailed to provide an upgrade path for the educational qualifications of the students. So, degree program at one university may give credits to a student who has done a diploma program at another institution.

## **4. ROLE OF MAJOR PLAYERS IN SOFTWARE EXPORTS: OVERVIEW**

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Software houses are primarily engaged in software development. They act like offshore software factories. Sales and marketing of software is done by the professional marketers operating in foreign countries where the customers for software exports reside. Educational institutions provide the much needed quality software professionals for the software houses. But, supporting these software houses, marketers and educational institutions requires on the one hand an enabling environment by the government, and on the other hand infusion of new capital from investors, venture capitalists and financial institutions. Government provides incentives, tax breaks and facilitating rules and regulations. Financiers and investors provide new capital and new instruments like loans, insurance and leasing, to sustain the growth of the software industry. The role of each of these players has been detailed in [Hyd97] and is being summarized below.

### **4.1 Role of Government**

Government's primary responsibility is to provide an enabling environment for software exports. It has taken a lead and announced several incentives and tax breaks for the software sector. But, this is not enough. Many other measures are needed like establishment of an affordable communications infrastructure. There is still confusion about the new PTCL rates for higher bandwidths. Many of the policies and incentives still need to be translated into procedures that are easy to comprehend and follow. There is a need for a network of Pakistani universities similar to the one that US government established that led to the development of Internet. Loans for students, and new software startups are required. Alos, legislation for copyright and intellectual property protection is needed.

#### **Development of Domestic Software Industry**

Development of domestic software market is necessary. This could be done by preferring domestic vendors in Government outsourcing projects. Government as the largest user and purchaser of software can develop the domestic software sector by preferring local vendors in huge government outsourcing contracts. Or at least ensuring that enough training and experience opportunities are created for local software professionals.

#### **Utilization of Existing Resources**

Utilization of existing infrastructure available with many public sector corporations, government departments and research institutes for software exports. Big public corporations can make their IT Departments as standalone subsidiaries. Government research organizations like STDC, NIE, PCSIR should be encouraged to enter software related areas in training and development. Private businesses should also be encouraged to follow the footsteps of Atlas, Crescent and Lakson group of companies that have made their IT departments into standalone software houses.

## **4.2 Role of SW Houses**

It is important that software houses specialize into niche markets. Potential foreign customers are wary of claims by software houses that are ready to provide all kinds of services for all kinds of systems. Software houses must specialize in terms of the target hardware, operating system, and development environment. They should then build a base of satisfied customers. These customers would be the best marketing and promotion that a software house can have.

Software houses must ensure quality and standards. This is not possible without quality software specialists and professional management. Ensuring a steady stream of qualified personnel is very important given the fast turnover in the IT field. Furthermore, as software development is creative and intellectual enterprise professional management is needed to deal with the behavioral issues. IT specialists must be continuously trained so that they remain abreast of technology that is continually changing.

Continuous training in new tools and methodologies is required. A very important source for such experimentation and training is the domestic market. So, it is important that software houses should not ignore local market. It is also not easy to sell in the foreign market. Professional marketing approaches are required for stimulating new distribution channels, and developing new products, promotion and pricing strategies.

## **4.3 Role of Educational Institutions**

A software house requires personnel at different levels of expertise. First level is that of programmers that should primarily be produced by computer institutes that offer one to two year diploma programs. Second level is that of software engineers and analysts. These are produced by universities and institutes offering 3-4 year computer degree programs. The next higher level is that software project managers. They are typically computer scientists with 3-5 year experience or MBAs with specialization in MIS. Experience is typically obtained on job or from management institutes specializing in information sciences and software management. Educational institutions must, therefore, specialize and provide education and training according to the job market requirements for each level of expertise.

Universities must redesign the curriculum regularly according to the changing trends. They must consider affiliating other computer institutes for strengthening and improving their standards. The trainers have to be trained by qualified and experienced teachers. Research and development at the universities must focus on evaluation of new tools and methodologies. Universities can nurture software startups in incubators or nurseries where the startups are provided with professional advice and infrastructure facilities.

#### **4.4 Role of Marketers**

Software developers can acquire marketing expertise but it is better to have professional marketers. Responsibility of software marketers is to analyze software markets, identify new and potential segments, target niche markets, explore distribution channels, stimulate promising outlets, and establish personal contacts. They should develop strategies for personal selling, advertising and promotion of software. These are very different from strategies for traditional products and services.

Marketers would prepare, implement and experiment with different market entry strategies. They would develop collaborative strategies for adding new software features, developing new enhancements, coordinating with distribution channels, and other software houses.

#### **4.5 Role of Financiers, Bankers, Investors**

Committed investors are required who are prepared for the long haul. Investors must be willing to hire and retain professional management. This is very important because software development is done by humans not machines, and is, therefore, not predictable and varies with mood and time of day. Need for professional management is often paid lip service in Pakistan but in software business the revenues are directly linked with it.

Investment is required not only for setting up of the software houses but also for setting up of the educational institutions. Without proper educational institutions, software houses would be starved of qualified software personnel. Similarly, there is need for investing in the marketing companies in foreign countries that can handle the off-shore selling and distribution of software. Without proper marketing channels software houses will be stuck with excess capacity.

Financiers and bankers need to consider the issue of valuing intellectual property like software. This valuation is very different from financing plant and machinery. Therefore, financial instruments specialized for software market are needed.

Loans for software startups would take into account experience, skills set and potential of the software house unlike considerations for valuing plant, machinery, or land. Leasing for computer equipment is different because the rate of obsolescence is very high in the computer hardware. Insurance for software products is difficult because it is impossible to declare any piece of software as bug-free. Moreover, software may work absolutely faultlessly for several years but for that one in a billion or one in a trillion chance. Similarly, financial considerations for calculating and adjusting for royalties and licensing of software are very different from practices in other industries.

## 5. ROLE OF GOVERNMENT

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Source [Hyd97]

### 5.1 Create Favorable Environment

- Control Law and Order Situation
- Ensure Stable Currency and Economy
- Provide Reliable Utility Services

Frequent power breakdowns, wild power fluctuations add substantial overhead costs through purchase of UPS, stabilizers and generators not only for computers but for all other type of electrical appliances.

### 5.2 Establish Communications Infrastructure

- Establish Networking Infrastructure for Universities

Internet was first established among universities in USA. If we need to see a corresponding growth of research and education then provision of high bandwidth networking infrastructure for universities is essential.

- Make Communication Bandwidth Affordable

Currently, PTCL charges exorbitant rates for higher bandwidth Internet connections. A 64kbps connection in USA costs around \$400. Whereas the same connection in Pakistan used to cost \$8000. There are indications that the rates of 64kbps connection have been decreased to Rs. 25,000 per month by PTCL. However, ISP's are not passing these benefits on to the end-users. End-users are not allowed to get these rates from PTCL. Recently, IBA contacted several ISP's and the minimum cost of 33.6kbps connection from an ISP is costing Rs. 25,000 per month.

On the other hand, India has made available these connections cheaply to software houses. Any one desirous of these links can get them at a very cheap rate.

- Ensure Reliable Communications Infrastructure

Reliability of communications infrastructure is must for ensuring support and maintenance through Internet to foreign customers. If however, lines drop frequently, then this would not help.

### 5.3 Encourage Domestic Entrepreneurs

- Encourage organizations with large in-house software development infrastructure facilities to form standalone software houses.

- Utilize large infrastructure facilities of Government Research Departments as software teaching institutes or software houses.
- Use purchasing power of government to pull up domestic software sector. Through its computerization drive, government can create large software projects that would develop domestic software expertise.
- Develop domestic software sector through a judicious use of government software contracts in which local software companies are preferred over foreign firms that are not interested in developing domestic software development skills or infrastructure.
- Act as negotiator of reciprocal access to other markets.
- Enforce quality standards for Government purchases

Government can dictate standards for its software contracts as a huge customer. It can be instrumental in enforcing software quality standards and encouraging development of tools that measure software quality.

- Enforce general quality standards guidelines

These may be enforced through professional bodies or Software Export Board. A few bad quality software export projects can affect the entire software export initiative.

#### **5.4 Influence Universities and Boards of Education**

- Influence Boards of Education to create public awareness of computers through compulsory courses at matriculation and intermediate levels.
- Influence Boards of Technical Education to modify curriculum and exploit the infrastructure and training experience of hundreds of Petroman like computer institutes spread all over the country
- Redesigning curriculum of Petroman like institutes for producing programmer rather than data entry operators is a more cost effective measure than creating new institutions. This would provide a jump start to the programmer requirements of software export houses.
- Use standardized testing to ensure quality of software personnel produced by computer institutes.
- Use mandatory aptitude test for university admissions to ensure the quality of input.

#### **5.5 Provide Incentives and Regulation**

Several incentives have been announced in the budget for software sector. However, procedural difficulties still exist. They affect the efficacy of these incentives. There is no income tax on software exports. Duties have been

waived for importing equipment to be used for software exports. Educational institutions and software houses can both take advantage of this facility. Much more needs to be done, in particular the Government should:

- Frame regulations so that domestic market is not ignored by software exports.
- Offer incentives to businesses that get their software developed locally instead of outsourcing it to outside consultants.
- Provide incentives to businesses with large software departments to form standalone subsidiaries.
- Provide incentives to multinational IT vendors with large infrastructure facilities to establish software houses and offer complete solutions instead of dumping
- Back bank guarantees for startup capital.

## **5.6 Bring Together Major Players**

- Create forums where major players participate in policy making
- Need for alliances with other countries and professional associations like India NASSCOM's alliance under Ministry of Commerce, GoI NIESA (NASSCOM's India-Europe Software Alliance)
- Set up Technology Parks and provide facilities for bringing together all the major players.

## **6. ROLE OF SOFTWARE HOUSES**

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### **6.1 Preparing a Strategic Plan**

Source [Hyd4-97]

#### ***6.1.1 Develop Expertise in a Niche Area***

Software market is huge and diverse. Competing with large international software houses with years of experience and large resource base is unrealistic. It is necessary to develop expertise in a certain key area or niche not yet covered by these software giants. It is necessary to develop an area of specialty and plan for growth around it. As described in Section 0, there are various market segmentation strategies.

Niche area would consist of identifying one hardware platform, one operating system platform, and one database platform. Over such a hardware, operating system and database platform, software house should try to develop an application package targeting an un-exploited niche.

For example, Ace Aims selected Oracle DBMS over UNIX and developed a leasing application with a GUI front-end. It managed to sell this package to a number of local leasing companies and is now poised to export it. Similarly, it has developed an NT based Human Resource Maintenance and Management application in MS Access. It is sufficiently flexible to meet the requirements of most business firms. It is now able to sell this package to various clients within Pakistan and outside.

#### ***6.1.2 Build Satisfied Customer Base***

Establishing a track record of satisfying the customers is one of the best possible promotions for obtaining software contracts. A software house should not, therefore, ignore local software development projects. Domestic market should be used in developing a satisfied customer base. These satisfied customers can help the software houses by recommending them to their principals at their head offices or to their suppliers and customers abroad.

#### ***6.1.3 Adopt Quality Standards***

International market is extremely quality conscious. It is necessary to adopt quality standards early on. Software business thrives on good recommendations from existing customer base. There is a need for quality assurance and testing department.



### ***6.1.4 Improve Project Management Techniques***

Use project management tools that help in controlling costs and meeting deadlines.

Adopt proven software development methodologies. Software development is still an art. New development methodologies are building up on the experience gained through large projects and are incrementally formalizing the development processes. Adoption of such methodologies increases the predictability of completing the projects in time without cost overruns and delays.

### ***6.1.5 Identify Strategic Partners***

It is difficult to manage alone all the critical aspects of software exports. It is therefore necessary to build strategic partnerships to gain valuable experience and gain leverage in larger markets. Strategic partners include financiers and investors, marketers, educational institutes, government, and even other software firms specializing in some different niche. Several collaboration strategies are possible that are described in detail in [Hyd2-97]. Collaboration with educational institutions can guarantee supply of quality software professionals. Collaboration with financiers and investors can provide finances to establish presence in a foreign market. Collaboration with government can yield suitable environment and favorable duties structure and regulations. Collaboration with other software houses can complement needs for expertise in some critical areas. Collaboration with universities can yield better R&D at lower costs in new areas.

### ***6.1.6 Build Marketing Front-Office and a Distribution Channel***

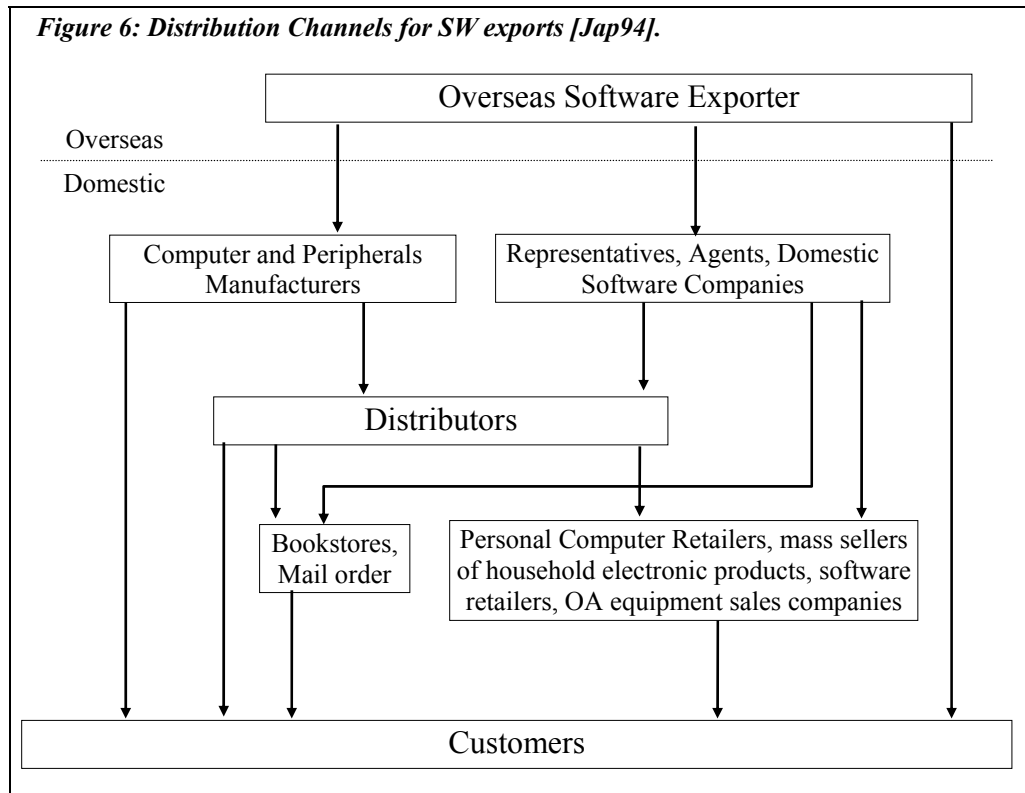
Most important link in the software exports is identification of the distribution channel and its stimulation. Figure 6 shows different types of distribution channels available to an overseas exporter in a potential market. The usefulness of a channel depends upon the type of software being exported. There is general purpose, packaged software that can be bundled with the computer and peripherals by the manufacturer. In rare cases the overseas exporter may be able to directly sell to a foreign customer.

The type of channel depends a great deal on the amount of customization needed to the software before implementation. Greater the customization greater the personal selling effort required.

Software development contracts are often awarded on the basis of personal contacts. Conventional channels like retail and other outlets are often not feasible unless sales are in large quantities for packaged software. This is typically not the case in niche markets and for software that requires detailed analysis and study of customer requirements. Thus, establishment of strategically placed promoters is often the more feasible distribution strategy.

There are various options:

1. Establish a subsidiary in the country to which software is to be exported. It



would represent the software exporter and would be responsible for marketing, sales and after sales support. It would also be responsible for modifying software according to the local requirements.

2. Enter into a sales agent contract with a native computer firm in the foreign country. Support marketing development of the firm. Support the firm technically with engineers, support persons and finances. Inability to support the firm may lead to failure.
3. The software house sends one or more sales representatives to the foreign country. It should then adequately support them. Lack of support of the representatives can result in failure.

## 6.2 Preparing Foreign Market Entry Plan

Source [Hyd3-97]

Following is a checklist of the activities to be considered in the preparation of a plan to enter market in a foreign country. The responsibilities and timings need to be specified for each of the activities given below. Reference [Jap94],[Aus96]

### **6.2.1 Preparation and Secondary Research**

- A. Consult PSEB, PASHA and other software associations
- B. Acquaint yourself with available export statistics from:
  - 1. Foreign country's government authorities
  - 2. Pakistani consulate or Trade commission in the country
  - 3. Manufacturers in the country you are planning to export
  - 4. Published sources
- C. Consult with other manufacturers and gain an understanding of their export experience
- D. Make inquiries with the Embassy, High Commission, or commercial representative of the country you are planning to export to
- E. Consult with banks that often have such information
- F. Contact expatriates

### **6.2.2 Primary Research**

- A. See if there are trade missions to the country being organized by the government. These may be very cost effective for initiating a presence in the market.
- B. Plan a visit to establish contacts and to gain an initial understanding
- C. Try to establish contacts with
  - 1. Typical, potential purchasers of your product
    - a) Retailers
    - b) Wholesalers
    - c) Distributors
    - d) Consumers
  - 2. Commission agents
  - 3. Custom agents
  - 4. Industry associations (importers, retailers etc.)
  - 5. Large retail chains

### **6.2.3 Identify Sector and Focus**

Select the market niche on the basis of the above research

- A. Identify Potential Customers: Target Market

1. Establish clearly who they are: Retailers, wholesalers, manufacturers...
  2. What are their needs (cheapness, reliability, small lots, etc.)
  3. What prices they currently pay and on what terms
  4. What would be the channel of distribution and support
- B. Identify source of Competitive Advantage
1. What is the advantage of your software over the software available in their local market
  2. Price
  3. Unique design
  4. Specific requirements
  5. Reliability
  6. Support
- C. Timing
1. When can your exports commence and in what volumes
  2. Assurance about time and cost commitments
- D. Cost: In addition to the usual freight, cartage, travel, commissions, duties costs there are other hidden costs:
- a) Working capital increases
  - b) Trial and sampling costs; test installations, demos
  - c) Costs of product development, customizations and incorporating specific user requirements
  - d) Extra staff; support and sales management
  - e) Insurance
  - f) Financing charges
- E. Financial Risks
1. Exchange rate movements
  2. Shipping delays

#### ***6.2.4 Management of Foreign Customer***

- A. Who will do the selling
- B. Stimulating contacts
- C. Finalizing contracts

- D. Relationship management
- E. Customer service and support
- F. Patches and new version installations
- G. Coordination with home-office
- H. Cost overruns

### ***6.2.5 Country Specific Regulations and Requirements***

It is important for the exporter to obtain information about the rules and regulations prevailing in the country before making a sale. Ignoring these details may jeopardize potential sales and leave the exporter susceptible to litigation and suits. Following are some of the important points to be considered:

- A. Import barriers
  - 1. Approval or permission required for software imports
  - 2. Import duties
  - 3. Quotas
  - 4. Restrictions
    - a) Hardware
    - b) Software
    - c) Packing material (pallets, crates, etc.)
- B. Documentation Requirements
  - 1. Notification of contract. If a local company signs a contract with an exporter, it may be necessary to notify the relevant authorities about the conclusion of the contract. For example, Ministry of Finance, Ministry of Trade and Industries, and Fair Trade Commission in Japan must be notified of any conclusion of contract with a Japanese company.
  - 2. Invoice
  - 3. Certificate of insurance
  - 4. Bill of lading
  - 5. Quarantine treatment certificates (if applicable)
  - 6. Packing list
- C. Standards
  - 1. Contact Standards Organization and boards and other regulatory agencies and obtain information about the standards requirements:
  - 2. Design codes which specify principles of safe design

3. Technical specifications; which describe the requirements the product must meet to in order to safely perform a defined function
4. Regulations which specify methods of testing
5. Guides, which consist of advisory, rather than compulsory specifications
6. Codes of practice, which specify the rules governing safe and effective performance of task
7. Quality standards, which specify overall management of an organization's activities in accordance with the principles of Total Quality Management (TQM)

D. Packaging and labeling

1. Clearly marked address and country of origin
2. Clearly marked address of agent
3. Description of goods be clearly documented
4. Hardware and other operational specifications
5. Consider regulation before putting "green" or "recyclable" labeling
6. Disclaimers or other regulation related information.

E. Sales Tax

1. At which price (Wholesale, retail, list, etc.)
2. Federal, state, city
3. Imported or local products

F. Conditions and Warranties

1. Conditions are major terms of contract
2. Warranties are minor terms of contract
3. Mercantile Quality: Basic level of quality and performance is expected in accordance with the price paid and the description of goods. Customers may be entitled to refund if the goods are not of merchantable quality.
4. Fit for Purpose: Goods must be fit for the purpose described by a customer at the time for purchase
5. Match any description or sample given to customer: Goods must be what they were described as and according to the supplied samples.
6. Warranties or guarantees or any claims about the quality, performance, or characteristics of goods made in writing, in advertising, or by sales staff must be backed up.

7. Reasonable supply of spare parts or repair facilities are available for goods that normally require them. If these are not provided or available the customers must be clearly informed of the fact before the sales

G. Licensing Arrangements

1. Percentage share of the total selling price
2. Number of users
3. Some other quantitative measure

H. Copyright

1. Copyright protection may be automatic and may commence when the program is completed.
2. Distribution may also be covered by the copyright laws
3. Parallel imports may also be governed by the law. These are imports of copyright (that is non-pirated software) other than by the licensed distributor. It may be allowed for individuals bringing in for their own personal use.

I. Advertising and Promotion Regulations: Making false or misleading representation and claims about the following are often regulated:

1. Particular standard, quality, value, grade, composition, style or model
2. Goods are new or refurbished
3. Prices of goods
4. Availability of repair facilities or of spare parts for goods
5. Place of origin of goods
6. Existence, exclusion, or effect of any condition, warranty, guarantee, right or remedy

## **7. ROLE OF MARKETERS**

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Marketing professionals have a very important role to play as a marketing front-office for the software developers. This includes identification of distribution channels, development of product features and innovations based on market research, program testing and verification, documentation, packaging, and product adaptation services.

### **7.1 Segmentation Strategies: Selecting a Niche**

A software house may segment the software market across various dimensions and also a combination of those. Segmentation may be according to the type of software application, type of platform, type of service, type of customer and industry and the geographical area. Actually, many of these are independent dimensions, so the targeted segment should include where actually the software house is going to position itself in terms of all of the following. The possibilities in each one of these dimensions are outlined below:

#### **7.1.1 Types of software**

1. Systems Applications
  - a) Device drivers
  - b) Interfaces
  - c) Utilities
2. Functional Applications
  - a) Accounting
  - b) Finance
  - c) Marketing
  - d) Manufacturing
  - e) Human Resource
3. Complexity of decision making support
  - a) Transaction Processing Systems
  - b) Reporting/Analysis Systems
  - c) Decision Support Systems
  - d) Expert Systems
  - e) Executive Information System
4. Nature of Analysis



- a) Multidimensional analysis
  - b) Data-warehousing
  - c) Data mining
  - d) Drill-down
  - e) Geographical
5. Off-the-Shelf Packages
- a) Top of the line
  - b) Mid-range
  - c) Low-end
  - d) Back-Office vs. Front-Office

### ***7.1.2 Types of Services***

- 1. Data-entry
- 2. Contract Programming
- 3. Requirements analysis and design
- 4. Software Engineering
- 5. Project Management
- 6. Business Process Re-engineering, Business Process Redesign
- 7. Education and Training
- 8. Ongoing systems support and maintenance

### ***7.1.3 Types of customer industry***

- 1. Banking
- 2. Insurance
- 3. Leasing
- 4. Trading
- 5. Manufacturing
- 6. Retail
- 7. Distribution
- 8. Transportation
- 9. Telecommunications
- 10. Government
- 11. Legal

12. Mining
13. Financial services
14. Defense

#### ***7.1.4 Types of platform***

1. HW
  - a) IBM large and midrange
  - b) AS/400
  - c) RISC: Sparc, HP, Power PC
  - d) PC
  - e) DEC, UniSys
2. OS
  - a) Unix
  - b) OS/400
  - c) MVS
  - d) Windows NT
  - e) Novell Netware
  - f) Windows 3.x, 95
3. DB
  - a) Oracle
  - b) Informix
  - c) Sybase
  - d) Foxpro
  - e) Access
  - f) Delphi
4. Client/server
  - a) Front-end GUI
    - (1) Access
    - (2) Delphi
    - (3) Visual Age
    - (4) Visual Basic
    - (5) Visual Foxpro

- (6) Foxpro/Dbase
- (7) Visual C++
- (8) Java
- b) Back-end DBMS
  - (1) Oracle
  - (2) Informix
  - (3) Sybase
  - (4) Foxpro
  - (5) DB/2
- 5. Distributed
  - a) CORBA
  - b) ActiveX
  - c) DCOM
- 6. Web
  - a) Java
  - b) Intranets
  - c) Internets

### ***7.1.5 Tools***

- 1. Front-end tools
- 2. Analysis tools
- 3. Y2K Problem Resolution Tools
- 4. Utilities
- 5. Performance Monitoring tools
- 6. Development tools and environments
- 7. Process modeling and redesign tools
- 8. Upper CASE
- 9. Lower CASE
- 10. DSS Tools
- 11. Visual Tools

## 7.2 Software Market Trends

### 7.2.1 *Trend towards Off-the-Shelf Packages, shrink-wrap software*

IDC estimated in 1988, packages market

\$47.2bn for PCs

\$29bn for large systems

\$22bn for mid range systems

Specialized for Niche Markets

Adding new features, further specializing to customer requirements

Offer economies of scale. Reduced risk for customers. Customized development is high risk and may involve scarce resources.

Accounts for 40% of revenues.

Despite generalization of hardware and software, software market is becoming more specialized by end-user sectors.

Drive to commercialize software developed for vertical markets.

As opposed to customized development

### 7.2.2 *Importance of Market for Systems Integration Services*

Provides key skills. Top 10 firms in US account for two-thirds of US software market. Important in the long run

Project management

Requirements analysis and design

Contract programming

Subsystem integration

Education and training

Ongoing systems support and maintenance

Develop Market Segmentation Strategies

Develop Promotion and Advertising Strategies

Stimulate Distribution Channels

## **8. ROLE OF EDUCATIONAL INSTITUTIONS**

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Software sector is labor intensive. Its development requires abundant availability of qualified software professionals. Education and training of these professionals requires efforts at various levels. Proposed actions are ordered in an increasing level of technical and business expertise of software personnel.

### **Computer Aware Public**

- Introduce compulsory basic computer course at Matriculation and Inter levels.
- Computer courses may be made pre-requisite for university admissions.
- Encourage television media to offer computer training programs.

### **Programmers**

- Redesign curriculum of Boards of Technical Education. There are several hundred computer institutes affiliated with these boards. Utilizing infrastructure and experience of these institutes is more cost and time effective than setting up new institutes.
- Ensure quality of these computer institutes through standardized testing.
- Encourage universities to offer various shorter programs like ALCOE.

### **System Analysts and Software Engineers**

- Redesign curriculum of computer departments of universities.
- Encourage private computer institutes to get affiliated with the universities.
- Increase collaboration among universities and software houses.
- Ensure quality of input in universities through admission tests.

### **Project Managers and Consultants**

- Government should prefer local software companies for software contracts. As a large customer, government can ensure that enough training opportunities are generated for local personnel through its computerization projects.
- Priority may first be given to local software vendors. If local software houses do not have sufficient experience, only then projects may be given to foreign consultants. But, they may be asked to display long term interest in developing local software industry, to keep some minimum number of local experts, and to sub contract locally where ever possible.
- Enforce quality standards for software projects as international market is extremely quality conscious.

## Software Entrepreneurs

Producing of entrepreneurs is more a function of favorable government policies than any education or training.

- Government’s drive to accelerate computerization of its departments would create growth of domestic software houses.
- Exploit large in-house software development facilities of organizations in public and private sector as standalone subsidiaries and software houses.
- Utilize infrastructure facilities of various research departments like NIE and STDC and PCSIR as software houses or computer training institutes.
- Encourage multinational IT Vendors to establish software houses and provide complete hardware and software solutions. These vendors have often been criticized for “hardware dumping”.
- Offer incentives to businesses to get their software developed locally
- Establish Incubators for Startups. Universities may form nurseries where software startups share overhead facilities and expertise until they learn to be independent.

### 8.1 Education & Training at various expertise levels

Software sector is labor intensive unlike other sectors of economy that are capital intensive. Development of software sector therefore requires abundant availability of qualified software professionals. Thus, education and training of software personnel is one of the most crucial success factors in boosting software exports.

Education and training requirements of software personnel are often specified at various levels of expertise needed for different software projects. Organized in an increasing level of technical expertise, these requirements may be summarized as:

| Expertise Level                         | Responsibility  | Major Skills and Requirements  |
|---|---|--|
| Computer Aware Public                   | Matric and Inter Boards of Education                            | Computer concepts, exposure, trends  |
| Programmers                             | Boards of Technical Education, one to two year diploma programs | Computer languages, database, 4GL, object oriented and web environments    |
| Systems Analysts and Software Engineers | Universities. Three to four year degree programs                | Analysis, design, modeling, programming. Algorithmic and conceptual skills |
| Project Managers and Consultants        | Government. MBA/MIS programs of universities                    | Experience of working on large software projects as team member and leader |
| Software                                | Government.   | Understanding of computer trends,  |

|               |  |                                       |
|---------------|--|---------------------------------------|
| Entrepreneurs |  | capital, management, marketing skills |
|---------------|--|---------------------------------------|

### **8.1.1 Computer Aware Public**

Software sector thrives in an environment where there is general awareness and interest about computer applications in daily life. It is important to spread this awareness and interest in public in order to produce a conducive environment for the development of software sector.

#### **Responsibility:**

Matriculation and Intermediate Boards of Education for schools and colleges

Print and television media

#### **Skills Required:**

- Basic computer concepts
- Exposure to computers

#### **Proposed Actions:**

1. Introduce compulsory basic computer course at Matric and Inter levels through their respective boards.
2. If offering of computer courses at school and university level is deemed too resource intensive, then having a certificate from a registered computer institute may be made pre-requisite for university admissions.
3. Encourage television media to offer computer orientation and training programs.
4. Encourage academics to write in the print media and increase awareness.

#### **Data Entry Personnel**

Data entry personnel require little technical expertise. Personnel with some knowledge of English can be trained in a few weeks for data entry operations. Pakistan has a large number of personnel available that meet the basic requirements for data entry. There are many computer institutes that train students for data entry operations.

Availability of data entry personnel indicates that data-entry projects are suitable for entering the international software market.

### **8.1.2 Programmers**

Programmers require greater technical expertise than data entry operators. It takes about one to two years to produce programmers with skills needed for software exports. Those trained should have basic verbal and analytical skills.

## **Responsibility**

Boards of technical education. There are several hundred computer institutes that are affiliated with these boards of technical education.

Computer institutes offering diplomas of one to two years.

## **Skill and Requirements**

- Programming languages and environments  
Procedural, visual, object oriented, 4GL, Web based
- Databases, Networking, Operating systems

## **Proposed Actions**

1. Redesign curriculum of Boards of Technical Education. Curriculum requires software export orientation. Sindh alone has about 180 computer institutes affiliated with these boards. They have sufficient infrastructure and training experience. Encouraging these institutes to produce programmers for software export is one of the quickest way to jump start education and training for programmers. It may be quicker than setting up new institutions.
2. Ensure quality of personnel produced by these computer institutes through standardized testing.
3. Encourage universities to offer shorter up to two year programs like ALCOE for preparing programmers for software export.

### ***8.1.3 System Analysts and Software Engineers***

System analysts and software engineers require greater technical expertise than simple programmers. Preparing them requires extensive training spanning over three to four years. Personnel with creativity and basic programming skills, are trained in analysis, design and implementation of systems. Technical know how of both business and information technologies is imparted.

## **Responsibility**

Universities

Computer institutes offering three to four year programs

Software houses

## **Requirements and Skills**

- Programming skills
- Analysis and design skills
- Experience of programming in real projects, knowledge of business systems
- Information technologies, operating systems, databases, and networking
- Analytic and algorithmic skills



## **Proposed Actions**

1. Redesign curriculum of computer departments of universities in view of software export requirements
2. Encourage private computer institutes offering 3-4 year programs to get affiliated with the universities.
3. Encourage computer departments to collaborate with software houses and businesses for making the students work on real life projects.
4. Ensure quality of input in universities through admission tests. Intermediate boards have failed to ensure quality. Aptitude tests would ensure that only capable students enter universities.

### ***8.1.4 Project Mangers and Consultants***

Project managers and consultants need to have experience of managing and working on large software projects. They typically get education and training on job. This is dependent on getting opportunities to work on large projects. In Pakistan, large software projects are rare and often Government sponsored. For example, computerization of CBR, AGPR, Courts and State Bank are multi-million dollars projects. Such large projects often go to foreign consulting firms that may not be interested in developing domestic software development skills or infrastructure.

#### **Responsibility**

Government as one of the most powerful buyer of software systems.

Software Houses, Universities

#### **Skills and Requirements**

- Management experience
- Experience as system analyst or software engineer.
- Experience of working on large computerization projects.

#### **Proposed Actions**

1. Government should prefer local software companies for software contracts.

As major customer of large software projects, government can ensure that enough training opportunities are generated for local personnel through these projects. With its purchasing power, it can dictate the terms on which it will buy from software vendors. Various options may be considered:

- i. First priority may be given to local software vendors.
- ii. If local software houses do not have sufficient experience, only then projects may be given to foreign consultants. But, they may be asked:

To display long term interest in developing local software industry.

To keep some minimum number of local experts.

To sub contract locally where ever possible.

iii. Government can specify as Brazil did with much success, priority levels for bidders depending upon their domestic orientation. Level 1 may be wholly domestic firms, level 2 may be partially locally owned firms. Level 3 may be a wholly foreign concern.

2. Universities should offer special software project management courses
3. Enforce quality standards for software projects. International market is extremely quality conscious. Government can dictate standards for its software contracts. In fact, Department of Defense in United States being a huge customer has been instrumental in enforcing software quality standards and encouraging development of tools that measure software quality. Similarly, Pakistan government can encourage standardization through the use of its buying power.

### ***8.1.5 Software Entrepreneurs***

Producing of entrepreneurs is more a function of favorable government policies than any education or training. Software entrepreneurs thrive where there is a suitable environment with infrastructure facilities, responsive capital markets, and adequate human resources.

#### **Responsibility**

Government, Financial institutions, Universities

#### **Proposed Actions**

1. Government's drive to accelerate computerization of its departments would create growth of domestic software houses. In fact, US government with its huge purchasing power often influences growth of selected sectors. Likewise, Pakistan government by continuing its drive for computerization would generate development of domestic facilities that may be used as a launching pad for global business operations. Experience of Brazil indicates suggests this trend for development of domestic software sector.

2. Exploit large In-house software development facilities

Various public and private sector organizations have large in-house software departments. They can be influenced through suitable policies to form standalone subsidiaries which can then participate in software exports. For example, Crescent group of companies transformed its IT department into a standalone subsidiary which is now among the leading software exporters.

3. Utilize research departments as software houses or training institutes.

Various institutes setup in government sector like National Institute of Electronics (NIE), Silicon Technology Development Center (STDC), PCSIR and others have

large infrastructure facilities. These facilities may be utilized as software houses, or indirectly as software training institutes.

4. Design of new financial instruments for enabling loans and credit line to software houses keeping in view that the basis of collateral in software sector is much different from other capital intensive sectors where one can mortgage plant and machinery. However, in software sector, there is only intellectual capital in the form of skills and experience and mostly some developed software.
5. Encourage multinational IT Vendors to establish software houses

Multinational hardware vendors have often been criticized for “hardware dumping” where lots of computer hardware was sold without ensuring the availability of suitable software. These multinationals may be asked to form their own software houses and develop complete solutions rather than just dumping hardware.

6. Offer incentives to businesses to get their software developed locally

There seems to be an emerging trend among multinationals in Pakistan to get their software from abroad. They could be encouraged to have locally developed software. If they are buying packaged software like SAP from outside, then they may be asked to facilitate setting up of its local dealership and training centers.

## **8.2 Role of Universities**

### ***8.2.1 Offer Software Export Oriented Programs***

- Offer short courses either directly or through affiliates
- Offer 1-2 years programming intensive diploma programs either directly or through affiliates
- Redesign curriculum of degree programs of computer departments according to software market requirements

### ***8.2.2 Research Software Opportunities***

- Identify target software markets
- Develop software promotion and advertising strategies
- Identify software distribution channels
- Identify effective software tools and technologies
- Identify effective software development methodologies

### ***8.2.3 Influence affiliated institutions to focus on software exports***

- Formalize affiliation procedures
- Encourage computer institutes that meet the criteria to affiliate
- Redesign curriculum of affiliated institutions

### ***8.2.4 Facilitate Networking Among Major Players***

Bring together major players like government, financiers, marketers, software houses to discuss issues and opportunities through seminars, conferences, journals and magazines.

### ***8.2.5 Establish Incubators for Startups***

Universities may form nurseries where software startups share overhead facilities and expertise until they learn to be independent. Startups would share office space, secretarial staff, meeting rooms, finance and marketing experts and so on. They may use the name and institutional image of the university till such time that they graduate.

### ***8.2.6 Develop Software through subsidiaries***

The number of software specialists is currently not enough in the country. Universities may consider utilizing their infrastructure and faculty resources in a side business of exporting software. Universities may set up subsidiaries for developing and exporting software.

## **9. ROLE OF FINANCIERS**

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Recognition of software sector as being labor not capital intensive requires a fundamental shift in the way a software firm may be valued by a financial institution.

### **9.1 Understand Peculiarities of Software Industry**

Conventional basis of valuation that take into account existence of physical plants and machinery are not applicable. New methods for valuing intellectual capital in the form of skills and experience of software personnel are required.

### **9.2 Develop New Financial Instruments**

Financial instruments like credit, leasing, insurance policies need to be specifically designed keeping in view peculiarities of software sector.

### **9.3 Develop Criteria for Software Loans**

Recently, Systems (Pvt.) Limited has succeeded in obtaining loans from financial institutions [Dawn Sep-Oct 1997]. Other financial institutions are also studying the feasibility and the type of relationships they can establish with the software houses. Criteria on which loans may be given to startups and expanding software houses need to be developed keeping in view the peculiarity of the software sector.

### **9.4 Stimulate Venture Capitalists**

Venture capitalists need to be informed about the business opportunities in software sector. They need to be educated about the risks and profit expectations. With this understanding, venture capitalists may be stimulated to put in money.

## 10. CASE STUDY: SOFTWARE INDUSTRY IN PAKISTAN\*

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*\* Following research was conducted and reported by MBA (MIS) students Mr.Ahsan Khalid Mirza and Mr. Muhammed Shahzad Khalid under the supervision of Dr. Syed Irfan Hyder as a partial requirement for the course MBR in Fall '97.*

The objective of this research was to generate the information regarding the Pakistani Software Houses in the following areas:

- The number of personnel and their skills.
- The major business line ( the field of specialization).
- Their development methodology.
- Information about their infrastructure.
- Problem they are facing in development and export.

### 10.1 Employee Information

Programmers are the backbone of the software industry, their educational background and experience has a direct bearing on a firm's performance and software development capabilities. In our analysis MBA stands for Master of Business Administration. MCS stands for Master of Computer Science or equivalent. BCS stands for Bachelor of Computer Science or equivalent

Our observations and analysis resulted in the following information:

Of total 388 programmers working in 25 software houses 9 are MBA degree-holders, 124 have their degrees in BCS, 60 are MCS degree-holders, 64 are diploma holders and 31 personnel have qualifications other than these. Others category includes simple graduation or inter etc. The overall average experience came out to be 2 years and more.

Of total 109 analysts, 16 are MBAs, 36 are BCS degree-holders, 45 are MCS, 12 have Diplomas in Computer Studies with an overall average experience of 5 years and more.

Of 50 Project Managers 13 are MBAs , 2 are BCS, 27 are MCS, 8 are Diploma holders. Their overall average experience is 8 + years.

Other managers are in total 53 in number, of them 15 are MBAs , 2 are BCS, 3 are MCS, 3 are Diploma Holders and 30 of them fall into "Others" category. The overall experience for this category of employees is 10 + years.

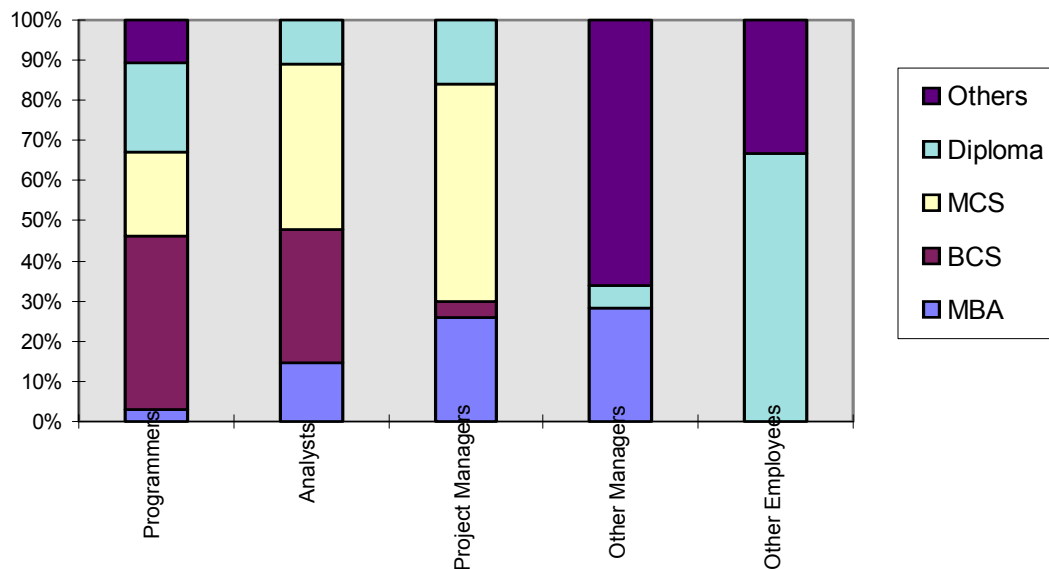
Other Employees are 285 in number, of these 190 are diploma-holders and 95 are Others.

The information in Tabular form is shown in table , graphically it is presented in figures below

### Total Employees and their educational background

| EMPLOYEES' INFORMATION |     |     |     |         |        |            |
|------------------------|-----|-----|-----|---------|--------|------------|
| Rank                   | MBA | BCS | MCS | Diploma | Others | Experience |
| Programmers            | 9   | 124 | 60  | 64      | 31     | 2 +        |
| Analysts               | 16  | 36  | 45  | 12      | 0      | 5 +        |
| Project Managers       | 13  | 2   | 27  | 8       | 0      | 8 +        |
| Other Managers         | 15  | 0   | 0   | 3       | 35     | 10+        |
| Other Employees        |     | 0   | 0   | 190     | 95     |            |

### Employees



## 10.2 Applications Developed For Different Industries

The rationale behind this question was to find out the fields in which different firms specialise as well as to get to know about the sectors which are turning towards the computerisation of their activities. Following is the analysis of the responses received.

### 10.2.1 Financial Services

In all 31 responses were received from software houses that have developed applications in financial services. Their break-up is as under.

|                      | Number |
|----------------------|--------|
| Σ Financial Services |        |
| Σ Bank               | 12     |
| Σ Leasing Companies  | 4      |

|                       |    |
|-----------------------|----|
| ✓ Insurance Companies | 9  |
| ✓ Others              | 6  |
| Total                 | 31 |

### **10.2.2 Manufacturing**

We received 49 responses who develop applications for Manufacturing. Here is their break up.

|                        |    |
|------------------------|----|
|                        |    |
| <b>✓ Manufacturing</b> | 13 |
| ✓ Sugar                | 5  |
| ✓ Cement               | 2  |
| ✓ Textile              | 11 |
| ✓ Food/Beverages       | 8  |
| ✓ Others               | 10 |
| Total                  | 49 |

### **10.2.3 Other Industries**

The industries other than those of financial services and manufacturing sector have been classified under the title of other industries. Their break-up too can be seen in table .

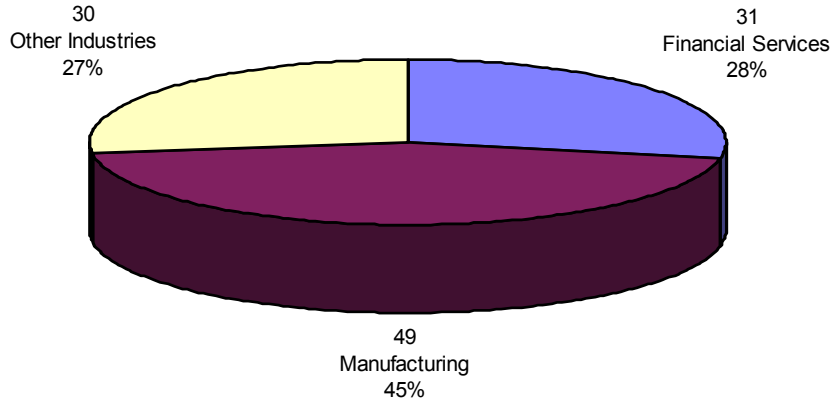
|                          |    |
|--------------------------|----|
| <b>Other Industries</b>  |    |
| ✓ Trading Companies      | 5  |
| ✓ Distribution Companies | 4  |
| ✓ Fuel / Energy          | 4  |
| ✓ Transport              | 5  |
| ✓ Communication          | 3  |
| ✓ Others                 | 9  |
| Total                    | 30 |

At a macro level the break-up of these industries is shown in table and their graphical depiction can be seen in figure shown below.

|                           |    |        |
|---------------------------|----|--------|
| <b>Totals</b>             |    |        |
| <b>Financial Services</b> | 31 | 28.18% |
| <b>Manufacturing</b>      | 49 | 44.55% |
| <b>Other Industries</b>   | 30 | 27.27% |



### Industries



### 10.3 Classification Of Applications On Functional Basis

The reason for including this question in the questionnaire was quite similar to that of the previous one, that is to find out the functional areas of specialisation and further more to know which functional areas are more computerised than others.

The overall break-up of Marketing, Operations, Accounting / Finance, Human Resource and Executive Information Systems is presented in table and in figure, graphically.

| Totals                              |        |    |
|-------------------------------------|--------|----|
| <b>Marketing:</b>                   | 18.89% | 17 |
| <b>Operation:</b>                   | 25.56% | 23 |
| <b>Accounting / Finance</b>         | 18.89% | 17 |
| <b>Human Resources</b>              | 32.22% | 29 |
| <b>Executive Information System</b> | 4.44%  | 4  |

Following is the analysis of the responses

#### 10.3.1 Marketing

In all 17 responses were received who develop applications for marketing. Their break-up is as under.

| <b>5 No of applications developed in:</b> |   |
|---|---|
| <b>Marketing:</b>                         |   |
| Sales Analysis                            | 4 |
| Pricing Analysis                          | 4 |
| Sales Forecasting                         | 4 |

|        |    |
|--------|----|
| Others | 5  |
| Total  | 17 |

### ***10.3.2 Operations***

In all 23 responses were received who develop applications for operations. Their break-up can be seen in the following table .

|                        |    |
|------------------------|----|
| <b>Operation:</b>      |    |
| Sales Order Processing | 3  |
| General Ledger         | 5  |
| Inventory              | 4  |
| Accounts Payable       | 4  |
| Accounts Receivable    | 4  |
| Costing                | 3  |
| Total                  | 23 |

### ***10.3.3 Accounting / Finance***

The applications related to Funds Management, Cash Flow analysis, Budgeting and the like have been classified under the title of Accounting and Finance. Their break-up too can be seen in table.

|                             |    |
|-----------------------------|----|
| <b>Accounting / Finance</b> |    |
| Funds Management            | 4  |
| Cash flow Analysis          | 2  |
| Budgeting                   | 4  |
| Others                      | 7  |
| Total                       | 17 |

### ***10.3.4 Human Resources***

In all 29 responses were received who develop applications for Human Resource departments of various firms and factories. Their break-up can be seen in table .

|                        |    |
|------------------------|----|
| <b>Human Resources</b> |    |
| Payroll                | 14 |
| Others                 | 15 |
| Total                  | 29 |

### ***10.3.5 Executive Information System***

Although executive information systems are quite important for assisting the executives in their decision making, however, there are only 4 respondents who develop EIS.

|                                     |          |
|-------------------------------------|----------|
| <b>Executive Information System</b> | <b>4</b> |
|-------------------------------------|----------|

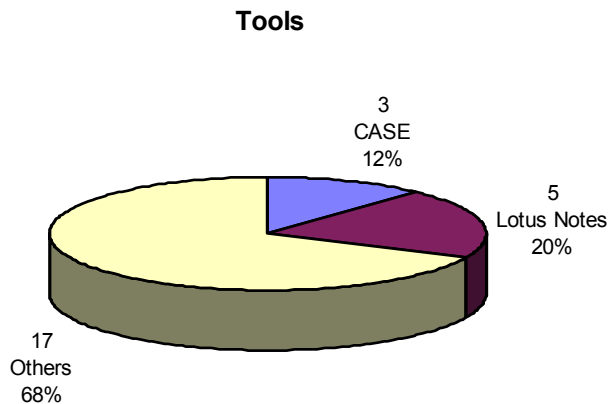
## 10.4 Development Environments

The purpose behind the inclusion of these questions was to discover the major tools, languages, databases and environments in which most of the applications are developed or the projects are designed.

### 10.4.1 Tools

Of 25 responses, 3 use CASE tools, 5 Lotus Notes and 17 use tools other than these two.

| 7 Indicate the number of projects developed in the following: |    |         |
|---|----|---------|
| Tools   |    |         |
| CASE  | 3  | 12.00%  |
| Lotus Notes   | 5  | 20.00%  |
| Others  | 17 | 68.00%  |
| Total   | 25 | 100.00% |

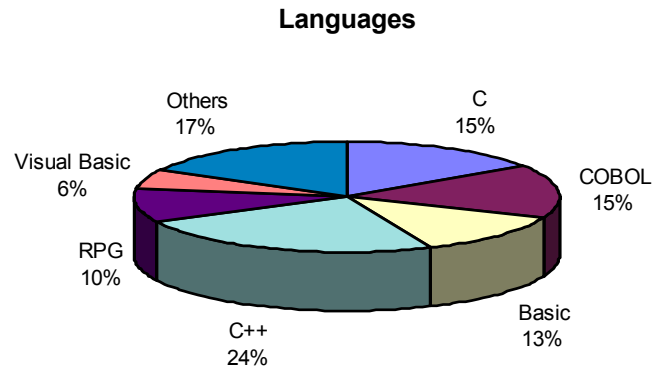


### 10.4.2 Languages

Of 71 responses, 11 use C, 11 use Cobol, 9 use Basic, 17 use C++, 7 use RPG, 4 use Visual basic and 12 use the languages other than these six languages

| Languages |    |        |
|-----------|----|--------|
| C         | 11 | 15.49% |

|              |    |         |
|--------------|----|---------|
| COBOL        | 11 | 15.49%  |
| Basic        | 9  | 12.68%  |
| C++          | 17 | 23.94%  |
| RPG          | 7  | 9.86%   |
| Visual Basic | 4  | 5.63%   |
| Others       | 12 | 16.90%  |
| Total        | 71 | 100.00% |

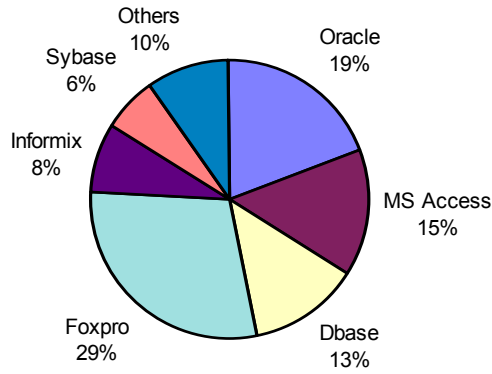


### 10.4.3 Databases

Of total 62 responses 12 develop in Oracle, 9 in MS Access, 8 in Dbase, 18 in Foxpro, 5 in Informix, 4 in Sybase and 6 in databases other than those mentioned earlier.

Their break-up can be seen in Table , and figure .

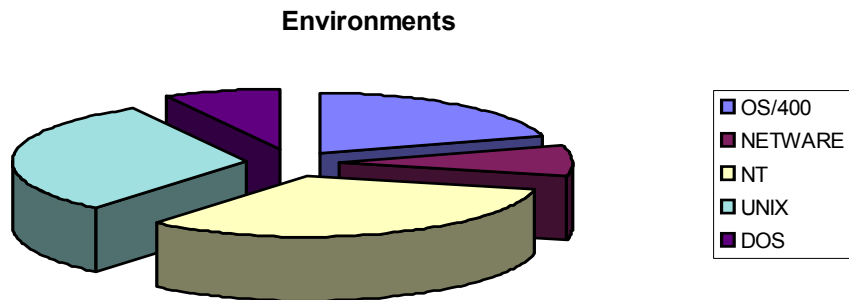
| <b>Databases</b> |    |         |
|------------------|----|---------|
| Oracle           | 12 | 19.35%  |
| MS Access        | 9  | 14.52%  |
| Dbase            | 8  | 12.90%  |
| Foxpro           | 18 | 29.03%  |
| Informix         | 5  | 8.06%   |
| Sybase           | 4  | 6.45%   |
| Others           | 6  | 9.68%   |
| Total            | 62 | 100.00% |



#### 10.4.4 Environments

Of total 49 responses 10 develop in OS/400, 4 in Netware, 16 in Windows NT, 15 in UNIX and 4 in DOS.

| 8 Number of applications developed in following Environments: |    |         |
|---|----|---------|
| OS/400  | 10 | 20.41%  |
| NETWARE   | 4  | 8.16%   |
| NT  | 16 | 32.65%  |
| UNIX  | 15 | 30.61%  |
| DOS   | 4  | 8.16%   |
| Total   | 49 | 100.00% |



## 10.5 Software Projects

Questions like, “the time it takes to complete a project(on average)” and “the number of projects completed in a year” were put forward to the respondents to judge their development capabilities as well as to ascertain the size of the business they are getting.

The analysis of these two questions resulted in the following data:

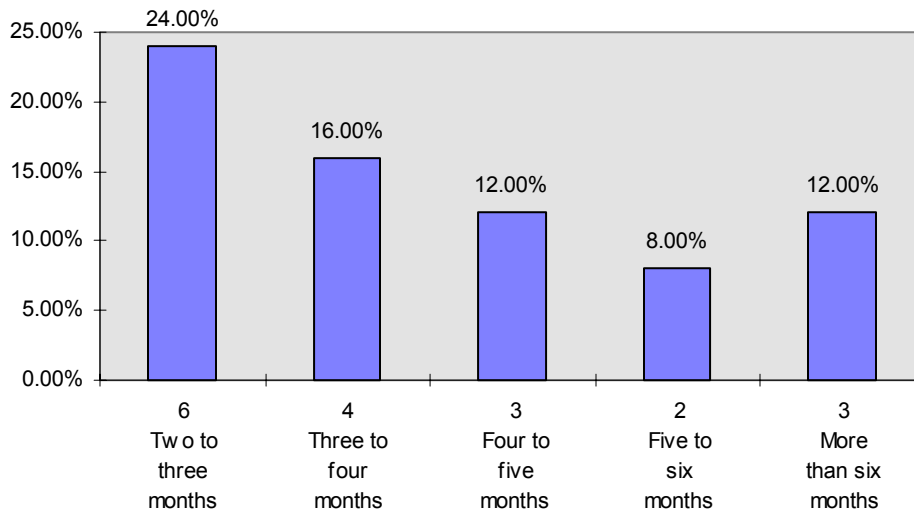
28 percent of the projects are completed in less than two months, 24 percent of the projects took two to three months, 16 percent of the projects are completed in three to four months, 12 percent took four to five months, 8 percent took five to six months and 12 percent took more than six months to complete a project.

Regarding the number of projects completed in a year, 84 % of the companies complete less than 10 projects in year, 16 % of the companies complete ten to twenty projects and none of the companies completes more than twenty projects in a year.

The tabular and graphical representations of time taken to complete a project and those of average no. of projects completed in a year are shown in the following tables and figures.

| <b>How long does it take to complete a project ( on avg.)</b> |               |             |
|---|---------------|-------------|
| <b>Time</b>   | <b>Number</b> |             |
| Less than two months  | 7             | 28.00%      |
| Two to three months   | 6             | 24.00%      |
| Three to four months  | 4             | 16.00%      |
| Four to five months   | 3             | 12.00%      |
| Five to six months  | 2             | 8.00%       |
| More than six months  | 3             | 12.00%      |
| Total   | 25            | 100.00<br>% |

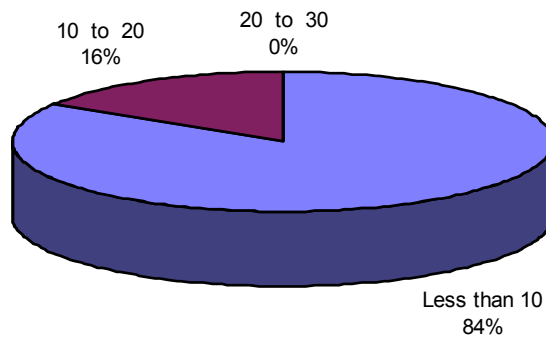
### Time



### 10 How many projects are completed in a year (on avg)

|              |         |    |
|--------------|---------|----|
| Less than 10 | 84.00%  | 21 |
| 10 to 20     | 16.00%  | 4  |
| 20 to 30     | 0.00%   | 0  |
| Total        | 100.00% | 25 |

### No of Projects



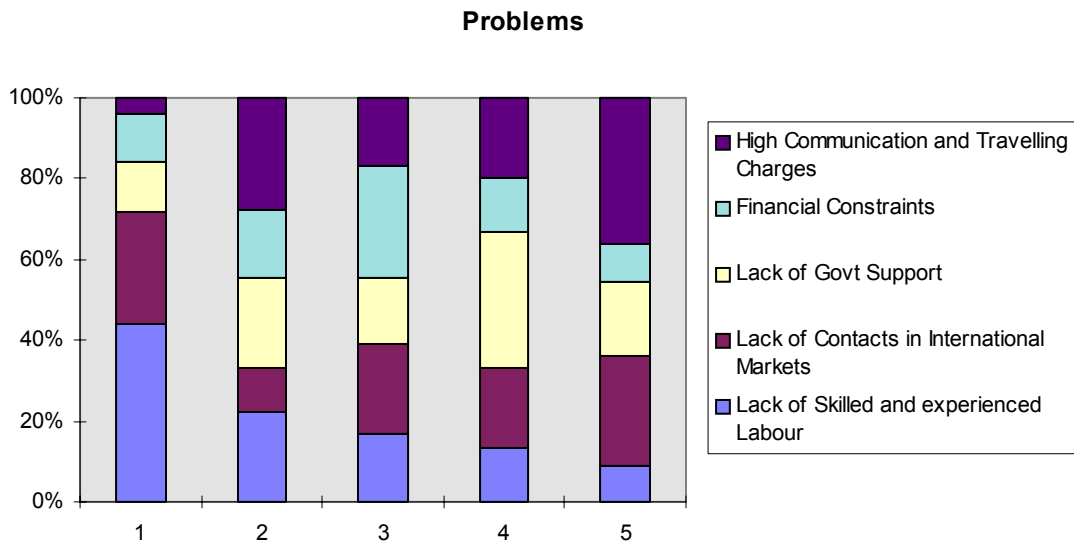
## 10.6 Five Major Problems In Software Export

The respondents were asked to give five major problems which, in their opinion, are hurdle in software exports for Pakistan, their responses could be classified into eight categories, which are accumulated into five categories and the order in which these responses occur have been taken as the ranks assigned to them.

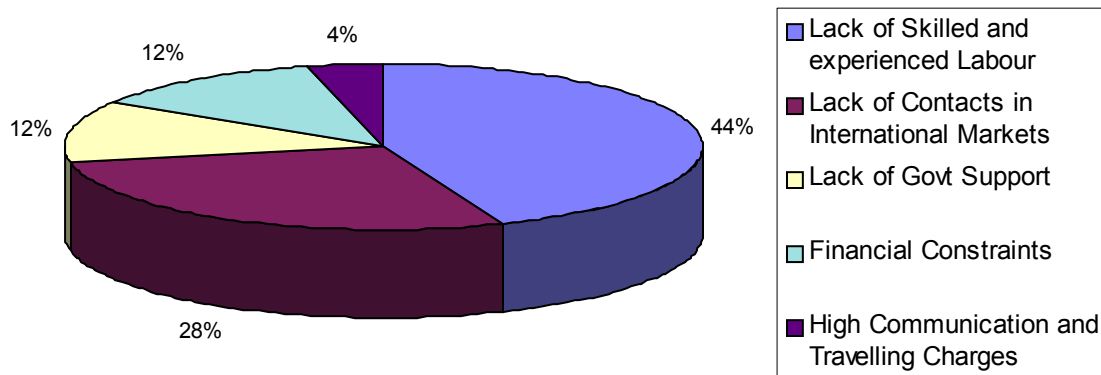
These problems are :

1. Lack of skilled and experienced Labour.
2. Lack of contacts in the International Markets.
3. Lack of Government support.
4. Financial constraints.
5. High Communication and Travelling Charges.

| <b>PROBLEMS</b>                           | <b>1</b> | <b>2</b> | <b>3</b> | <b>4</b> | <b>5</b> |
|---|----------|----------|----------|----------|----------|
| Lack of Skilled and experienced Labour    | 11       | 4        | 3        | 2        | 1        |
| Lack of Contacts in International Markets | 7        | 2        | 4        | 3        | 3        |
| Lack of Govt Support                      | 3        | 4        | 3        | 5        | 2        |
| Financial Constraints                     | 3        | 3        | 5        | 2        | 1        |
| High Communication and Travelling Charges | 1        | 5        | 3        | 3        | 4        |







## 10.7 Results And Findings

Our research project resulted in a number of findings, some of which confirmed our gut feelings while others were a bit unexpected giving a new insight into the field of Software Exports. These results can be summed-up as follows.

- Regarding the employees, the majority of the programmers are in the possession of BCS degree while MCS and Diploma Holders closely trail behind whereas there is only a negligible number of MBAs in this category. From this we can safely conclude that although the programmers are not highly qualified, but nevertheless are closely related to the field of computers.
- Then in the category of Analysts and Project Managers we find that majority of the personnel are MCS, thus confirming our observation that the employees in these categories must be highly qualified as well as more experienced.
- The employees in *Other Managers* and *Other Employees* category are mostly MBAs and simple graduates respectively and their number is small in comparison with the computer personnel, hence indicating that the management comprises mainly of business graduates and day to day clerical work is mostly done by ordinary graduates.
- In the question concerning the number of applications developed for various industries, the major findings are that most of the applications are developed for Banks and Insurance companies in the Financial Service Category, whereas for the manufacturing industry majority of the computerisation projects are undertaken in the Pharmaceuticals and Textile sectors. This shows that of the different industrial sectors the above-mentioned fields are comparatively more computerised.

- At the industrial level, manufacturing sector dominates with 45% of the total applications developed, financial services with 28% and other sectors with 27% trail behind, thus indicating that manufacturing industries are more computerised.
- In the functional classification of the computer applications, most of the projects have been developed in Human Resource and then further in Human Resource ,specifically the number of Pay Roll programs exceed other programs.
- Another thing that we noticed was that almost all the software houses have been developing programs for a diverse market. This could be attributed to the lack areas of specialisation.
- Another thing that came up during the research was the fact that some of the firms develop generalised programs for a specific area and then customise it according to the needs of customers, sell them to different buyers.
- In some instances applications that are normally classified separately, are put under one broad and general category, for example we came across one such case, where marketing, finance, H.R. etc. were classified as “Commercial Softwares”.
- The important languages in which the applications are being developed are (in the order of importance), C++, COBOL and Visual Basic.
- In Databases Foxpro tops the list, followed by Oracle and MS Access. Mostly used Environment is that of Windows NT, UNIX is the second mostly used Environment.
- Most of the projects take less than two months to get completed and usually less than ten projects are completed in a year. This shows that Pakistani Software houses do not have much capacity.
- Regarding the problems faced by the software houses in exports, lack of skilled and technical personnel emerged as the major problem whereas global marketing and getting orders is the second biggest issue.
- During the course of our research we also came across the finding that some Hardware Vendors have declared themselves as Software houses, the reason for this is the Government’s policy of relaxation in import of Computer Equipment exclusively for the Software Houses. Consequently these hardware vendors import computer equipment at reduced rates and sell it in the local market.

## 11. CASE STUDIES OF OTHER COUNTRIES

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This section gives case studies of four countries. Two cases are of third world countries from software exporter point of view and two cases are of the developed countries from software importer point of view.

### 11.1 INDIA: Software Exporter

The source for the following data is World Wide Web [Ind96]. The address is <http://www.software.india.com/overview.html> 1995-96.

#### **Growth of Indian Software Industry**

India formulated Computer Software Policy in 1986 after the policy makers and planners realized the potential of Indian talent in computer software.

In 1996-97 the size was Rs. 26.05 billion (US\$ 835million). If the in-house development is taken into account then it is Rs.32bn (US\$1bn). CAGR for Indian Software Industry is 42% for export industry CAGR is 38.16%.

- In 1985 US\$24million
- 1994-95 US\$485million
- 1995-96 US\$650million
- 1996-97 expected \$1bn
- Expected growth rate is 60-70%

#### **Indian Software Sector**

- World's second largest pool of scientific manpower knowledgeable in English.
- Software industry provides employment for over 125,000 people.
- According to NASCOM survey, there are 425 companies in the software sector.
- There are 360 companies in the export industry. These are in addition to public and private companies not in software sector but involved in software development.
- Copy piracy act is to be legislated in the near future
- Duty on software is 10%.

#### **11.1.1 Indian Domestic Software Industry**

Following are some of the reasons for the lack of development of the domestic software industry in India as compared to the high growth in the software exports [Sch92].

### **Lack of diffusion in Domestic Market**

One of the major reasons that led to software exports in the mid eighties was the low volume of computers in the Indian market. In 1989-90, there were only 75,000 microcomputers [Sch92]. Domestically produced PC's were over priced by about 2-3 times and were associated with inefficiencies. This restrained the diffusion of technology in the domestic market. It led the software houses towards exports market.

### **Little Investment in R&D**

Relatively little was invested in R&D in India as compared to the efforts found in US, Europe and Japan. Indians moved slowly from redeveloping the software wheel. A lot of effort was spent developing Spreadsheet and database packages.

### **Lack of Sufficiently up-to-date Hardware and Software Engineering Tools**

Because of restrictions, larger platforms like IBM AS/400 and Risc 6000 were generally unavailable in India. That forced the companies to send Indian software developers to work at client's facilities. Similarly, the adoption of software development tools like 4GL's, Visual tools and other design tools has been rather slow.

### **Emphasis on Exports Earning at the Expense of Domestic Sector**

Domestic sector was ignored in the quest for foreign exchange earnings. The policy that created a monopoly of one firm for large governmental projects stifled the development of local software houses in the late 70s and early 80's. There has been large gap in the development for the local needs and marketing of software for international customers.

## ***11.1.2 Development of the Software Export Industry***

This discussion about the factors affecting the development of software exports from India is based on [Sch92] and [Sch87].

### **Emphasis on Low level Programming Overseas**

India has focused on onsite services abroad. This has often been called body-shopping. This involves low level routine tasks of coding and debugging (rather than design, analysis, and project management). In 1989, up to 90% of exports came through this area.. These are short term, low risk, low-value-added, and low investment operations. Typically, programmers are contracted out to the clients for hourly or monthly rates.

The advantage is that these programmers do pick up experience and knowledge of tools working at client's premises. However, the downside is that there is a lot of turnover as many of these programmers decide to take up jobs abroad. Moreover, it is debatable how much relevant experience the firm acquires through these contracts.

## **Indian Policy Making**

Indian government set out software export goals based on alluring data available on world software market. These have been quite optimistic plans and were executed in piecemeal fashion rather than executed as a part of long term software sector development planning. Longer term policies should have focused on the development of higher level skills in software engineering. The plans typically have been to make the export figures rise

## **Export Processing Zones**

Government has provided export processing zones at Bombay, Madras, Delhi and some other places. The facilities at these zones include:

- Fast and duty free import and export
- Wholly owned foreign firms are allowed to repatriate profits and earnings
- Single window clearance for all bureaucratic dealings
- Exemptions and subsidies on sales tax and excise duties
- Tax holiday
- 25 % of production can be sold in the domestic market

## **Software Technology Parks**

Software technology parks scheme is a 100 percent export oriented scheme. An organization, Software Technology Parks of India (STPI) has been set up by the government. There are STP's at Bangalore, Pune, Bhubaneswar, Thiruvananthapuram, Hyderabad, Nodia, and Gandhinagar [STP97]

They offer infrastructural facilities like utility power, ready to use built up space, centralized computing services, and high speed data communications facility.

They offer other services like issuance of import certificates, software valuation, attestation of export declarations etc.

Various data communication services are available like *softPOINT* which is 64kbps connectivity link, *softLINK* which is a leased shared internet connectivity at 9.6kbps, and *softMail* which is electronic mail and newsgroup services.

## **Foreign Collaborations**

Foreign investment has been attracted by the availability of low wages and desire to keep a foot in the domestic Indian market. However, till the early 90s shortcomings of the skilled software engineers, the large investments in equipment imports, and unattractive bureaucratic dealings were considered a major hindrance. Many companies believe that China and Central Europe represent a much cheaper source of location costs and salaries for the programmers.

## Low skill trap

Inadequate supply of skilled and qualified personnel may be considered a major reason for the expansion of the domestic software sector. Universities and research institutes do not encourage their staff to do outside consulting. Demand for different types and categories of jobs is very large as compared to the supply. Increasing the supply of skilled professionals is difficult because of the dependence on the output from the public sector universities and educational institutions. The body shopping and contracting of software programmers abroad has also led to brain drain.

### 11.1.3 Profile of Software Houses

#### Domestic Companies

425 companies employing more than 35,000 technical people. Breakup of the companies by number of staff.

#### India

| <u>Company size</u> | <u>no of companies</u> | <u>% of total</u> |
|---------------------|------------------------|-------------------|
| 100+                | 39                     | 9.2               |
| 50-99               | 34                     | 8                 |
| 40-49               | 30                     | 7.1               |
| 30-39               | 25                     | 5.9               |
| 20-29               | 57                     | 13.4              |
| 10-19               | 80                     | 18.8              |
| below 10            | 160                    | 37.6              |
| Total               | 425                    | 100%              |

Growth CAGR of 38.16% estimated at Rs. 10.7bn

#### Breakup of Software Exporters

#### India

| <u>Company size</u> | <u>no of companies</u> | <u>% of total</u> |
|---------------------|------------------------|-------------------|
| 100+                | 31                     | 8.6               |
| 50-99               | 36                     | 10.0              |
| 40-49               | 28                     | 7.8               |
| 20-39               | 110                    | 30.5              |
| below 20            | 155                    | 43.1              |
| Total               | 360                    | 100%              |

## Geographical location of software companies

Headquarters of top 200 companies

| City      | No of companies |
|-----------|-----------------|
| Bombay    | 68              |
| Delhi     | 30              |
| Madras    | 15              |
| Hyderabad | 16              |
| Banglore  | 56              |
| Calcutta  | 8               |
| Pune      | 7               |

### 11.1.4 Export Market Segmentation

According to Geographical Area of Exports

**%age of Exports**

|               |    |
|---------------|----|
| Europe        | 20 |
| Australia, NZ | 3  |
| USA           | 58 |
| West Asia     | 4  |
| SE Asia       | 6  |
| Japan         | 8  |
| Rest of world | 6  |

According to Types of Services

| <u>Types of services</u> | <u>Rs Million</u> | <u>%age</u> |
|--------------------------|-------------------|-------------|
| On site services         | 9348              | 61          |
| Offshore services        | 4522              | 29.5        |
| Offshore packages        | 1480              | 9.5         |
| <b>Total</b>             | <b>15350</b>      | <b>100</b>  |

According to type of software activity

|                       | <b>Domestic</b>           |                    | <b>Export</b>             |                    |
|-----------------------|---------------------------|--------------------|---------------------------|--------------------|
|                       | <b><u>Rs. Million</u></b> | <b><u>%age</u></b> | <b><u>Rs. Million</u></b> | <b><u>%age</u></b> |
| Turnkey               | 1050                      | 37.8               |                           |                    |
| Professional services |                           |                    | 7520                      | 49                 |

|                       |      |      |      |    |
|-----------------------|------|------|------|----|
| Products and packages | 4095 | 38.3 | 1680 | 11 |
| Consultancy           | 741  | 7    | 3830 | 25 |
| Training              | 682  | 6.4  |      |    |
| Data processing       | 880  | 8.2  | 1380 | 9  |
| Others                | 252  | 2.3  | 940  | 6  |

**According to Customers' Industries**

**% age of Companies**

|                         |    |
|-------------------------|----|
| Banking                 | 75 |
| Insurance               | 55 |
| Defense                 | 25 |
| Manufacturing           | 70 |
| Hotels                  | 50 |
| Transport               | 68 |
| Retail and Distribution | 70 |
| Communications          | 68 |
| Government              | 60 |
| Others                  | 50 |

**According to Hardware Skills**

**%age of Companies**

|               |    |
|---------------|----|
| IBM Mainframe | 73 |
| AS/400        | 75 |
| DEC           | 70 |
| HP            | 67 |
| UniSys        | 50 |
| DG            |    |
| Tandem        | 50 |
| Unix Boxes    | 83 |
| PC            | 90 |
| Mac           | 57 |
| PS/2          | 55 |
| Novell LAN    | 84 |



### ***11.1.5 Development Focus and Breakup***

Enduser application products and services    two-third

- Accounting systems
- Specialized niche market products
- customized services

Consultancy

System Integration

Supply of specialized software systems

- software tools
- Communications software
- Software for dedicated hardware devices

## **11.2 BRAZIL: Domestic Producer and Consumer**

Brazil's software industry presents a contrast to the Indian software industry. Unlike India, it is more biased towards domestic software industry as a result of policy that encouraged domestic software development and large scale consumption. The sector is more responsive to the domestic sector requirements. This section is based on [Sch92] and [Sch87].

- Brazil's strategy was to learn by doing. Gain competency through indigenous efforts.
- Brazil managed to attain a balance. It provides protection to software and also allows the entry of more universal applications programs that are available internationally.
- Brazil is now poised for a takeoff as a big exporter with its large domestic base.
- It would benefit from the large experience and know-how of advanced systems.

### **Brazil Software Industry**

It is the sixth largest market in the world. In 1989, it was \$ 5.6bn and \$6.6bn in 1990. In 1988, the software and services sector generated a revenue of US\$1.4 bn, of which only \$1m was that of exports. Annual growth is steady at 100-11%. The Brazilian industry is approximately five time the size of India's software and services sector.

The sector is highly concentrated with top 10 slots accounting for nearly 80% of total revenues. Unlike India that has around 700 firms, there are over 6000 firms in Brazil.

Demand in the banking sector contributed to the boom in the Brazilian software sector in the early eighties.

### ***11.2.1 Software Registration for Encouraging Domestic Sector***

In Brazil the software sold to the government has to be registered and reregistered after every two years. The objective of this registration process is to ensure that the Government buys only that software from outside for which comparable national software is unavailable. Priority for Government purchase was given according to the following categories:

- i. Software developed in Brazil by a national enterprise with its own technology.
- ii. Software of foreign origin, the technology and commercial rights for which have been transferred to a national firm.
- iii. Software developed in abroad and being commercialized by a Brazilian subsidiary.

Nationally developed software is given priority in purchases by government agencies and state enterprises.

It is important to note that the local industry in Brazil realized early on, that there is no point in reinventing the wheel unlike India that continued to invest in the research and development of packages available commercially.

### ***11.2.2 Domestic Base of Hardware***

Software sector in Brazil stands over a foundation of a strong nationally owned hardware industry. Domestic software applications were developed in accordance with this hardware. According to government statistics, the number of PCs (35) per thousand people compares favorably with the average of some of the European countries. Huge investment by public and private sectors in data processing and hardware installations in the late 70s and early 80s created the spill over effect in the software sector.

Growth rate of investment by public and private sector in information services was 22.4% and 35.7% respectively from 1975 to 1981.

### ***11.2.3 Financial Assistance***

Financial sector of Brazil played an important role in the development of the software sector. Both in terms of creating demand and in terms of lending. National Development Bank (BNDES) for example increased its spending from US\$24m in 1984 to US\$95m in 1988. Banks took initiative in moving away from lending in the traditional sectors where the output is tangible to lending in the software sector where output is intellectual and intangible. Credit was given rather indiscriminately. It however served the purpose and provided initial capital and expansion financing.

#### ***11.2.4 Academics Links with the Industry***

Unlike India, Brazil's academia had very strong links with the software industry. Several research groups at the universities are involved in research and development for the domestic software sector.

#### ***11.2.5 Software Protection and Copyright***

Software protection and copyright laws in Brazil are comparable to most developed countries. However, in return to this protection, Brazil legislated that the software companies must also provide:

- i. Correction of errors without additional charges
- ii. Provision of additional technical services for the correct operations of the software
- iii. Responsibility for to the user for the satisfactory technical quality of the software.

As users could count on support the level of piracy decreased. It was a win-win situation.

### **11.3 AUSTRALIA: Software Importer**

This section describes the profile of the potential market for exports in Australia. Source for the following information was "Australian Import Market Report", March 1996, published by Trade and Investment Promotion Service, Department of Foreign Affairs and Trade, Australia [Aus96].

The total IT market in Australia is around A\$12 bn. Hardware accounts for 48%, software around 19% and services around 33%. Of the top 100 IT vendors in Australia, 42 are US based, 37 are Australian, 10 are European, nine from Asia and two from Canada.

Software market grew from 1991-96 at the rate of 11.5%. Growth in the IT services area during the same period was 4.6%. Imports for Software during 1996 was A\$1bn and IT services was A\$.05bn, whereas domestic production of software was A\$.7bn and for IT services was A\$2.3bn.

#### ***11.3.1 Market Segments***

Software market is divided into following segments; packaged software, PC software, professional services, processing services, and support services.

Packaged software segment includes application solutions, application tools, and systems/utilities software sold as packages for mainframe, midrange, and single user systems as well as software bundled with these packages. This is the most diverse of the Australian with hundreds of multinationals and local vendors. Sales in this segment increased from A\$1.053 bn in 1989 to A\$1.538bn in 1993 and are forecasted at A\$2.922bn in 1998. Imports account for around 75% of Australian

sales of packaged software. The top ten suppliers in this segment account for A\$411m sales and include Microsoft (11.3%), Computer Associates (3.2%), Oracle (3.2%), Novell (3.2%), Lotus (3.2%) and CoCam (2%). This shows that the application solutions market is highly fragmented with hundreds of vendors.

Australian PC software market segment in 1993 comprised of desktop publishing (A\$14m), word processing (A\$73m), database (A\$26m) and spreadsheet (A\$70m). Microsoft being the dominant supplier with Lotus and Novell having significant share.

The professional services market segment covers a range of services provided by IT hardware and software vendors as well as specialist services suppliers including consulting, design, development, implementation, outsourcing, training and systems integration. This market segment estimated in 1993 at A\$1.3bn was dominated by small number of large companies doing large cross country integration, outsourcing and implementation projects. The segment is dominated by Anderson Consulting (US), Price Waterhouse (US), Coopers and Lybrand (US), Electronic Data Systems (US), IBM (US) and others.

The processing services market segment includes payroll and personnel management, processing, electronic commerce, and dedicated information services. In 1983, this market segment was valued at A\$410m. There are small number of large companies in this segment with major ones being Dow Jones (US), Reuters (UK), AAP (Australia) in the Financial services area. Ferntree (Australia) and MicrOpray (Australia) in the Payroll and personnel management processing area. GEIS (US) and Telecom (Australia) in the Electronic Commerce area.

### ***11.3.2 Distribution and Pricing***

Hardware and Software distribution market is highly fragmented. In 1993, there were about 1500 firms involved in IT wholesaling. Over 80% of these had less than 10 employees. Distribution is high volume and low margins.

There is a very strong price competition at all levels in the Australian market for computer hardware and software. The average buyer is well informed and although haggling is not common but the buyers do expect discounts. Prices at the low end depend more on the price and features than on the brand name.

Real niches exist in the Australian IT market for vertical applications in a wide range of industry sectors including legal, accounting, local government, retail, distribution, wholesale banking, insurance, financial services in health and community services.

## **11.4 JAPAN: A Software Importer**

The source for the following material in this section is a report titled “Your Market in Japan: Computer Software”, March 1994, No 36. Published by JETRO,

it is part of the series “Your Market in Japan” that provide outline of Japanese markets for assisting foreign countries in promoting exports to Japan [Jap94].

Information services industry in Japan is classified by Ministry of International Trade and Industry (MITI) in three categories; The software industry which comprises of customized software and software products. The information processing industry which comprises of On-line and off-line information processing, data processing, rental of machines, control and administration of systems. Information supplying industry that comprises of database services. And, other information services like surveys.

### ***11.4.1 Market Segmentation***

In 1992, annual sales of information services industry were Y7,127.6bn. Of this development of software and services was Y4,295.9bn, and software products was Y660bn. Software products for PC’s were about 50%, for general purpose computers was 30% and the rest was for office computers and minicomputers.

Growth in the information services industry was 7.8 times higher in 1992 than 10 years earlier. It was 3.1 times higher than five years earlier. Number of companies in the information services industry increased from 5,627 companies in 1988 to 6,977 companies in 1992. Biggest customer of information services in 1992 was Banking and Insurance sector with 26.8% of sales. The close second was Mining and Manufacturing that consumed 25.7% of sales. Wholesale, retail and restaurants consumed 9.4% and public sector consumed 7.9%. Sales within the information service industry were 15%.

In the software industry, the number of companies increased from 3,107 in 1988 to 4,234 in 1992. Sales of the software development and programming industry increased from Y1,799.1bn in 1988 to Y4,295.8bn in 1992.

Following table compares the sales in some selected categories between 1988 and 1992.

| <b>Category</b>                                   | <b>1988 Y billion</b> | <b>1992 Y billion</b> |
|---|-----------------------|-----------------------|
| CAD   | 13.8                  | 38.2                  |
| Business Specific                                 | 11.7                  | 35.2                  |
| OS, Utilities                                     | 10.1                  | 36.3                  |
| Languages, Database                               | 15.1                  | 40.4                  |
| Wordprocessing,<br>Graphics, Spreadsheets,<br>DTP | 21.8                  | 50.1                  |
| Finance and Accounting                            | 4.3                   | 11.8                  |
| Integration                                       | 3.9                   | 6.1                   |
| Specific tasks                                    | 5.98                  | 13.6                  |

|                |      |      |
|----------------|------|------|
| Games          | 14.5 | 17.1 |
| Communications | 6.58 | 18.8 |

### ***11.4.2 Market Trends***

Due to the prevailing recession in 1992, the outlook for software products growth was only about a few percent.

Market trends for software is correlated to hardware sales. Moreover there is a shift from customized software to packaged software. Customers expect reduced prices for packaged software that seemed high in comparison with hardware.

The trends for downsizing and developing open systems, coupled with the need for higher performance software, are increasing the demand for both software products and packaged software.

Software products that are exported to Japan are often first translated into Japanese. Apart from this constraint there are no barriers for importing software in Japan. Furthermore, most software is sold in Japan through some technical cooperation between overseas and Japanese companies. Information about such cooperation is not available generally.

There are two ways of entering Japanese market. First, to establish some marketing arrangement with a Japanese company and secondly, to establish a subsidiary in Japan or to establish some kind of a marketing base.

## 12. RECOMMENDATIONS

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Recommendations for boosting software exports are organized in the following categories:

### 12.1 Government

- Develop domestic software industry acts as a launching pad for exports. Domestic software industry should not be allowed to starve or be ignored at the expense of software exports.
- Government in its capacity as the largest consumer of IT products can stimulate the development of domestic software industry through the use of its purchasing power. Government's drive to accelerate computerization of its departments would create growth of domestic software houses provided contracts are given to the local companies.
- Offer incentives to businesses to get their software developed locally
- Match incentives and announcements made at the policy level with corresponding action at the implementation level.
- Currently, software programming requires extensive human effort and skills. In future, software industry will become less human labor intensive with the maturity of automatic software development tools. There is this window of opportunity where labor intensive economies like Pakistan can make their presence felt on the basis of software skills and labor. Later, acquisition of development tools would become capital intensive and will require large investment.
- Encourage multinational IT Vendors to establish software houses and provide complete hardware and software solutions. These vendors have often been criticized for "hardware dumping".
- Encourage the adoption of standards and resolution of disputes through quality control and arbitration organizations.
- There is a need for coherent IT policy. There are currently too many policies and divergent organizations like PSEB, EPB, IT Commission, Ministry of Science and Technology, Computer Bureau of Pakistan, etc.
- Enact strict copyright and intellectual property laws and ensure their implementation.
- Increase computer awareness in the general public through the use of television media and public meetings.
- Software professionals acquire skills and experience not in a class room setting, but in actual job environments. This requires availability of

opportunities in the domestic software sector. Thus, government as a policy should prefer domestic software houses and local consultants for the outsourcing of its IT projects. Provide opportunities to software professionals to obtain training on large government projects.

## **12.2 Software Houses**

- Develop expertise in a niche market and build a satisfied customer base to act as your promoter.
- Software houses should focus on high level niches rather than lower level programming and data entry markets. The requirement for low level programmers and data entry operators is going to decline in the future as imaging technologies develop and with the maturity of automatic development tools. Software industry will require more high level model builders, engineers, managers and project leaders than low level programmers.
- Trend towards outsourcing has created demands for industry specific off-the-shelf software packages. These packages represent market niches that need to be exploited by software exporters.
- Prepare a strategic plan as outlined in Section Preparing a Strategic Plan6.1
- Prepare a foreign market entry plan as outlined in Section 6.2.
- Design the organization with a front office abroad looking after marketing and sales support and a back-office locally looking after development and maintenance of software. Collaborate with marketers (expatriates, international software houses) for the setting up of the marketing front-offices (Section 3.2).
- Develop quality assurance standards and ensure their compliance.
- Develop professional software management techniques, methodologies and tools. Design formal organization structures.
- Guarantee the supply of quality software professionals by collaborating with software institutes through scholarships, adoptions of programs and funding to evaluate new tools and methodologies.

## **12.3 Universities**

- Establish curriculum advisory committees to promote exports oriented education and training .
- Share teachers and faculty with the industry as consultants and get professionals as part-time teachers from the industry
- Undertake applied research and development projects that would help software houses to increase their productivity.



- Increase interaction with the industry through seminars, projects and short courses like ALCOE program of PSEB.
- Produce students of computer science, engineering and software management with analytical skills and knowledge of new and upcoming technologies
- Setting up of more educational and vocational training institutions and improving quality of existing institutions
- Establish Incubators for Startups. Universities may form nurseries where software startups share overhead facilities and expertise until they learn to be independent.
- Ensure quality of input in universities through admission tests.

#### **12.4 Support Services**

- Telecommunication companies need to provide affordable, competitive and reliable infrastructure.
- Vendors need to provide support technologies for disk-copying, printing and other services.
- Mail/express services for easy and fast communication with foreign clients.
- Reliable utility services are required.

#### **12.5 Collaborations Among Major Players**

- There is need for collaboration and joint ventures among all the major players of the software sector like the Government, software houses, investors, educators, and marketers (Section 3).
- Software houses need to collaborate with marketers in setting up front-end sales and support offices in foreign countries.
- Software houses need to collaborate with educational institutions for promoting job oriented education and for guaranteeing supply of quality professionals.
- Software houses need to collaborate with the Government for obtaining favorable incentives, standards and environment.
- Investors need to collaborate with software houses in developing capacities for exports.

#### **12.6 Public and Private Sector Corporations**

- Increasing complexity of software has made it unfeasible to sustain large in-house software development environments in public or private enterprises.

Instead of maintaining large development facilities, public and private organizations should outsource IT projects to domestic software companies.

- Organizations evaluating outsourcing should consider turning their large IT departments into standalone software subsidiaries which can take up their IT projects.
- Utilize infrastructure facilities of various research departments like NIE and STDC and PCSIR as software houses or computer training institutes.

## **12.7 Financial Community**

- Develop venture capital markets to provide seed capital for launching new concepts and innovative thrusts in software exports.
- Government should give contracts and grants for startups and other software houses to provide much needed exposure and experience of large projects.
- Financial institutions should understand intellectual property issues and should finance software projects on the basis of valuation of intellectual capital.
- Develop New Financial Instruments
- Develop Criteria for Software Loans

## **12.8 Educational Institutions**

- Introduce compulsory basic computer course at Matriculation and Inter levels. Computer courses may be made pre-requisite for university admissions.
- Redesign curriculum of Boards of Technical Education. There are several hundred computer institutes affiliated with these boards. Utilizing infrastructure and experience of these institutes is more cost and time effective than setting up new institutes.
- Ensure quality of these computer institutes through standardized testing.
- Encourage private computer institutes to get affiliated with the universities.

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