

South East Asia Regional Computer Confederation



REPORT ON THE
REGIONAL ICT MANPOWER
AND SKILLS SURVEY
YEAR 1999-2000

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**MESSAGE FROM
MR. ROBERT IAU,
SECRETARY GENERAL OF SEARCC**

In 1992, the South East Asia Regional Computer Confederation (SEARCC) formed a regional interest group, the SEARCC Regional Interest Group on Professional Standards (SRIG-PS) with the aim of examining issues relating to Professional Standards for the IT profession that could eventually be applied across the region. The approach adopted was to understand the requirements of IT users and industry and how the establishment of standards could assist them to effectively determine the quality of resources being sought.

Since 1992, SRIG-PS has issued a total of three reports including this report just released. Without exception all three are unprecedented studies probably the first of their kind in the world. The latest, a Report on the Regional ICT Manpower and Skills is the most ambitious undertaking by SRIG-PS. It is also most timely and significant especially when the countries participating in the survey are making or have made plans to enter the global IT market.

As a regional organization, SEARCC aims to add value to its members through facilitating and sharing of opportunities among members. Since its founding in 1976, it has helped to position IT in the consciousness of planners and professionals and moved IT from its early perception as an enabling technology for value add and productivity to its pre-eminence today as a product with vast economic value and opportunity. The survey undertaken by SRIG-PS has successfully convinced all participating countries of the importance of systematic development of resources, in numbers, quality and skill segments.

The work of SRIG-PS would not have been possible but for the generous and unfailing support of the Center of Internal Cooperation for Computerization (CICC) of Japan. In the regional survey on ICT manpower, the National Computer Board, now the Infocomm Development Authority of Singapore (IDA) generously shared its national survey methodology with SRIG-PS and also provided the support to refine the methodology for regional use. It also processed the data collected. The Central Academy of Information

Technology (CAIT) undertook the regional correlation of processed country data and reports. Without these benefactors the work of SRIG-PS would not have been possible and to them the SEARCC region and its development of ICT professionals owe a debt of gratitude.

Robert Iau
Secretary General
SEARCC

**MESSAGE FROM
MS DITTAS A. FORMOSO
CHAIRPERSON, SRIG-PS PHASE 3
1998-2000**

Eight years of one's life in a project seems inconceivable, but it is with great pride and joy to say that I have done so in SRIG-PS. I have served as the "technical secretary" of the chairperson of Phase 1 (1992-1994) Ms. Carol Carreon of the Philippines, and likewise to the chairperson of Phase 2 (1995-1997), chaired by Ms. Nita Lal from India.

The country representatives in SRIG-PS have changed through the years except for Fumihito Sato of Japan, who has been in this project for as long as I have. Each member so vividly etched in my mind. The synergy, as well as the patience with each other's idiosyncrasies never fails to amaze me. From them, I had the most wonderful opportunity to learn the fine ways of facilitating discussions across various cultures.

Having worked through the 3 phases of this project, enabled me to develop a warm professional relationship with the managing directors of Center of the International Cooperation for Computerization (CICC), Singapore Office. Starting with Mr. Koji Tanabe in Phase 1, Mr. Yoshiki Mikami in Phase 2, and finally Mr. Masaki Komurasaki of Phase 3. Each one of them shows unconditional support of the project. Their participation in the project had been crucial to its success.

Phase 3 had been the most challenging part of the SRIG-PS efforts. It meant months of dedicated effort by the country representatives, as well as the support of organizations like Centre for Business Research & Development (CBRD), Infocomm Development Authority of Singapore (IDA), and Central Academy of Information Technology (CAIT). We pulled it through. The first of its kind in the world, in the ICT Industry.

Special thanks and gratitude to Robert Iau, the Secretary General of SEARCC, who has provided the inspiration, motivation, and the needed push when things get rough and unwieldy. His energy, patience, not to mention his superb command of the plume had sustained the team through the years.

I look back with pride on what we have done. Eight years had been worth it.

Dittas A. Formoso
Chairperson
SRIG-PS Phase 3
1998-2000

**MESSAGE FROM
MR. MASAKI KOMURASAKI,
MD OF CICC SINGAPORE OFFICE**

Dear Sir, Madame

It is a great honor for our office to be one of supporters to SRIG-PS (III) activity. I can recall the scene three years ago when I just arrived Singapore and was facing the decision whether my office would commit the intention of sponsorship for SRIG-PS (III). I am sincerely satisfied with having joined this activity.

I am appreciating SRIG-PS (III) team to have implemented this excellent job with the integrated survey on IT (Information Technology) human resources by coordinating participating countries. I am appreciating the participating Computer Societies to have decided to join in this difficult task and achieved it. Joint work among various countries might not have been easy task.

IT is the cutting edge of social and economic development in the world. All governments and business sectors of the world put the stress on IT for their development. Especially IT human resource development (HRD) is the key for success. CICC, Center of International Cooperation for Computerization, is in charge of promoting IT related cooperation among Asian countries including Japan during around 20 years. CICC is also putting the utmost stress on IT HRD nowadays. Every year CICC has been inviting around 100 IT engineers for IT Training in Tokyo, Japan.

However it was very difficult to get the scientific data on the profile of IT human resources in this region. Policy makers and business societies must have proceeded their activities without enough basic data, like voyage without light. SRIG-PS (III) team has achieved the great job. This publication is the first light to guide our effort to develop the IT human resource. I believe the achievement of SRIG-PS (III) will greatly contribute to each policy maker and private sector developing IT human resource in their policy and their business. The report of SRIG-PS(III) will give the excellent guidance for business society and government.

I hope this work will become the continuous effort of SEARCC to maintain the human network of the team, which was established during implementing joint work of SRIG-PS (III), and keep issuing the scientific data and the policy message on IT human resources in this region to both of government and business society in SEARCC region.

Masaki KOMURASAKI
CICC Singapore Office
November 2000

ACKNOWLEDGEMENT

The SEARCC Regional Interest Group on Professional Standards (SRIG-PS), Phase 3, started in 1998. A total of nine (9) countries and four (4) organizations actively participated in this project. This report represents the efforts, which had been poured in this project for the last three years. SRIG-PS would like to acknowledge the participants to this project.

First and foremost, SRIG-PS thanks the Center of the International Cooperation for Computerization (CICC), Singapore Office under the leadership of Mr. Masaki Komurasaki, Managing Director, for the financial and logistical support it had continually provided for the project from 1998 to 2000.

The Infocomm Development Authority of Singapore (IDA), formerly the National Computer Board, provided the model questionnaire and report format for both the organization and professional survey. This had greatly reduced the cycle time of the project. IDA was ably represented in SRIG-PS by Seah Lye Khim and Lo Yoong Khong, both Deputy Directors, and Oon Tze Puan and Chong Tze Fern, both Managers.

The task of establishing the methodology for tabulating the country results as well as guiding the countries in the interpretation of the various statistical data, was ably provided by the Centre for Business Research & Development (CBRD), National University of Singapore. Ong Chin Huat and Anne Yeo, both Research Fellows, are commended for their tireless effort in working with the various countries. They have also assisted substantially in finalizing the regional report and providing the SRIG-PS chair with the data necessary for making the formal report to the SEARCC 2000 conference.

The Central Academy of Information Technology (CAIT) of Japan, represented by Mr. Fumihiko Sato, presently Professor, Faculty of Economics at Chuo University and the Chairman of IT Education Survey Committee of CAIT, prepared the comparative data from the survey results of the various countries. Mr. Sato also wrote the first draft of the regional survey report, which provided SRIG-PS with an excellent start in analyzing the

results for the final regional report. As Chairman of the IT Education Survey Committee of CAIT, Mr. Sato provided the leadership in promoting the survey in Japan and in submitting the country result to SRIG-PS.

The regional report would not have been possible without the individual country reports. Except for Singapore and Japan, it was the first time for the other participating countries, to conduct a survey of this nature. The professionals representing the national computer societies of the participating countries provided the leadership in their own countries. It is with great pride that we acknowledge the tenacity and perseverance of the following SRIG-PS members:

Computer Association of Thailand	Sumnuan Hirunwong Senior Expertise for Information Services, Department of Research and Information Services, Institute for Small and Medium Enterprises Development
Computer Society of India	Sanjay Prasad COO and GM NewWorldApps, India
Computer Society of Pakistan	Ahmed Allaudin Senior Vice President and DP Manager United Bank Limited
Computer Society of Sri Lanka	Dushan Soza Managing Director Information Foundation (Pvt), Ltd.
Ikatan Profesi Komputer dan Informatica Indonesia (IPKIN)	I Wayan Simri Wicaksana Head of Computer Engineering University of Gunadarma
New Zealand Computer Society	David Kinraid IT Consultant Infinity Group
Philippine Computer Society	Jose Neil Hortillo Country Manager Technomedia, Philippines
Infocomm Development Authority of Singapore (IDA)	Chong Tze Fern Manager, Manpower Development Infocomm Development Authority

Special thanks also to Mr. George V. Leung of the Hong Kong Computer Society for providing the role of secretary during the SRIG-PS meeting.

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GLOSSARY OF TERMS

Convenience Sampling: The sampling procedure used to obtain those units or people most conveniently available.

Probability Sampling: A sampling technique which every member of the population will have a known probability of selection.

ICT: ICT refers to the merging of telecommunications, information and media technologies.

ICT Manpower: ICT manpower pertains to a person engaged primarily in ICT-related work for an IT supplier, telecommunications vendor, user or government organization. He/she must be employed on a full-time/part-time basis, either as a permanent or direct contract staff, working in the local organization or stationed overseas. The work of the person may include the following: (1) development, distribution, implementation, support and operation of telecommunication, computer hardware/software and multimedia contents; (2) provision of information services to end-user; (3) dissemination of IT knowledge and skills and (4) management of the above processes. Not included in the definition are (1) IT staff under the employment of contractors and subcontractors and (2) data entry clerks and computer operators.

EXECUTIVE SUMMARY

Surveys on ICT manpower resources have not been a practice in most of the SEARCC member countries. Among those participating in this survey, only Japan and Singapore have ongoing programs of this nature. As a consequence the survey undertaken by the SEARCC Regional Interest Group on Professional Standard (SRIG-PS) was a learning process for the majority of the participating national societies.

This survey should by no means be taken as the first and last definitive study of ICT manpower resources in the region. The regular collection of data would replace empirical and anecdotal information and facilitate the study of trends, shortfalls and evolving technology directions. The availability of reliable information would greatly assist planning strategy and satisfy the needs of investors whose decision to invest is often influenced by reliable information.

This survey aims to establish the fundamentals that would allow this process to begin and to be sustainable. Simply put, the survey provided the first regional snapshot on the ICT manpower resources currently available, the shortfalls in skills where they occur, the resources to meet current and foreseeable needs and the possible approaches that are being contemplated or in place to redress the shortages.

The countries participating in the survey and the implementation SEARCC members/bodies responsible were

- | | | |
|----|-------------|---|
| 1. | India | Computer Society of India |
| 2. | Indonesia | Indonesia Computer Society (IPKIN) |
| 3. | Japan | Information Processing Society of Japan |
| 4. | Pakistan | Computer Society of Pakistan |
| 5. | Philippines | Philippine Computer Society |
| 6. | Singapore | Infocomm Development Authority of Singapore |
| 7. | Sri Lanka | Computer Society of Sri Lanka |
| 8. | Thailand | Computer Association of Thailand. |

New Zealand was involved in the planning for the survey and similarly undertook initial gathering of data but because of the lower than expected returns, the New Zealand Computer Society voluntarily withdrew to avoid causing any impact on the outcome of the survey. Despite this a country report from New Zealand has been included. The experience of the New Zealand Computer Society could have a number of useful lessons and this too should be equally shared.

Two sources were targeted for data for the survey. The first was from organizations that were users and vendors of ICT products and services and the other from ICT manpower resources who were employed by these organizations. This approach provided a contrapuntal element that would help to improve the synergy in the survey cohort without having to address extraneous inputs from unrelated sources. More information on the methodology and survey frame construction is given in a separate chapter in this report.

A total of 2,320 organizations responded to the survey with valid and usable data. The survey on the ICT manpower resources engaged in these organizations resulted in a total of 9,369 usable responses. Japan and Singapore generally recorded higher returns and this could be attributable to familiarity of respondents to similar exercises.

The top five ICT skills competency currently available, derived from the average ranking of self-assessment returns rendered by ICT manpower resources, showed noticeable concentration of skills in applications/systems development followed by database administration. Competency in skills such as network protocols/topologies seemed to be among the less commonly available among the five skills ranked.

When asked to indicate the top five skills most sought after by ICT manpower resources, the average ranking that resulted showed the acquisition of skills in e-commerce and Internet development to be most highly desired. However there seemed to be no clear trend thereafter as skills such as JAVA, UNIX/LINUX and project management shared more or less similar berths in the perception of needs.

Interestingly, the organizations that employed the ICT manpower resources seemed to have somewhat different views. In an average ranking of the top five most needed skills from the organization standpoint, database administration, e-commerce, applications/

systems development and Internet development shared almost equal billing. Japan and Singapore were the only countries that raised the need for telecom system engineering and mobile wireless communication respectively.

This apparent disparity was illuminating. It was likely that the perception of organizations could be underscored by their current demand for skills more relevant to immediate and foreseeable needs relating to the performance of the organizations. The ICT manpower resources could be looking to acquisition of skills that could represent their future career opportunities in the market as a whole. Far from being contradictory, the findings in this regard showed that there could be extensive dynamism already present and this was not in any way related to the state of ICT development of any particular country. It could also indicate that the ICT market was not at all homogenous and that further fragmentation in market niche and skills demanded could well be possible.

The survey sought to gather information on non-technological skills that ICT manpower resources could increasingly be expected to acquire. Such additional skills could encompass the entire range of management disciplines, business acumen, the ability to think outside the box, among others. As in the case of the assessment of technological skills, both the organizations and the ICT manpower resources employed by them were requested to give their respective rankings.

In the average ranking of the top five non-technology skills the ICT manpower resources indicated they currently possessed, presentation skills and creative thinking seemed to be most prevalent. Other non-technological skills such as interpersonal skills, customer service and strategic planning occupied lower positions. When asked to rank the top five non-technological skills that they wish most to acquire, presentation and interpersonal skills came out ahead with creative thinking and strategic planning somewhat behind.

The response given by organizations in regard to the top five non-technological skills they considered important in their ICT manpower resources was however significantly different. Marketing and sales, customer service and strategic planning were indicated as the most desired skills. Presentations and interpersonal skills occupied positions of lesser importance.

As a general and perhaps sweeping comment, it would seem that ICT manpower resources of organizations have yet to integrate and identify themselves totally with the life and culture of the organization. This could be due to historic reasons that tended to segregate technology manpower into niches that could be somewhat distanced from the corporate life of the organization. Although the gap could be seen to be closing, there could still be some way to go.

With a predisposition for ICT manpower to be relatively mobile and the rapid rate of obsolescence of ICT technology, organizations were compelled to develop strategies to acquire a sufficient and timely supply of resources with the right skills to fulfil their needs. To provide a consistent contextual reference for the organizations, the five top ranking skills that they had identified were used as the basis to describe the methods adopted to acquire the indicated skills.

The preferred method that emerged from the responses given by organizations was startlingly similar across the entire region. Top priority was given to the upgrading of existing ICT manpower resources through training, followed by direct hire of experienced staff from other organizations. Next came the hiring of fresh graduates from tertiary institutions and provide them with further training and the last option was to hire foreign talent.

This phenomenon is worthy of comment. It could be adduced that organizations had generally accepted and implemented regular upgrading programs as part of the strategy to retain valuable staff, prepare for natural attrition due to market demands and minimize the risk of obsolescence. It was also evident that hiring from other organizations was not seen to be free from risks because of possible conflicts in organizational culture and need for harmonization through a period of immersion.

What was remarkable was the apparent low priority given to hire fresh graduates. It seemed to suggest that institutions producing graduates for deployment in the ICT market might have failed to meet the expectations of the very market that they are to serve. It could also indicate that these institutions might not be able to keep pace with the speed of change and have lagged behind. Without exception, all organizations surveyed indicated that they would be prepared to pay a premium for ICT manpower resources that held

current certification for skills, provided that the certification was granted by a reputable organization that required regular and stringent re-certification. This seemed to imply that a distinction could exist between entry level competence and incremental certification to demonstrate competence at any point of time.

In terms of factors that could influence career satisfaction in ICT, and by inference the incidence of job mobility, the ICT manpower resources surveyed indicated career advancement to be most important. Next came achievement of goals and targets and salary, to be followed by job responsibility and job content.

It would seem that the traditional wisdom that salary is the main motivation of ICT manpower resource might be too simplistic a conclusion. It should however not be ruled out that salary would ultimately come to the fore as the motivation for job change, if all other factors failed to materialize. Given that the other satisfaction factors occupied a higher preference level, enhancing them might ameliorate the perceived impact of salary.

It could be seen that while SRIG-PS might have begun with the aim of harmonizing professional standards in the SEARCC region, it had gone considerably beyond its original brief. But this is precisely the intention of SEARCC in embarking upon the exercise. By accepting the dynamic and eschewing the didactic, it was able to add value in real terms to members of SEARCC. In the ultimate, what the members could contribute in concrete terms to their respective countries through the facilitation of SEARCC must be the *raison d'être* for its being.

CHAPTER 1: INTRODUCTION

Phase 3 of SRIG-PS covers the period 1998-2000. The decision to implement the first regional ICT manpower profile survey was concluded in the SEARCC EXCO meeting held in Darwin in 1998. There are two types of survey in this project: the organizational survey and the professional survey.

In order to determine the regional ICT manpower profile survey, the participating countries have to conduct the survey in their own countries. The different countries agreed upon a common form and methodology. However, each was left to add questions in the survey, which may be of specific interests to their respective countries. In the original plan, the target was to have a participation number of 2,700 organizations and 10,000 professionals. At the end of the project 2,320 organizations (85.9% of target) and 9,369 professionals (93.7% of target) responded to the survey.

From a regional perspective, the objectives that were established for this survey were as follows:

- To determine the skills profile of the ICT human resource in the region;
- To identify the areas of skills training and re-training needs based on the skills that were identified as essential to the business;
- To determine the careers and work environment concerns of ICT professionals; and
- To determine the ICT manpower requirements for the next two years

Eleven (11) countries originally expressed their intention to participate in this project, however, only nine (9) were able to conduct the survey. These are:

India
Indonesia
Japan
New Zealand
Pakistan
Philippines

Singapore

Sri-Lanka

Thailand

The survey covered data from 1999-2000. Except for Singapore, that conducted the survey in the early part of 1999, all the other countries started the survey in their respective countries in November 1999. The country reports were presented at an SRIG-PS meeting held in May 2000 in the Philippines.

This publication documents the results of the regional comparison of ICT manpower profile skills. Chapter 2 explains the methodology used in the survey, including the scope of the survey, the determination of sample size, the format of the questionnaires, and the different methods used by the countries in conducting the survey.

Chapter 3 details the profile of the respondents, both from the organizational and professional survey. Chapters 4 and 5 highlight the findings of the survey in the areas of technical and non-technical skills respectively. Chapter 6 provides an indication of the preferences in education and training methods, and gives a discussion on certification.

Chapter 7 provides an interesting insight on the job factors, that ICT professionals consider to be most important, as well as their level of satisfaction in each of these factors. The mismatch between importance and satisfaction levels is also explained in this chapter.

Chapter 8 concludes with statements on lessons learned by the SEARCC family in conducting this study; the SEARCC vision on future researches which may be undertaken in connection with ICT manpower, as well as the recommendations on how this study can benefit the participating countries in the formulation of ICT related - education or manpower development efforts.

CHAPTER 2: METHODOLOGY

In this chapter, four main aspects are covered: the research instrument, sampling method, data collection methods and verification of data accuracy.

2.1 Research Instrument

A questionnaire approach was adopted. There were two surveys: (1) organizational and (2) professional. Both questionnaires were adopted from the 1999 ICT surveys conducted by the Infocomm Development Authority of Singapore (IDA). Only minor revisions were made to suit regional differences. Examples of such revisions were: (1) usage of local currency values for each country and (2) additions of skill sets to reflect the different levels of ICT development. These revisions have however resulted in some cases whereby Singapore does not possess the required data for comparison against other countries.

The organizational questionnaire aims to capture organizational characteristics, ICT skills requirements and training needs. As for professional survey, features such as demographic data, skill competency and career aspirations of ICT employee are covered. For more details, the interested reader can refer to the full questionnaires provided in the appendix.

Target respondents of organizational questionnaire were the chief information officers and/or IT managers. In the case of professional survey, the questionnaire was to be filled up by ICT workers. In some countries, questionnaires were also translated to local languages so as to reach a wider audience.

2.2 Sampling Method

As it was the first time whereby such a survey was launched for many countries, the statistical rigorousness of sample size selection was not greatly emphasized. With the exceptions of Singapore and Japan, which used the scientific method of probability

sampling, the other countries generally used convenience sampling. On the other hand, to reduce response bias, countries carried out the surveys across various segments of the economy (that is, government, private ICT end users and ICT vendors) and ICT employment categories. Some countries also attempted to reduce response bias by choosing samples from various places. For example, in the case of India, data were collected from various cities such as New Delhi, Bangalore and Pune.

Sample size is of a less serious issue in this study as no rigorous data analysis was performed. Only descriptive statistics (frequency counts, mean, median and mode) are highlighted in this report. Furthermore, except Singapore whereby sample findings were extrapolated to the population, results for the other countries were at sample level. However, in respect of the statistical law of large numbers, only surveys with a response of at least 100 valid returns were used in analysis.

2.3 Data Collection Methods

While the common research instrument is questionnaires for all countries, the methods of data collection differ to suit local situations. Most countries used mail surveys. In addition, a few countries such as the Philippines and Singapore also attempted a Web-based survey while some nations like Sri Lanka adopted face-to-face interview for data collection.

2.4 Verification of Data Accuracy

As the survey spans across eight countries in this report, data accuracy and consistency become very important issues. To ensure these two conditions, various measures were carried out. Firstly, a training program was provided by Centre for Business Research & Development (CBRD), National University of Singapore, to all country survey representatives. During this exercise, definitions of terms were discussed and agreed among all representatives, and the data entry method were taught and practised. One example is the definition of ICT manpower. In addition, a common code sheet for data entry (hard and soft copy) was distributed to country representatives for usage at home. Secondly, all countries (except Singapore which has already collected all data) were

required to pilot test 10 cases each for both organizational and professional questionnaires. The data collected were then inputted into the common code sheets and sent to CBRD for checking. Feedback on mistakes was provided on one-to-one basis with each survey representative. Thirdly, all final data were also checked and verified by CBRD. In cases whereby the mistakes could not be verified, the responses were deleted from analysis.

CHAPTER 3: PROFILE OF RESPONDENTS

3.1 Response Rate

This chapter presents some salient features of the organizational and professional respondents. Tables 3.1 and 3.2 show by country the participating number of organizations and professionals respectively. Among the seven countries, Singapore obtained the highest valid response from organizations (25%), followed by Japan (21%) (Table 3.1). Among the eight countries surveyed, India recorded the highest number of professional respondents, and hence the highest response rate of 32% (Table 3.2).

Table 3.1 Number of Organization Respondents by Country

Country	Number of Respondents	Valid Percent
India	319	13.8%
Indonesia	310	13.4%
Japan	483	20.8%
Pakistan	314	13.5%
Philippines	110	4.7%
Singapore	580	25.0%
Sri Lanka	204	8.8%
Total	2,320	100%

Table 3.2 Number of Professional Respondents by Country

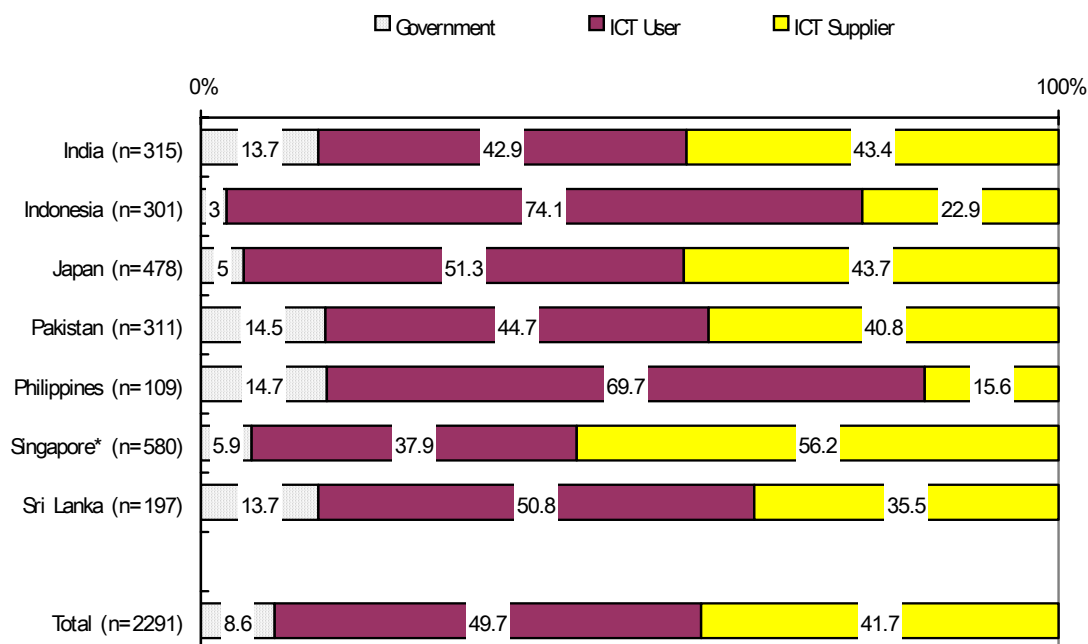
Country	Number of Respondents	Valid Percent
India	3,032	32.4%
Indonesia	410	4.4%
Japan	1,219	13.0%
Pakistan	2,375	25.3%
Philippines	526	5.6%
Singapore	1,021	10.9%
Sri Lanka	530	5.7%
Thailand	256	2.7%
Total	9,369	100%

3.2 Overview of Organizational Respondents

3.2.1 Sector Distribution

The organizations to which ICT professionals belonged were classified into the three categories of government, ICT user, and ICT supplier. In the seven countries covered in the survey, half (49.7%) of the organizations were ICT users, and two-fifths (41.7%) were ICT suppliers. Only one in ten (8.6%) organizations was government-related (Chart 3.1). The distribution of organizations in each country shows Singapore registering the highest percentage of ICT suppliers (56.2%) whereas the Philippines the lowest (15.6%). The proportion of ICT users was highest in Indonesia (74.1%) and lowest (37.9%) in Singapore.

Chart 3.1 Distribution of Organizations by Sector



n: Number of respondents * Data not extrapolated

3.2.2 Size of Employment

In the seven countries surveyed, the average size of ICT staff was 125 (Table 3.3). Organizations in India, Japan and Pakistan employed substantially larger ICT staff than those in the other four countries. The average employment size in the former ranged from 177 to 309 while the latter varied between 10 and 35. On the other hand, the median and mode show a tighter distribution of employment. The former ranges from 6 to 30 while the latter between 2 and 5.

Table 3.3 Number of ICT Staff in Organizations

Country	n	Mean	Median	Mode
India	269	309	12	5
Indonesia	251	10	6	4
Japan	452	195	30	5
Pakistan	270	177	10	4
Philippines	90	28	6	3
Singapore*	430	35	6	2
Sri Lanka	185	23	7	2
Total	1,947	125	10	2

n: Number of respondents

* Data not extrapolated

3.3 Overview of ICT Professionals

3.3.1 Distribution of Jobs

In the survey, jobs, or the main work of professionals, were classified into 13 categories. In terms of the eight-country totals, 45.4% of the professionals were in "software R&D". The percentages of the other jobs were all less than 10%: "ICT management," "education," "networking," and "ICT sales & marketing" accounted for 7% to 8%, while "technical support" and "ICT consultancy" were a little over 5%.

There were very few professionals in "e-commerce" (0.7%) and "Internet" (1.7%). These figures show that the number of Web-related specialists was comparatively small.

The job distribution by country shows that "software R&D" professionals accounted for as high as 66.1% in Japan, followed by Thailand (59.7%) and Pakistan (51.7%) (Table 3.4).

By contrast, "software R&D" professionals accounted for only 13.3% in Singapore and 19.0% in Indonesia. In Singapore, the share of professionals in "software R&D" was exceeded by those in "networking" (18.6%), "technical support" (16.7%), and "ICT sales & marketing" (15.7%). Singapore's share of specialists in "e-commerce" and "data communications" was the highest among the eight countries.

Chart 3.2 Regional Distribution of Jobs

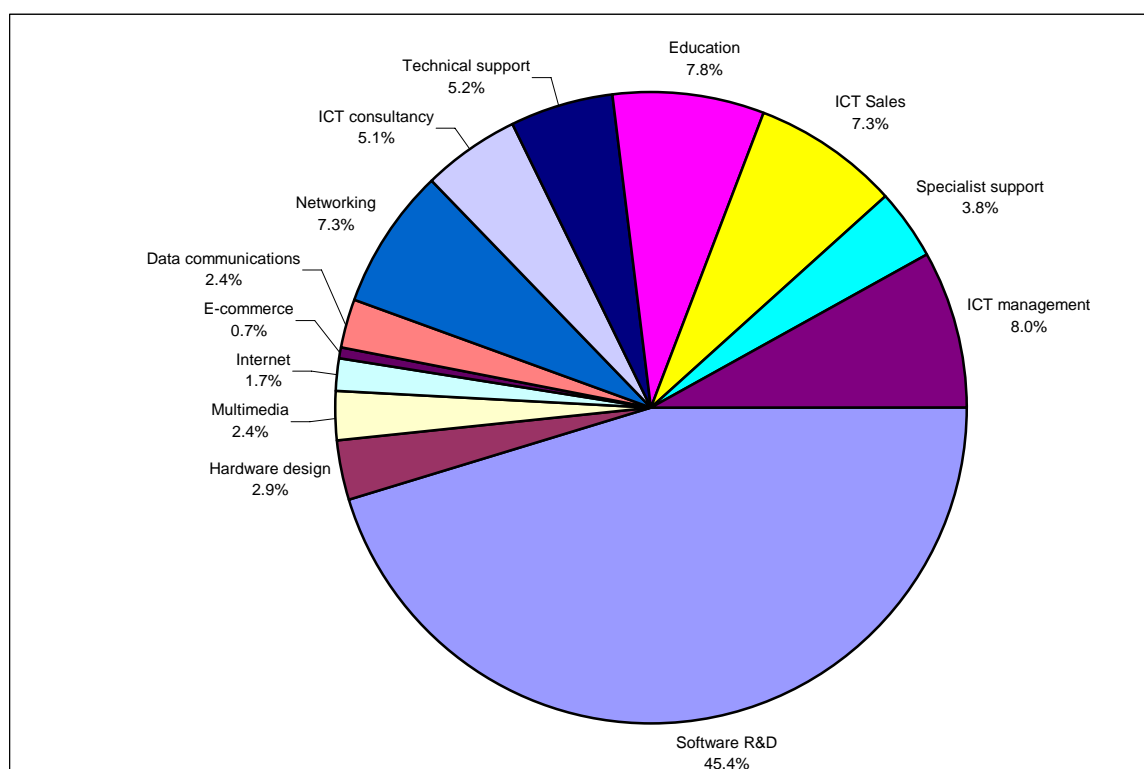


Table 3.4 Distribution of Jobs by Country

n	Percentage													
	1	2	3	4	5	6	7	8	9	10	11	12	13	
India	2,919	41.6	5.2	2.9	2.7	1.1	1.5	3.6	5.9	1.5	14.8	9.7	3.0	6.5
Indonesia	394	19.0	1.0	7.6	1.8	0.3	4.1	7.6	8.4	15.7	2.0	8.1	10.2	14.2
Japan	1,216	66.1	0.2	2.2	1.3	0.2	1.0	8.1	3.8	3.6	1.9	1.4	2.5	7.7
Pakistan	2,239	51.7	2.5	1.6	0.5	0.5	3.4	9.4	2.3	6.0	6.2	6.0	3.6	6.3
Philippines	500	37.6	0.6	1.6	1.8	0.6	0.4	5.2	15.8	7.8	3.0	8.8	4.0	12.8
Singapore*	580	13.3	2.2	1.4	2.2	1.6	6.4	18.6	5.0	16.7	1.6	15.7	5.3	10.0
Sri Lanka	491	45.6	1.0	1.2	1.4	0.4	2.3	8.4	4.3	4.7	5.9	4.3	6.7	13.8
Thailand	248	59.7	6.9	2.4	1.6	0.4	4.5	4.5	0.8	3.2	4.0	3.2	4.0	4.8

n: Number of respondents

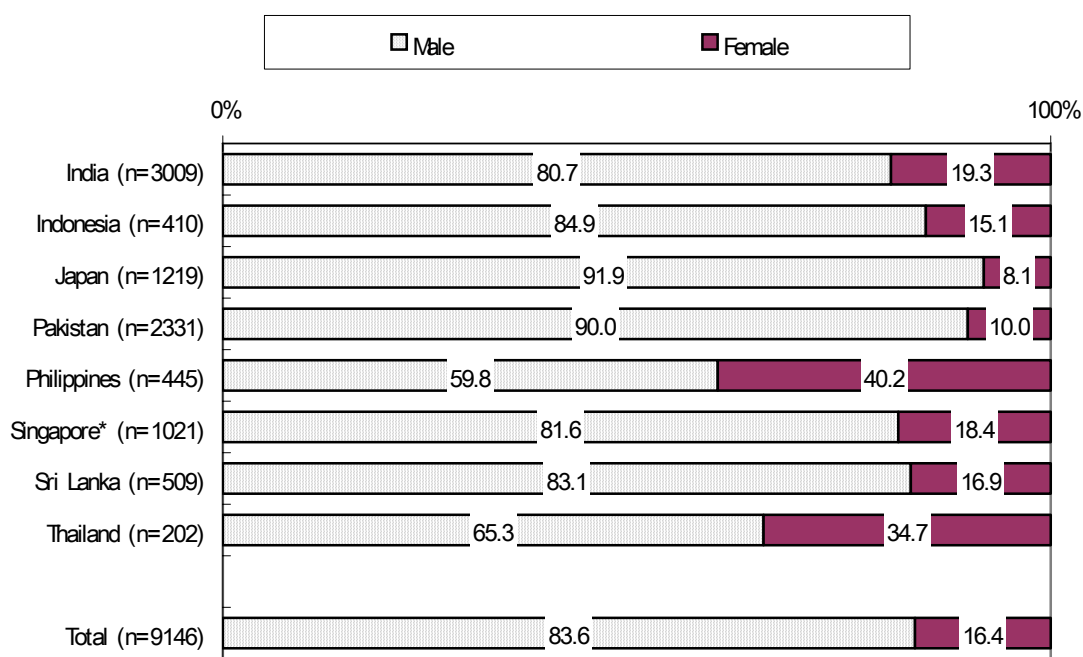
* Data for professionals and organizations are linked and matched, hence the figures refers to those of organizations.

- | | |
|-----------------------------------|-------------------------------------|
| 1 Software Research & Development | 8 ICT Consultancy/Business Analysis |
| 2 Hardware Design/Development | 9 Technical Support/Helpdesk |
| 3 Multimedia Development | 10 Education & Training |
| 4 Internet Development | 11 ICT Sales & Marketing |
| 5 E-commerce Development | 12 Specialist Support Services |
| 6 Data Communications & Telecom | 13 ICT Management |
| 7 Networking(LAN Administration) | |

3.3.2 Gender

By gender, male accounted for 83.6% of the professional. The highest female percentage was recorded by the Philippines (40.2%) while the lowest was in Japan (8.1%) (Chart 3.3).

Chart 3.3 Distribution of ICT Professionals by Gender



n: Number of respondents

* Data not extrapolated

3.3.3 Age

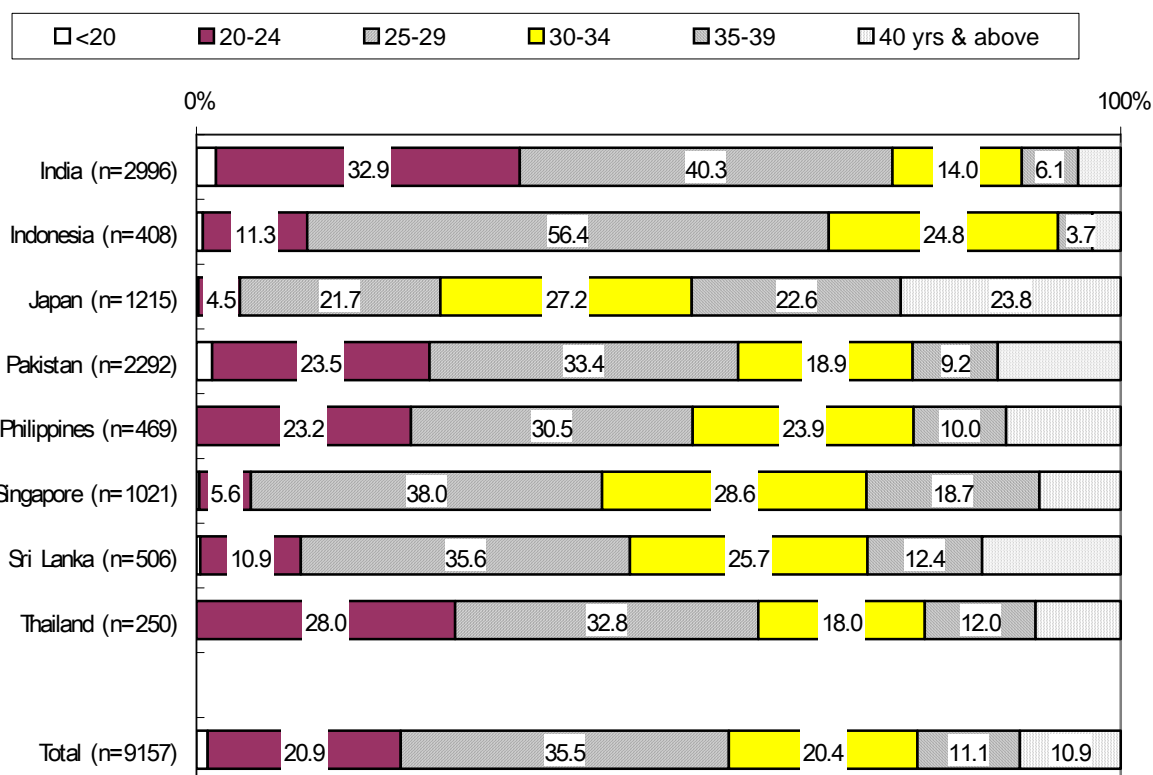
In terms of the eight-country totals by age groups, the largest concentration of professionals (35.5%) was in the age group of 25-29 years (Chart 3.4). The next largest groups were aged 20-24 years and 30-34 years (20.9% and 20.4% respectively). Only 1.2% of the respondents were less than 20 years old.

In other words, as many as 56.4% of the professionals were in their 20s (aged 20 to 29), representing the youth of the ICT industry.

India had a particularly high concentration of young professionals; the percentage of those in their 20s (or younger) was 75.3%. Similarly to a lesser extent, a majority of professionals were in their 20s in Indonesia (68.4%) and Thailand (60.8%).

Japan showed a noticeably different pattern. Nearly half of the Japanese professionals (49.8%) were in their 30s with almost one-quarter (23.8%) aged 40 years or older.

Chart 3.4 Distribution of ICT Professionals by Age Group



n: Number of respondents

3.3.4 Salary

In terms of ICT professionals' annual remuneration/compensation (simply translated into U.S. dollars, without adjustments for different price levels among countries), Japan was by far at the top, followed by Singapore. One-third (35.6%) of Japanese professionals (35.6%) received a gross remuneration of US\$58,000-US\$87,000, while a marginally lower proportion of Singapore professionals (34.9%) earned US\$17,000-US\$26,000 a year (Table 3.5).

**Table 3.5 Distribution of ICT Professionals by Gross Annual Remuneration/
Compensation**

Category		1	2	3	4	5	6	7	8	9	10	11	12	Total
Country														
India	n	1,969	312	131	72	77	31	28	26	83	12	24	56	2,821
	%	69.8%	11.1%	4.6%	2.6%	2.7%	1.1%	1.0%	0.9%	2.9%	0.4%	0.9%	2.0%	100.0%
Indonesia	n	319	30	22	11	4	2	6	2	2	3	4	2	407
	%	78.3%	7.4%	5.4%	2.7%	1.0%	0.5%	1.5%	0.5%	0.5%	0.7%	1.0%	0.5%	100.0%
Japan	n	0	0	1	0	26	130	174	312	417	65	38	11	1,174
	%	0%	0%	0.1%	0%	2.2%	11.1%	14.8%	26.6%	35.6%	5.5%	3.2%	0.9%	100.0%
Pakistan	n	1,357	280	123	70	51	13	15	9	11	6	4	9	1,948
	%	69.5%	14.4%	6.3%	3.6%	2.6%	0.7%	0.8%	0.5%	0.6%	0.3%	0.2%	0.5%	100.0%
Philippines	n	200	84	36	52	33	19	7	5	8	4	6	5	459
	%	43.6%	18.3%	7.8%	11.3%	7.2%	4.1%	1.5%	1.1%	1.7%	0.9%	1.3%	1.1%	100.0%
Singapore	n	31	12	25	119	356	207	109	82	60	9	4	7	1,021
	%	3.0%	1.2%	2.4%	11.6%	34.9%	20.3%	10.7%	8.0%	5.9%	0.9%	0.4%	0.7%	100.0%
Sri Lanka	n	342	65	22	11	12	4	3	4	6	0	0	0	469
	%	72.8%	13.9%	4.7%	2.3%	2.6%	0.9%	0.6%	0.9%	1.3%	0%	0%	0%	100.0%
Thailand	n	90	77	29	17	13	8	5	2	3	0	1	0	245
	%	36.9%	31.4%	11.8%	6.9%	5.3%	3.3%	2.0%	0.8%	1.2%		0.4%		100.0%
Total	n	4,308	860	389	352	572	414	347	442	590	99	81	90	8,544
	%	50.3%	10.1%	4.6%	4.1%	6.7%	4.8%	4.1%	5.2%	6.9%	1.2%	0.9%	1.1%	100.0%

Figures in US currencies are translated from local currencies by individual countries.

n: Number of respondents

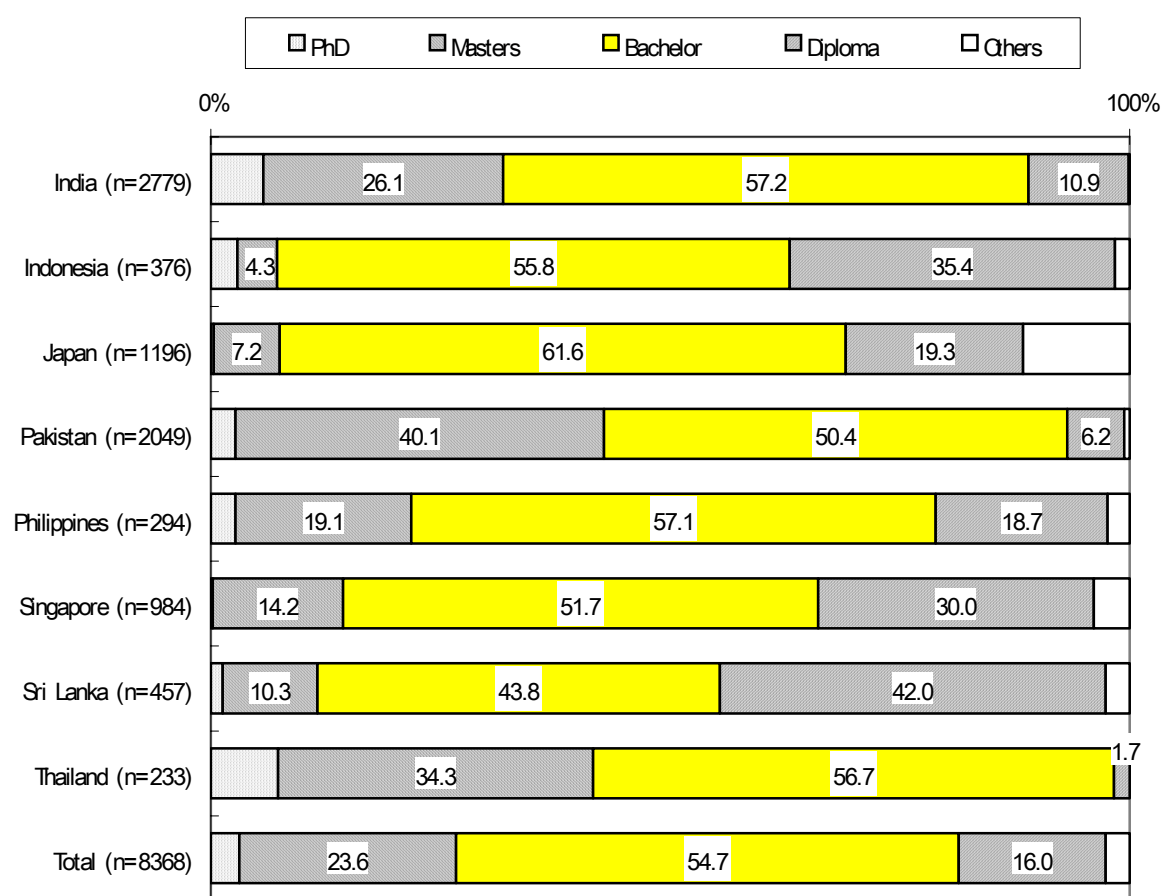
- | | | | |
|----------------|-----------------|-----------------|--------------------|
| 1: <US\$5K | 4: US\$12K-<17K | 7: US\$35K-<44K | 10: US\$87K-<100K |
| 2: US\$5K-<8K | 5: US\$17K-<26K | 8: US\$44K-<58K | 11: US\$100K-<125K |
| 3: US\$8K-<12K | 6: US\$26K-<35K | 9: US\$58K-<87K | 12: ≥US\$125K |

3.3.5 Educational Level¹

In terms of the eight-country totals, 54.7% of the professionals hold a bachelor degree, 23.6% masters, 3.1% PhDs, 16.0% diplomas, and 2.6% others. (Chart 3.5)

A majority of the professionals in each country have at least a bachelor degree.

¹ For the purpose of this survey, the different stages of education in each country have been grouped on a very broad basis to reflect equivalence in qualification for meaningful comparison across countries. However, the comparison should not to be taken literally. For more details, please refer to the individual country reports.

Chart 3.5 Distribution of ICT Professionals by Education Level

n: Number of respondents

3.3.6 Years of ICT Work-Related Experience

The average length of experience in ICT work was 6.3 years. There appears to be a positive relationship between work experience and age. In India, Indonesia and Thailand, where large proportions of professionals were in their 20s, the average length of experience was short (mean of 4.4 to 5.3 years). By contrast, in Japan, where the average age of professionals was high, the average length of experience was correspondingly long at 10.4 years (Chart 3.6).

3.3.7 Average Length of Stay in Organization

The average length of stay for an ICT professional in an organization was three years (Chart 3.7). Turnover rate for ICT professionals was higher in India, Indonesia, Pakistan and Singapore as the average length of stay in an organization averaged two years.

Japan is unique in this respect too. The average length of stay was ten years per organization, reflecting lifetime employment practices in Japan.

Chart 3.6 Years of ICT Work-Related Experience (Professionals)

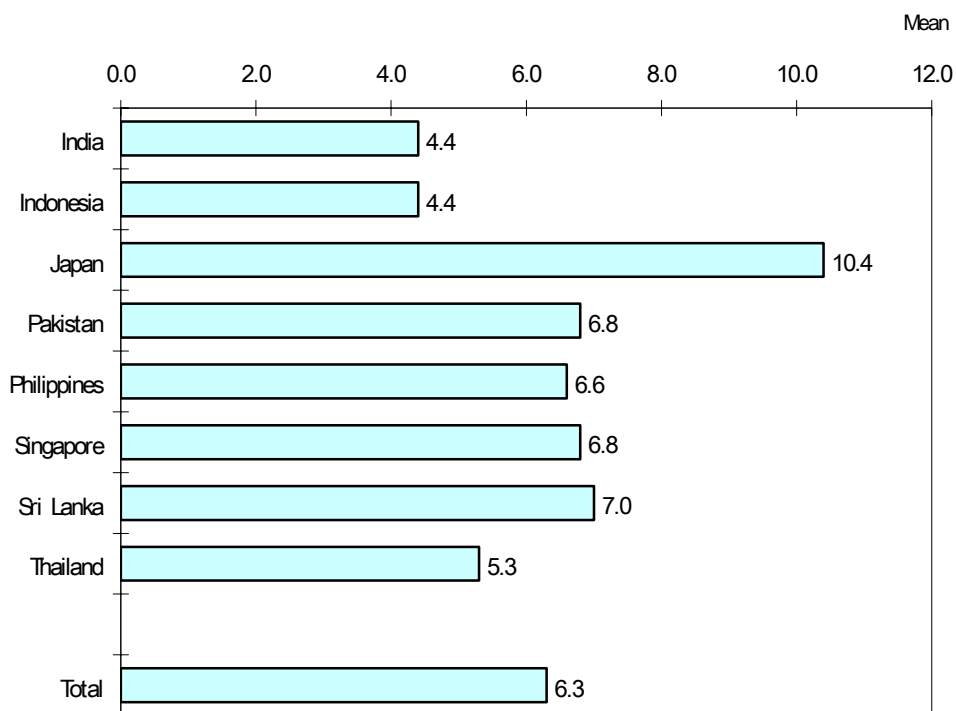
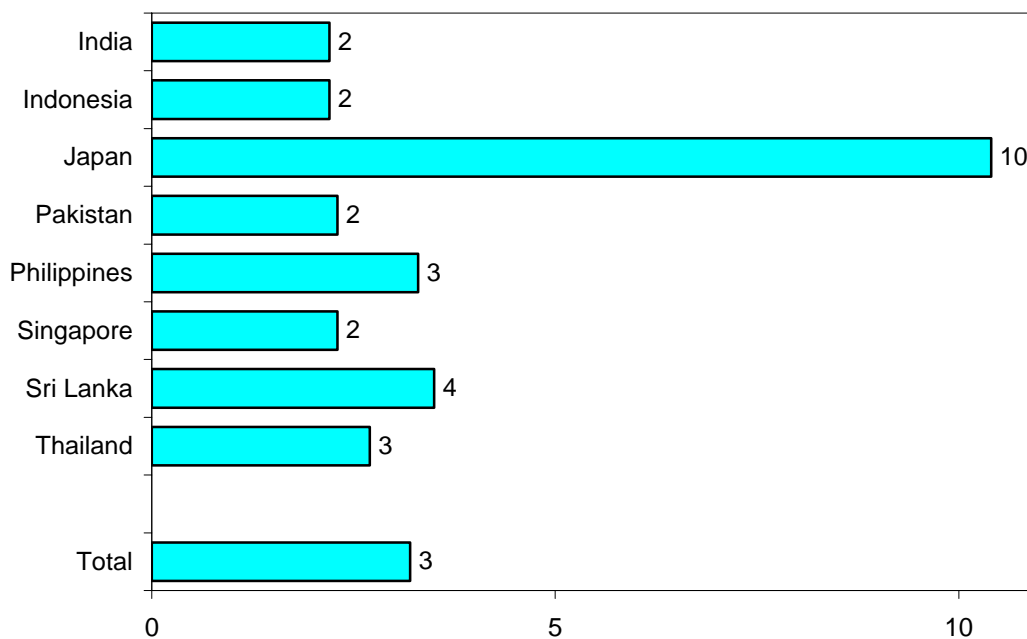


Chart 3.7 Average Length of Stay Per Organization in ICT Related Work



CHAPTER 4: TECHNICAL SKILLS

4.1 Technical Skill Competency

ICT professionals surveyed ranked applications/systems development, database administration, project management, Internet development, and workflow/groupware as the top five common skills with which they are currently most proficient.

On the other hand, less frequently mentioned skills include NT/Novell Netware, network protocols/topologies and UNIX/LINUX.

Table 4.1 Average Ranking of the Top 5 Technical Skill Competency (Professionals)

Country	Rank 1 st	2 nd	3 rd	4 th	5 th
India	Applications/ Systems Development	Database Administration	Project Management	Internet Development	C++
Indonesia	Database Administration	Applications/ Systems Development	NT/Novell Netware	Net Protocols/ Topologies	Workflow/ Groupware
Japan	Applications/ Systems Development	Database Administration	NT/Novell Netware	Project Management	UNIX/ LINUX
Pakistan	Applications/ Systems Development	NT/Novell Netware	Project Management	Database Administration	Net Protocols/ Topologies
Philippines	DCOM	Applications/ Systems Development	CORBA	Project Management	Database Administration
Singapore*	NT/Novell Netware	Net Protocols/ Topologies	Project Management	Internet Development	UNIX
Sri Lanka	Applications/ Systems Development	Database Administration	Project Management	NT/Novell Netware	Net Protocols/ Topologies
Thailand	Applications/ Systems Development	Project Management	Internet Development	Database Administration	Net Protocols/ Topologies

* Database administration, workflow/groupware and applications systems development were not asked. As for UNIX/LINUX, the skill was separated out.

Rank 1 refers to the most highly ranked technical skill competency.

4.2 Shortfalls in Technical Skills Stated by ICT Professionals

The response from the ICT professionals surveyed pointed strongly to shortfalls being perceived in technical skills related to Internet. This would seem to reflect concerns that development and exploitation of e-commerce through the Net could be affected if this shortfall in skills were not addressed early. Concerns were also expressed in regard to skills relating to JAVA and databases. It is worthy of note that the need for UNIX/LINUX, project management, network protocols/topologies, and telecom systems engineering was given less urgency. These trends were similar among the countries surveyed.

It could perhaps be surmised that the responses given could be representative of a snap shot position of the current concerns felt by the ICT professionals. The situation is clearly dynamic and in the context of the countries surveyed, it should be expected that the perceived shortfalls in skills could change rapidly as market demands for skills in support of business opportunities move on. What could be important to note is the volatility of expectations that the ICT professionals were attempting to momentarily address.

Table 4.2 Top 5 Technical Skills Most Frequently Sought (Professionals)

Country	Rank	1 st	2 nd	3 rd	4 th	5 th
India		Internet Development	JAVA	E-commerce	UNIX/ LINUX	Applications/ System Development
Indonesia		Internet Development	E-commerce	UNIX/ LINUX	Database Administration	Net Protocols/ Topologies
Japan		Internet Development	Database Administration	Telecom Systems Engineering	E-commerce	JAVA
Pakistan		Internet Development	E-commerce	JAVA	Database Administration	Project Management
Philippines		E-commerce	Internet Development	JAVA	Database Administration	Project Management
Singapore*		E-commerce	Internet Development	Net Protocols/ Topologies	Project Management	JAVA
Sri Lanka		Internet Development	E-commerce	JAVA	Database Administration	Project Management
Thailand		E-commerce	Internet Development	JAVA	UNIX/ LINUX	XML

* Database administration, workflow/groupware and applications systems development were not asked. As for UNIX/LINUX, the skill was separated out.

4.3 Essential Technical Skills Perceived by Organizations

The top five essential technical skills ranked by organizations are generally related to the Internet. It would seem that there was a great need for skills on Internet development, e-commerce, applications/systems development, and databases. In this regard there is strong correlation to the perception expressed by ICT professionals as to the skills they wish to acquire. Reading this in totality, it would seem reasonable to conclude that the propensity for rapid business expansion utilizing the Internet could be among the top priorities perceived by business organizations.

Table 4.3 Top 5 Technical Skills Considered Most Essential by Organizations

Rank Country	1 st	2 nd	3 rd	4 th	5 th
India	E-commerce	Internet Development	JAVA	Database Administration	Applications/ Systems Development
Indonesia	Database Administration	Applications/ Systems Development	Internet Development	E-commerce	Net Protocols/ Topologies
Japan	Applications/ Systems Development	Database Administration	Internet Development	Telecom Systems Engineering	Project Management
Pakistan	Database Administration	E-commerce	Applications/ Systems Development	Internet Development	Net Protocols/ Topologies
Philippines	Applications/ Systems Development	Internet Development	Net Protocols/ Topologies	E-commerce	Database Administration
Singapore*	Internet Development	E-commerce	Net Protocols/ Topologies	Mobile/Wireless Communication	Multimedia/ Video Development
Sri Lanka	E-commerce	Applications/ Systems Development	Database Administration	Internet Development	Project Management

* Database administration, workflow/groupware and applications systems development were not asked. As for UNIX/LINUX, the skill was separated out.

It is interesting to note that only Singapore organizations highlighted mobile/wireless communication technology and multimedia/video development among the top ranked skills sought. In this respect, Singapore could be different from the other countries surveyed. Its use of Internet appears to be broadening to encompass both businesses and individual users. This has been borne out by growing demands from a communications

market integrating audio and video access. It is expected that this market will become increasingly homogenous and the skills required for its development would similarly evolve.

Interestingly, while the current technical skill claimed by ICT professionals appear to be somewhat different from requirements expressed by organizations, there seem to be a congruity of perceptions between them. For example, the two skills most desired by professionals and considered most essential by organizations are similar – Internet development and e-commerce.

Table 4.4 Comparison of Top 5 Technical Skills in Order of Importance, Required by Organizations and Stated/Hope to Have by Professionals

Ranking	Skills considered most essential by organizations	Skills which ICT professionals have	Skills which ICT professionals hope to have
1	Internet Development	Applications/Systems Development	Internet Development
2	E-commerce	Database Administration	E-commerce
3	Applications/Systems Development	Project Management	JAVA
4	Database Administration	NT/Novell Netware	Database Administration
5	Net Protocols/Topologies	Net Protocols/Topologies	UNIX/LINUX

Results obtained by assigning 5 points to first place 1 point to fifth place in individual country ranking data respectively.

CHAPTER 5: NON-TECHNICAL SKILLS

5.1 Non-Technical Skill Competency

Responses gathered from ICT professionals of the countries surveyed indicated that the three major non-technical skills in which they are competent in were presentation skills, creative thinking, and interpersonal skill. This view appeared substantially the same among the surveyed countries, despite some differences in the rankings given to the three skills stated. Following closely behind were skills relating to customer service and strategic planning. A few instances of technical writing and change management/BPR skills were also indicated.

**Table 5.1 Average Ranking of the Top 5 Non-Technical Skill Competency
(Professionals)**

Rank Country	1st	2nd	3rd	4th	5th
India	Creative Thinking	Presentation	Interpersonal	Customer Service	Strategic Planning
Indonesia	Creative Thinking	Presentation	Interpersonal	Strategic Planning	Tech/Biz Writing
Japan	Presentation	Interpersonal	Creative Thinking	Change Mgmt/BPR	Customer Service
Pakistan	Creative Thinking	Presentation	Interpersonal	Customer Service	Strategic Planning
Philippines	Interpersonal	Creative Thinking	Presentation	Customer Service	Strategic Planning
Singapore	Interpersonal	Presentation	Customer Service	Creative Thinking	Tech/Biz Writing
Sri Lanka	Creative Thinking	Interpersonal	Presentation	Customer Service	Strategic Planning
Thailand	Creative Thinking	Presentation	Interpersonal	Customer Service	Strategic Planning

Rank 1 refers to the most highly ranked non-technical skill competency.

5.2 Shortfalls in Non-Technical Skills That Need to Be Remedied

By coincidence, ICT professionals also indicated perceived shortfalls in non-technical skills to be presentation skills, interpersonal skills and creative thinking. This apparent contradiction could be attributable to the differences in the levels of skills held and the spread of these skills across the ICT profession could be considered inconsistent.

Strategic planning has emerged as one of the most important shortfall in non-technical skills. The emergence of strategic planning as an acknowledged skills shortfall would seem to correlate closely to the positioning of Infocomm technology as an integral component of businesses in recent years. Overall it could be surmised that non-technical skills could become increasingly important in the portfolio of skills to be acquired by ICT professionals in future.

Table 5.2 Top 5 Non-Technical Skills Most Frequently Sought (Professionals)

Rank Country	1st	2nd	3rd	4th	5th
India	Presentation	Creative Thinking	Interpersonal	Customer Service	Strategic Planning
Indonesia	Strategic Planning	Creative Thinking	Presentation	Interpersonal	Tech/Biz Writing
Japan	Presentation	Interpersonal	Strategic Planning	Change Mgmt/BPR	Creative Thinking
Pakistan	Presentation	Creative Thinking	Interpersonal	Strategic Planning	Tech/Biz Writing
Philippines	Strategic Planning	Presentation	Creative Thinking	Interpersonal	Marketing/Sales
Singapore	Strategic Planning	Presentation	Interpersonal	Creative Thinking	Tech/Biz Writing
Sri Lanka	Presentation	Strategic Planning	Interpersonal	Creative Thinking	Customer Service
Thailand	Strategic Planning	Creative Thinking	Presentation	Interpersonal	Change Mgmt/BPR

5.3 Essential Non-Technical Skills Perceived by Organizations

Responses from organizations employing ICT professionals indicated that the major shortfalls in essential non-technical skills include marketing and sales, customer service and strategic planning.

Table 5.3 Top 5 Non-Technical Skills Considered Most Essential by Organizations

Rank Country	1 st	2 nd	3 rd	4 th	5 th
India	Marketing/ Sales	Strategic Planning	Creative Thinking	Customer Service	Presentation
Indonesia	Marketing/ Sales	Customer Service	Presentation	Strategic Planning	Creative Thinking
Japan	Change Mgmt/BPR	Presentation	Strategic Planning	Interpersonal	Marketing/ Sales
Pakistan	Marketing/ Sales	Customer Service	Strategic Planning	Presentation	Interpersonal
Philippines	Strategic Planning	Marketing/ Sales	Customer Service	Interpersonal	Change Mgmt/BPR
Singapore	Marketing/ Sales	Customer Service	Interpersonal	Strategic Planning	Presentation
Sri Lanka	Marketing/ Sales	Customer Service	Strategic Planning	Presentation	Creative Thinking

There seems to be a significant dichotomy between the perceptions of ICT professionals and the organizations that they work for over what could be considered essential to the respective parties. Businesses understandably place great importance on skills related to the successful conduct of business, such as marketing and sales, customer service, and strategic planning. It is also apparent that the underlying support needed to do so is increasingly dependent on technology to build business models and Internet-related business systems just to name two. There is an increasing convergence taking place between information technology and the conduct of successful businesses. It would appear that the majority of ICT professionals have so far directed their skill acquisition effort primarily at information technology. As information technology integrates into every facet of businesses, ICT professionals would have little choice but to increase their quotient of business-related skills.

Table 5.4 Comparison of Top 5 Non-Technical Skills in Order of Importance, Required by Organizations and Stated/Hope to Have by Professionals

Ranking	Skills considered most essential by organizations	Skills which ICT professionals have	Skills which ICT professionals hope to have
1	Marketing	Creative Thinking	Presentation
2	Strategic Planning	Presentation	Strategic Planning
3	Customer Service	Interpersonal	Creative Thinking
4	Presentation	Customer Service	Interpersonal
5	Interpersonal	Strategic Planning	Technical/Business Writing

Results obtained by assigning 5 points to first place 1 point to fifth place in individual country ranking data respectively.

CHAPTER 6: TRAINING AND CERTIFICATION

6.1 Methods of Education and Training

The results obtained from the survey on methods of educating and training of ICT professionals showed significant consistency among the countries surveyed. Based on responses obtained in respect of training undertaken in 1999, On-the-job training (OJT) and classroom based training emerged first and second respectively. Computer based training (CBT) was in third place and the use of the Web emerged in fourth place. It is to be noted that Singapore did not gather any data on OJT and has no presence in this category.

Clearly, OJT and classroom training remain important methods by which ICT professionals maintain their currency in skills. In terms of specific country preferences, classroom training was most prevalent in Indonesia, the Philippines, and Singapore, whereas OJT was most often resorted to in India, Japan, Pakistan, and Sri Lanka. Overall the results were fairly consistent.

When asked to project the likely methods to be deployed to educate and train ICT professionals in Year 2001, the responses obtained showed little change for Indonesia, Japan, Pakistan, the Philippines, and Sri Lanka. Changes in preferred approach were however indicated for India and Singapore. In India, while OJT is expected to remain as first choice, CBT and the use of the Web would overtake the use of classroom training. For Singapore, it is anticipated that Web-based training would be most preferred followed by CBT while classroom training would be last. This seems to indicate Singapore's intention to adopt on-line methods of education and training.

Table 6.1 Most Common Training Method Done Currently (Organizations)

Yr.	Rank Country	1 st	2 nd	3 rd	4 th
1999	India	OJT	Classroom	CBT	Web
	Indonesia	Classroom	OJT	CBT	Web
	Japan	OJT	Classroom	CBT	Web
	Pakistan	OJT	Classroom	CBT	Web
	Philippines	Classroom	OJT	CBT	Web
	Singapore*	Classroom	CBT	Web	-
	Sri Lanka	OJT	Classroom	CBT	Web

Ranking is based on average utilization level of each training method. Rank 1 means the highest utilization level.

CBT: Computer-based training OJT: On-the-job

*OJT was not asked.

Table 6.2 Most Preferred Training Method for the Next 2 Years (Organizations)

Yr.	Rank Country	1 st	2 nd	3 rd	4 th
2001	India	OJT	CBT	Web	Classroom
	Indonesia	Classroom	OJT	CBT	Web
	Japan	OJT	Classroom	CBT	Web
	Pakistan	OJT	Classroom	CBT	Web
	Philippines	Classroom	CBT	OJT	Web
	Singapore*	Web	CBT	Classroom	-
	Sri Lanka	OJT	Classroom	CBT	Web

Ranking is based on average utilization level of each training method.

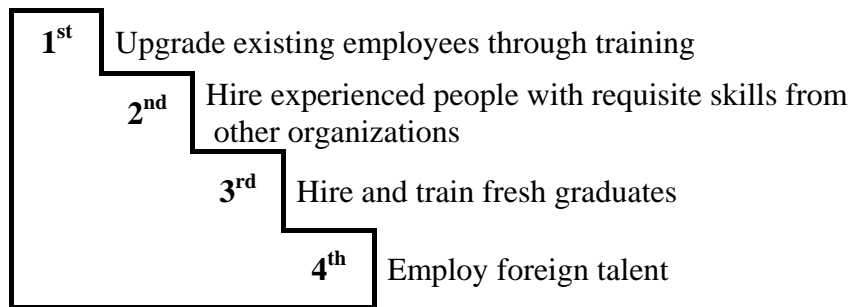
CBT: Computer-based training OJT = On-the-job

*OJT was not asked.

6.2 Preferred Methods of Acquiring Skills by Organizations

The results of survey relating to the ways adopted by organizations to acquire ICT resources showed startling similarity among all countries surveyed. The rankings on preferences of approaches were also identical. It is of significance that regardless of the propensity of high turnover among such staff, the most accepted approach was to upgrade existing staff through training. This is carried through to recruitment from external sources where experienced staff is preferred over fresh graduates. It would seem that this could be advantageous in terms of the time required to bring staff up to production speed. Employment of foreign talent does not seem to be favored momentarily and this prospect is given the lowest placing. Presumably it is still difficult for countries to employ foreign talent or find a reliable source and a system for their evaluation.

Chart 6.1 Preferred Methods of Acquiring Skills (Organizations)

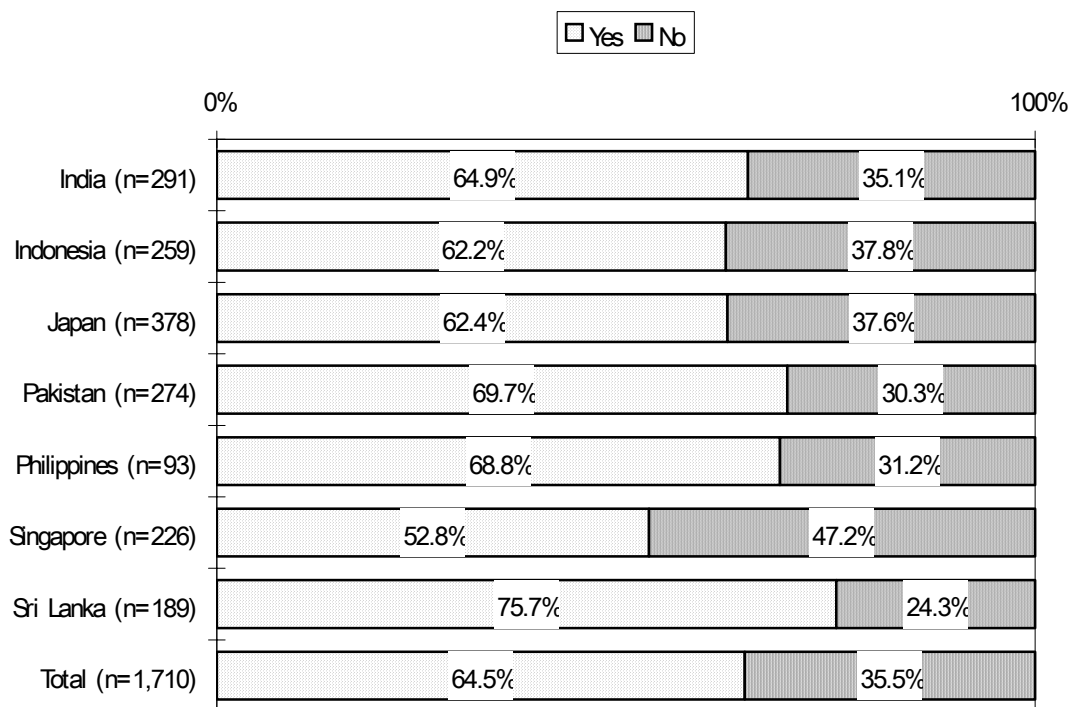


Ranking is based on number of respondents citing each of the four methods for all top five skills.

6.3 Premium for Certified ICT Professionals

Chart 6.2 shows the summary of responses given on the willingness of organizations to pay a premium for an ICT professionals possessing of technical skills duly certified by a reputable authority.

Chart 6.2 Willingness To Pay Premium For Certified ICT Professionals (Organizations)



n: Number of respondents

The results adduced showed a possible uneasiness over the lack of systematic and ascertainable benchmarks of skill currency that could be used to help define whether the

potential ICT professionals does possess the skills sought. Especially when the technology is constantly expanding, the reliance on skills attained in the past might no longer be a dependable guide.

Among countries surveyed, Sri Lanka showed the highest ratio of positive response to payment of a premium to certified ICT resources, with more than 75% of the organizations that responded reflecting this inclination. This would seem to correlate to the endeavors currently made by businesses and other organizations in these countries for early formulation and implementation of endorsed certification systems.

It is to be noted that Japan has a government endorsed certification system in place for some years. Studies have revealed that about 60% of organizations in Japan do pay a premium or provide other salary allowances for those who are certified. Accordingly, the survey finding is consistent with the actual conditions that had pertained in Japan.

CHAPTER 7: CAREER ISSUES

This section analyses the responses of ICT professionals in regard to the relative importance/satisfaction that they attach to job-environment factors. Altogether, 20 job-related factors were offered for their ranking. They comprise among others, salary and benefits, training and career advancement, interpersonal relationship, job-security and workload. Others attributes related to networking, travel, job challenge and image of the company they worked for. Professionals were asked to rank their relative importance/satisfaction.

7.1 Ranking of Importance of Job-Environment Factors

Table 7.1 below shows the rankings of the top five most important job-environment factors in respect of each of the countries indicated. It is to be noted that among seven of the eight countries, two attributes were consistently among the top five most important factors at their places of work. They were the achievement of goals/targets and opportunities for career advancement. This could underscore the comparatively young age profile of ICT professionals and illustrate their expected ambitions and concerns for a meaningful and rewarding career. This also illustrates to some extent their awareness of the high obsolescence rate of technology and the indication of these attributes as important to their job-environment could have been expected.

Table 7.1 Top 5 Most Important Job-Environment Factors by Country

Rank Country	1st	2nd	3rd	4th	5th
India	Image of Company	Job Responsibility	Career Advancement	Achievement of Goals/ Targets	Challenging Job
Indonesia	Salary	Career Advancement	Achievement of Goals/ Targets	Employee Benefits	Job Security
Japan	Job Content	Salary	Relationship with Supervisor	Job Responsibility	Achievement of Goals/ Targets
Pakistan	Job Responsibility	Achievement of Goals/ Targets	Image of Company	Career Advancement	Challenging Job
Philippines	Career Advancement	Salary	Achievement of Goals/ Targets	Job Content	Job Security
Singapore	Career Advancement	Salary	Recognition from Management	Relationship with Supervisor	Job Content
Sri Lanka	Achievement of Goals/ Targets	Job Responsibility	Career Advancement	Salary	Image of Company
Thailand	Co-worker Relationships	Achievement of Goals/ Targets	Job Content	Job Responsibility	Career Advancement

Ranking is based on average level of importance of factors. Rank 1 refers to the top most important factor.

Correlating these factors at the regional level, career advancement emerged as the most popularly sought factor. This was followed by achievement of goals/targets, salary, job responsibility and job content. The results would seem to indicate that opportunities to facilitate and encourage personal endeavors and granting recognition therefor could be an important factor.

Table 7.2 Most Important Job-Environment Factors in the Region

Ranking	Job-related Factors
1	Career advancement
2	Achievement of goals/targets
3	Salary
4	Job Responsibility
5	Job Content

7.2 Factors Relating to Job Satisfaction

Table 7.3 shows the ranking of top five attributes considered to be most essential to create job satisfaction in respect of the countries indicated. ICT professionals in seven of the eight countries ranked good co-worker relationship as most important. Positive relationship with supervisors and responsibility relating to the job also featured in all the countries as factors to job satisfaction.

Table 7.3: Top 5 Job-Satisfaction Factors by Country

Rank Country	1 st	2 nd	3 rd	4 th	5 th
India	Co-worker Relationships	Image of Company	Job Responsibility	Relationship with Supervisor	Job Security
Indonesia	Co-worker Relationships	Relationship with Supervisor	Achievement of Goals/ Targets	Image of Company	Job Responsibility
Japan	Co-worker Relationships	Relationship with Supervisor	Job Responsibility	Job Content	Achievement of Goals/ Targets
Pakistan	Co-worker Relationships	Image of Company	Relationship with Supervisor	Job Responsibility	Achievement of Goals/ Targets
Philippines	Co-worker Relationships	Relationship with Supervisor	Job Responsibility	Job Security	Image of Company
Singapore	Co-worker Relationships	Relationship with Supervisor	Job Security	Image of Company	Job Responsibility
Sri Lanka	Relationship with Supervisor	Job Responsibility	Co-worker Relationships	Image of Company	Achievement of Goals/ Targets
Thailand	Co-worker Relationships	Job Security	Job Responsibility	Job Content	Relationship with Supervisor

Ranking is based on average level of satisfaction of factors.

Extending this to a regional context it would seem to affirm that co-worker relationship continued to occupy a prominent position in regard to factors that could contribute most to satisfaction at the work place. This is followed by relationship with supervisor.

The inference that could be drawn from this could relate possibly a need for a supportive work environment especially in regard to a young workforce profile. It could also indicate the importance of human resource management in regard to team building in an area of

work that is no longer based on individuals effort but the co-ordinated efforts of every one in the team. Table 7.4 shows the overall regional response.

Table 7.4 Ranking of Job Satisfaction Factors in the Region

Ranking	Job-related Factors
1	Co-worker relationships
2	Relationship with supervisor
3	Job responsibility
4	Image of company
5	Job security

7.3 Job-Environment Factors that Did not Match Expectations

This section examines the job-environment factors that did not come up to the expectations of ICT professionals in the countries indicated. It should be noted that this analysis is not to be read against the job-environment factors that had been indicated as important but rather the possible incremental satisfaction that could be obtained. Where such dichotomy exists, it is considered a mismatch of expectations.

Table 7.5 Mismatch between Expectations and Satisfaction in Job-Environment Factors by Country

Country	Rank 1 st	2 nd	3 rd	4 th	5 th
India	Overseas Travel	Salary	Stock Options	Career Advancement	Training by Organization
Indonesia	Salary	Career Advancement	Training by Organization	Employee Benefits	Stock Options
Japan	Salary	Training by Organization	Job Content	Social Networking Exposure	Work Load
Pakistan	Overseas Travel	Training by Organization	Career Advancement	Employee Benefits	Salary
Philippines	Stock Options	Overseas Travel	Career Advancement	Employee Benefits	Salary
Singapore	Career Advancement	Salary	Recognition from Management	Training by Organization	Achievement of Goals/ Targets
Sri Lanka	Overseas Travel	Training by Organization	Career Advancement	Salary	Employee Benefits
Thailand	Salary	Overseas Travel	Career Advancement	Training by Organization	Work Load

Ranking is based on average absolute difference between rating of importance and satisfaction of factors.

Table 7.5 shows that salary continues to be one of the 5 key attributes of mismatch indicated by ICT professionals all countries. It is however worthy of note that career advancement has emerged as an equally important mismatch except Japan. Similarly training by organisation was included as one of the top 5 mismatches in all countries except for the Philippines.

This finding is significant. Salary as a mismatch factor signifies a sense of restlessness among ICT professionals and availability of alternative opportunities. The emergence of career opportunities and training as mismatched factors would add importance of career planning as integral part of ICT resource retention strategy. Otherwise, mobility could be the solution sought by ICT professionals to meet these satisfaction factors.

Table 7.6 below shows the regional ranking of the same mismatched factors. In descending order, they are salary, overseas travel, career advancement, training by organization, and stock options.

Table 7.6 Ranking of Importance of Satisfaction Mismatch in the Region

Ranking	Job-related Factors
1	Salary
2	Overseas travel
3	Career advancement
4	Training by organization
5	Stock options

It is to be noted that the top five mismatch factors indicated by India were among the top five mismatch factors derived for the region. This was to be expected as India has a diverse spread of development status in ICT and could well represent a microcosm of the region. One factor that did not appear in the region's top five mismatch factors but were indicated in the other seven countries related to employee benefits. This appeared in Indonesia, Pakistan, the Philippines and Sri Lanka.

Japan and Singapore revealed five other mismatched factors. For Japan, the three other top mismatches were job content, social networking and workload. For Singapore, the two other top mismatches were recognition from management and achievement of goals/targets. These could reflect the business environment and work ethos of these two countries. The need to exercise greater sensitivity in engaging ICT resources could

become important when higher value add work becomes the norm rather than exception and quality of work merges with the quality of life in the work environment.

CHAPTER 8: CONCLUSION

This survey that took a total of more than two years from conception to completion was a test of the conviction and determination of National Societies who participated. With a few exceptions, most of them never had any experience in conducting a survey on such a massive scale. That they had chosen to participate might be regarded uncharitably as the recklessness of innocence. But their getting this difficult assignment successfully concluded is a demonstration of their grit and that must deserve respect.

Many lessons were learnt comprising both good and not so good experiences. The most positive of outcomes was the engendering of confidence among SEARCC members that such an exercise could be successfully carried out. Even for those who did not or could not be involved in this survey, they could similarly be encouraged to take this on in future.

Another positive outcome was the timeliness of this survey. Although this was not planned, the survey received support and encouragement from almost all the relevant authorities in their respective countries. It coincided with the unveiling of national IT strategy in a number of countries planning to enter global technology markets as part of their development strategies. It also coincided with plans being developed in some countries for a similar survey. The respective country reports released were received with enthusiasm and have engendered debates and discussions that are no longer based on empirical and anecdotal perceptions.

There were two main difficulties encountered during the survey. The first was the effort needed to overcome reluctance to respond especially in countries unfamiliar with surveys. And ironically in one instance, a surfeit of other surveys that led to survey fatigue.

The other is the belief that surveys could be more effectively conducted via the Web. That did not happen and resort had to be made to the traditional paper questionnaire approach. This could be attributable to the possible unfamiliarity in the use of the Web in some of

the countries participating in the survey. The less obvious could be issues relating to the perceived authenticity of a survey posted on the Web, its confidentiality and security.

Great and creative ingenuity was evident from SEARCC members in the approaches adopted to gather their raw data. Measures included lottery and lucky draw prizes for respondents, use of enumerators with powerful shoulders and massive hands and many others that the Executive Council of SEARCC had politely declined to be informed.

What this demonstrated were the differences in survey climate existing in the region. It would have been wrong to attempt to mandate the collection process, as it would have inevitably failed. By allowing members to exercise their judgment in an environment they know best was the right solution. Especially when this could happen again.

A survey based on a sample cohort must possess a number of limitations. Because of this, more emphasis was placed on examining qualitative attributes and quantitative results were curtailed. Accordingly, reading of the results of the survey and attempting to extrapolate them on a broader basis that they are intended to support, should be undertaken with care.

By design, the attributes surveyed were grouped in accordance with the more acceptable and understood ICT competencies used in the region. These were extracted from the previous studies undertaken by SRIG-PS between 1992-1997. There would accordingly be other domain-based attributes such as research and development that have not been included, as the level of such activities in the region could be relatively low momentarily and statistically not significant.

The ICT manpower survey has laid the foundation upon which future surveys could be successfully built. It is necessary that surveys be undertaken on a regular basis. The importance of developing a statistical series on the emerging profiles of this resource is of paramount importance especially to countries intending to adopt technology as a major building block for their future and continued economic success.

There would be opportunity to broaden and deepen the scope of future surveys to investigate specific attributes that could help to guide development and market strategies.

By proactively transferring the initial experiences of this survey to participating countries, SEARCC has added value that could encourage them to embed this important activity in their respective development culture. Reliable and timely information would not only help in establishing sound and pragmatic plans and policies for development but equally important, they would encourage and give confidence to inbound investments to capitalize on the resources available.

Mention was made in the survey report of the trend towards certification as a means of ascertaining the currency of ICT manpower quality. A significant proportion of respondents to the survey had indicated their willingness to pay a premium for properly certified resources.

SEARCC has seen this as an important development that could add a new dynamic and relevant dimension to the concept of professional standards. In 1998, SEARCC established the SEARCC Regional Interest Group on Certification (SRIG-CERT). This SRIG is led by the Singapore Computer Society that also made available its Certified IT Project Manager (CITPM) program to SEARCC members. This program is co-certified by the Institute of Project Managers of the US with over 60,000 members.

SEARCC would be increasing its certification program activities in the coming years and approaches would be made to Government authorities to accord recognition to SEARCC certification. This would help to facilitate cross border flow of quality ICT products, services and resources that would enhance mutually supportive development of the region.

The role of SRIG-PS is by no means over with the conclusion of this survey. In fact its role could be expected to expand. The development of regional certification programs would add another dimension to its work as both SRIG-PS and SRIG-CERT are aimed at increasing quantity and quality of ICT resources and measuring the success of this effort. Their work is interdependent and interminable.

It would be less than truthful to say that the success of this ICT Manpower & Skills Survey was a foregone conclusion. Nothing could be further from this. There were many moments when despair and gloom ruled supreme. There were other moments when

realization of the immense complexity of running and coordinating a survey across a region that stretches from Pakistan to New Zealand hit with a painful thud. And there were still other occasions when mayhem and grievous bodily harm was seriously contemplated against some parties.

But the Family spirit of SEARCC came through as it always did. Assignments became deep personal commitment. Numberless were the lighted windows across the immense region that shone through the night, as the deadline drew near. Re-writes and further re-writes flowed in from all over the world via the Net, as those responsible continued to work on the survey report even as they were traveling the world on their own businesses. It was a responsibility to the Family.

And the SEARCC Family delivered!

Annex A: Organizational Survey Questionnaire



South East Asia Regional Computer Confederation

1999

ICT (Information & Communications Technology) Manpower

Organizational Survey Questionnaire²

SEARCC is conducting this survey to assess ICT manpower requirements among its member countries. This is a region-wide project and its success depends on your participation. *All information provided by you will be treated as strictly confidential and only aggregates will be used for the purpose of this study.* **In return for your participation, a copy of the survey highlights will be provided to you.**

This survey is to be completed by the Chief Information Officer or IT Manager.

DEFINITION OF ICT MANPOWER (see Appendix for detailed classifications)

A person engaged primarily in ICT-related work for an IT supplier, telecommunication vendor, user or government organization. He/She must be employed by the organization on a full-time/part-time basis, either as permanent or direct contract staff, working in the local organization or stationed overseas. The work of the person may include the following:

- a) The development, distribution, implementation, support and operation of telecommunication, computer hardware/software and multimedia contents;
- b) The provision of information services to end-user;
- c) The dissemination of IT knowledge and skills; or
- d) The management of the above processes.

Not included:

- IT staff under the employment of contractors and subcontractors
- Data Entry Clerks and Computer Operators

² Final version as at 11 September 1999

Section A - Company Profile

Q1. Please tick the **principal** business activity of your organization (Please tick **ONE** only).

Government Body	ICT User Organization	ICT Supplier Organization
1 <input type="checkbox"/> Ministry 2 <input type="checkbox"/> Statutory Board 3 <input type="checkbox"/> Educational Institute 4 <input type="checkbox"/> Research Institute 5 <input type="checkbox"/> Others: _____	6 <input type="checkbox"/> Manufacturing (non-ICT) 7 <input type="checkbox"/> Food & Beverage 8 <input type="checkbox"/> Electrical & Electronics 9 <input type="checkbox"/> Petroleum & Petrochemical 10 <input type="checkbox"/> Industrial Chemicals, Pharmaceuticals & Plastics 11 <input type="checkbox"/> Machinery & Metals 12 <input type="checkbox"/> Ship-repair, Heavy Engineering & Aerospace 13 <input type="checkbox"/> Precision Engineering 14 <input type="checkbox"/> R&D and Design 15 <input type="checkbox"/> Printing & Publishing 16 <input type="checkbox"/> Others: _____ 17 <input type="checkbox"/> Transportation 18 <input type="checkbox"/> Construction & Property 19 <input type="checkbox"/> Hotel, Catering & Tourism 20 <input type="checkbox"/> Wholesale & Retail (non-ICT) 21 <input type="checkbox"/> Financial Services 22 <input type="checkbox"/> Business Services (non-ICT) 23 <input type="checkbox"/> Social & Personnel Services (non-ICT) 24 <input type="checkbox"/> Education & Training (non-ICT) 25 <input type="checkbox"/> Healthcare 26 <input type="checkbox"/> Media & Publishing 27 <input type="checkbox"/> Others: _____	28 <input type="checkbox"/> Telecommunications 29 <input type="checkbox"/> Telecom Services 30 <input type="checkbox"/> Data Communications/Network Services 31 <input type="checkbox"/> Broadcasting Services 32 <input type="checkbox"/> Supporting Services to Telecom 33 <input type="checkbox"/> Network Equipment Vendor 34 <input type="checkbox"/> Others: _____ 35 <input type="checkbox"/> Manufacturer of Own-Brand Hardware Products* 36 <input type="checkbox"/> Hardware Products* Wholesale & Retail Distribution 37 <input type="checkbox"/> Software Product Development 38 <input type="checkbox"/> Software Product Distribution & Technical Support 39 <input type="checkbox"/> IT Consultancy Services 40 <input type="checkbox"/> Systems Integration Services 41 <input type="checkbox"/> Multimedia Content Development 42 <input type="checkbox"/> Web-site Publishing 43 <input type="checkbox"/> Internet Services 44 <input type="checkbox"/> E-commerce Services 45 <input type="checkbox"/> Information Services 46 <input type="checkbox"/> IT Training 47 <input type="checkbox"/> IT Manpower Contracting Services 48 <input type="checkbox"/> Facilities Management Services 49 <input type="checkbox"/> IT R&D Services 50 <input type="checkbox"/> Others: _____ * <i>Hardware Products include computer hardware, peripheral equipment and computer accessories</i>

Q2. Please indicate the number of employees in your organization, including all branches, divisions and subsidiaries located in the country. _____ employees

Q3. What is the percentage of your desk-bound employees to total employment in your organization (e.g. administration and management, not including factory or line workers)? _____%

Q4. What percent of your desk-bound workers use computers? _____%

Q5. Please indicate the percentage of local equity ownership of your organization. _____% local equity

Q6. What was the 1998 *revenue/budget of your local-based organization.
 US\$ _____ (* Please delete accordingly)

Section B – ICT Manpower Planning

Q7. For each ICT manpower category given below, please indicate the number of ICT staff (full-time employment) in your organization for 1999 (by nationality), as well as your estimated requirements by the end of year 2000 and 2001. Please refer to the Appendix for a detailed description of the manpower categories.

ICT MANPOWER CATEGORY <i>(Please refer to the Appendix for a detailed description of the manpower categories)</i>	No. of ICT Employees in 1999		No. of ICT Employees Estimates by	
	Local Staff	Foreign Staff	Year-end 2000	Year-end 2001
A. DEVELOPMENT				
a. Software Research & Development				
b. Hardware Design and Development				
c. Multimedia Development				
d. Internet Development				
e. E-Commerce Development				
f. Data Communications & Telecommunications (WAN, Voice, Internetworking)				
B. SERVICES				
g. Networking (LAN Administration)				
h. IT Consultancy/Business Analysis				
i. Technical Support/Helpdesk				
j. Education & Training				
k. IT Sales & Marketing				
l. Specialist Support Services (IT Security, IT Audit, Database Administration, Quality Assurance)				
m. IT Management				
n. Others (please specify)				

Q8. What was the total number of ICT staff (full-time employment) in your organization in the country at the **beginning of 1998** and **end of 1998**? How many **new** ICT staff (full-time employment) joined your organization during **calendar year 1998**?

	No. of ICT Employees
At beginning of 1998	
At end of 1998	
Joined during 1998	

Q9A. Please indicate the current number of ICT staff (full-time employment) in your organization by their residential status.

Residential Status	No. of ICT Employees
Citizens	
Permanent Residents (PR)	
Foreigners	

Q9B. Please indicate the current number of ICT staff (full-time employment) in your organization who are Permanent Residents (PRs) or foreigners, by their country-of-origin.

Country-of-origin	No. of ICT Employees
1. Australia	
2. Canada	
3. China	
4. Hong Kong	
5. India	
6. Indonesia	
7. Japan	
8. Malaysia	
9. Nepal	
10. New Zealand	
11. Pakistan	
12. Philippines	
13. Singapore	
14. Sri Lanka	
15. Taiwan	
16. Thailand	
17. UK	
18. USA	
19. Others (please specify)	

Q10. Please indicate the number of ICT foreign talents and the preferred source country for these foreign talents that your organization intends to source (full-time/part-time) by year-end 2001, based on the discipline as given.

Codes for Preferred Source Country

Australia	= 1	Pakistan	= 11
Canada	= 2	Philippines	= 12
China	= 3	Singapore	= 13
Hong Kong	= 4	Sri Lanka	= 14
India	= 5	Taiwan	= 15
Indonesia	= 6	Thailand	= 16
Japan	= 7	UK	= 17
Malaysia	= 8	USA	= 18
Nepal	= 9	None	= 19
New Zealand	= 10		

Discipline	No. of ICT foreign talents required	Most Preferred Source Country (please use codes from 1-19)
Computer Science/IT		
Business		
Engineering		
Science (excluding Computer Science)		
Others (please specify).....		

Section C – ICT Skills Requirement

Q11. Please indicate the estimated number of ICT staff in your organization whom you would send for training in the next 2 years (2000-2001).

SKILL SET	Estimated no. of ICT staff to be sent for training from year 2000-2001
1. E-Commerce	
2. Internet Development	
3. Multimedia/Video Development	
4. Mobile/Wireless Communication	
5. Network Protocols/Topologies	
6. Internet Telephony	
7. Voice/Language	
8. Telecom Systems Engineering	
9. Enterprise Resource Planning (incl. SCM & CRM)	
10. Knowledge Management	
11. Project Management	
12. Database Administration	
13. Workflow/Groupware	
14. Applications/Systems Development	
15. Interpersonal Skills	
16. Presentation Skills	
17. Creative Thinking Skills	
18. Technical/Biz Writing	
19. Strategic Planning	
20. Change Management/BPR	
21. Marketing/Sales Skills	
22. Customer Service Skills	
23. XML	
24. DCOM	
25. CORBA	
26. JAVA	
27. ACTIVE X	
28. UNIX/ LINUX	
29. NT/Novell Netware	
30. C++	
31. Others (please specify)	

- Q12. From the list of skills (*refer to Q11*), please identify the **Top Five** skills that are **most essential for the core business** of your organization (you may use the numbers listed from Q11). For each skill, please indicate the **PREFERRED** way for your organization to acquire the skill.

Preferred Ways to Acquire Skill

F – Hire and train fresh graduates

E – Hire experienced people with requisite skills from other organizations

U – Upgrade existing employees through training

T – Employ foreign talent

	Top Five Skills (Begin with the most important)	Preferred Way to Acquire Skill (Circle one only)			
1.		F	E	U	T
2.		F	E	U	T
3.		F	E	U	T
4.		F	E	U	T
5.		F	E	U	T

- Q13. Please indicate the number of ICT manpower you would need to train (including in-house, on-the-job and conferences & courses) in the next 2 years in the following vertical industry specific applications. For each of the skill, please indicate the preferred way for your organization to acquire the skill.

Vertical Industry	No. of ICT Manpower Needed for 2000-2001	Preferred Way to Acquire Skill (Circle one only)
Banking & Finance		F / E / U / T
Discrete Manufacturing		F / E / U / T
Process Manufacturing		F / E / U / T
Logistic		F / E / U / T
Distribution & Retail		F / E / U / T
Edutainment/Education		F / E / U / T
Healthcare		F / E / U / T
Others (please specify)		F / E / U / T

Section D – ICT Manpower Development

- Q14A. What was the total ICT Training expenditure for your organization in 1998 and 1999? What percentage of this expenditure was through utilization of training grant from the government?

	January to December	
	1998 (US\$)	1999 (Estimated) (US\$)
ICT Training Expenditure (include government grants/subsidy)		
% Through Grant		

Q14B. Please indicate the percentage of this training expenditure spent on Training of Users vs. Training of ICT Manpower.

	January to December	
	1998	1999
Training of Users		
Training of ICT Manpower		
TOTAL	100%	100%

Q14C. Please indicate the average training expenditure as a percentage of revenue/budget for years 1998 and 1999 (where average training expenditure is defined as total training expenditure divided by the revenue/budget).

1998 _____ % 1999 _____ %

Q14D. Please indicate the average number of training days received by your ICT manpower in 1998 and 1999.

1998 _____ days 1999 _____ days

Q14E. Do you intend to increase/decrease your training budget for Year 2000? Please indicate the percentage change.

Training budget for Year 2000 will be <i>(please circle one only)</i>	% Change
Increase / Decrease / No change	

Q15. Please rate the current utilization level of the following methods of training in your organization on a scale of 1 to 10, where 1=no utilization and 10=very high utilization. Please indicate what will be the expected utilization rating in 2001.

Methods of training	Utilization level on scale of 1 to 10 January to December	
	1999	2001
Classroom Training		
Computer-Based e.g. CD-ROM		
Web-Based		
On-the-Job (OJT)		

Section E – ICT Manpower Competencies

Q16. How do you rate the competency level of ICT degree holders and non-degree holders (between local and foreign) along the following work related attributes?
(Please use a scale of 1 to 10 for rating, where 1=very poor and 10=very good)

Work Related Attributes	Competency level on scale of 1 to 10			
	Degree Qualified		Non-Degree Qualified	
	Local	Foreign	Local	Foreign
Domain/Technical Knowledge				
Interpersonal Skills				
Presentation Skills				
Creative Thinking Skills				
Project Management Skills				
Work Attitude				
Team Work				

Section F – Others

Q17. Are you willing to pay a premium for hiring a certified ICT professional if he/she is trained under a nationally recognized IT skills certification programme in your country ?
 Yes
 No

Q18. What do you think should be the role of the following organizations in ICT manpower development in your country?

A. Government

.....

B. Non-Government ICT Organizations

.....

Q19. Please outline your primary concerns pertaining to ICT manpower development in your country.

- 1.....
- 2.....
- 3.....
- 4.....
- 5.....

Q20. How critical is the shortage of qualified ICT professionals in your country? (Please circle on a 10 point scale of 1-10, where 1=No Shortage Exists and 10=Extreme Shortage Exists)

1 2 3 4 5 6 7 8 9 10

Q21. Please rank the top five skills (from 1-5) which you consider are in critical shortage in your organization where 1=Extreme shortage and 5=Least shortage.

SKILL SET	Please Rank the Top Five Skills (from 1-5) which are in shortage
1. E-Commerce	
2. Internet Development	
3. Multimedia/Video Development	
4. Mobile/Wireless Communication	
5. Network Protocols/Topologies	
6. Internet Telephony	
7. Voice/Language	
8. Telecom Systems Engineering	
9. Enterprise Resource Planning (incl. SCM & CRM)	
10. Knowledge Management	
11. Project Management	
12. Database Administration	
13. Workflow/Groupware	
14. Applications/Systems Development	
15. Interpersonal Skills	
16. Presentation Skills	
17. Creative Thinking Skills	
18. Technical/Biz Writing	
19. Strategic Planning	
20. Change Management/BPR	
21. Marketing/Sales Skills	
22. Customer Service Skills	
23. Others (please specify)	
.....	

THANK YOU FOR YOUR COOPERATION

Please Attach Your Business Card
for a complimentary copy of the survey highlights

Appendix

ICT MANPOWER CATEGORIES [FOR REFERENCE]

DEVELOPMENT

Software Research & Development

- IT Analyst
- IT Architect
- IT Designer
- Programmer
- Project Leader
- Project Manager
- Software Development Manager
- Software Engineer
- Systems Analyst
- Systems Programmer
- Systems Engineer
- IT Research Engineer
- R&D Engineer/Specialist

Hardware Design/Development

- Firmware Engineer/Specialist
- Hardware Engineer/Specialist

Multimedia Development

- Animator
- Graphic/Media Designer
- Multimedia Developer/Engineer
- Multimedia Development Technician
- Multimedia Producer
- Multimedia Programmer
- Web Developer/Engineer

Internet Development

- Internet Consultant
- Internet Programmer
- Internet Support Engineer
- Internet Systems Developer

E-Commerce Development

- Electronic Commerce Engineer/Specialist
- Electronic Commerce Developer

Data Communications & Telecommunication

- Communication Manager
- Communication Software Engineer/Specialist
- Data Communication Manager
- Data Communication Specialist
- Telecommunication Engineer

SERVICES

Networking (LAN Administration)

- Infrastructure Analyst
- Network Administrator
- Network Analyst
- Network Engineer
- Network Engineering Manager
- Network Manager
- Network Operations Engineer
- Network Operations Manager
- Network Operations Technician
- Network Support Technician

IT Consultancy/Business Analysis

- IT Consultant
- Business Analyst

Technical Support/Helpdesk

- Help Desk Analyst
- IT Technician
- Technical Support Manager
- Technical Support Specialist

Education & Training

- Course Director/Planner/Manager
- IT Trainer
- Lecturer
- Professor
- Teaching Associate/Instructor

IT Sales & Marketing

- Application Engineer/Executive
- Application Service Manager
- Business Development Executive
- Business Development Manager
- Customer Engineer/Executive
- Customer Engineering Manager
- Customer Service Engineer/Executive
- Customer Service Manager
- Field Engineer
- IT Planner
- Market Analyst/Researcher
- Marketing Engineer/Executive
- Marketing Manager
- Product Specialist/Marketer
- Sales Engineer/Executive
- Sales Manager

Specialist Support Services

- Database Administration Manager
- Database Administrator
- Database Analyst/Engineer/Specialist
- Information Centre Specialist
- IT Audit Manager
- IT Auditor
- IT Security Administrator
- IT Security Analyst/Engineer/Specialist
- IT Security Manager
- Quality Assurance Analyst/Engineer/Specialist
- Quality Assurance Manager
- Technical Writer
- Test Engineer

IT Management

- Chief Information Officer
- EDP Manager
- IT Director/Manager/Administrator/Department Head
- IT Vice President

Annex B: Professional Survey Questionnaire



South East Asia Regional Computer Confederation

1999

ICT (Information & Communications Technology) Manpower

Professional Survey Questionnaire³

SEARCC is conducting this survey to assess the ICT manpower requirements among its member countries. This is a region-wide project and its success depends on your participation. *All information provided by you will be treated as strictly confidential and only aggregates will be used for the purpose of this study.* When completed, this survey questionnaire should be returned to your Chief Information Officer or IT Manager.

DEFINITION OF ICT MANPOWER

A person engaged primarily in ICT-related work for an IT supplier, telecommunication vendor, user or government organization. He/She must be employed by the organization on a full-time/part-time basis, either as permanent or direct contract staff, working in the local organization or stationed overseas. The work of the person may include the following:

- a) The development, distribution, implementation, support and operation of telecommunication, computer hardware/software and multimedia contents;
- b) The provision of information services to end-user;
- c) The dissemination of IT knowledge and skills; or
- d) The management of the above processes.

Not included:

- IT staff under the employment of contractors and subcontractors
- Data Entry Clerks and Computer Operators

³ Final version as at 11 September 1999

Section 1 - Current Job Title

Q1. Which of the following best describes your job category? (Please tick **one** only)

DEVELOPMENT

Software Research & Development

- 1 IT Analyst
- 2 IT Architect
- 3 IT Designer
- 4 Programmer
- 5 Project Leader
- 6 Project Manager
- 7 Software Development Manager
- 8 Software Engineer
- 9 Systems Analyst
- 10 Systems Programmer
- 11 Systems Engineer
- 12 IT Research Engineer
- 13 R&D Engineer/Specialist

Hardware Design/Development

- 14 Firmware Engineer/Specialist
- 15 Hardware Engineer/Specialist

Multimedia Development

- 16 Animator
- 17 Graphic/Media Designer
- 18 Multimedia Developer/Engineer
- 19 Multimedia Development Technician
- 20 Multimedia Producer
- 21 Multimedia Programmer
- 22 Web Developer/Engineer

Internet Development

- 23 Internet Consultant
- 24 Internet Programmer
- 25 Internet Support Engineer
- 26 Internet Systems Developer

E-Commerce Development

- 27 Electronic Commerce Engineer/Specialist
- 28 Electronic Commerce Developer

Data Communications & Telecommunication

- 29 Communication Manager
- 30 Communication Software Engineer/Specialist
- 31 Data Communication Manager
- 32 Data Communication Specialist
- 33 Telecommunication Engineer

SERVICES

Networking (LAN Administration)

- 34 Infrastructure Analyst
- 35 Network Administrator
- 36 Network Analyst
- 37 Network Engineer
- 38 Network Engineering Manager
- 39 Network Manager
- 40 Network Operations Engineer
- 41 Network Operations Manager
- 42 Network Operations Technician
- 43 Network Support Technician

IT Consultancy/Business Analysis

- 44 IT Consultant
- 45 Business Analyst

Technical Support/Helpdesk

- 46 Help Desk Analyst
- 47 IT Technician
- 48 Technical Support Manager
- 49 Technical Support Specialist

Education & Training

- 50 Course Director/Planner/Manager
- 51 IT Trainer
- 52 Lecturer
- 53 Professor
- 54 Teaching Associate/Instructor

IT Sales & Marketing

- 55 Application Engineer/Executive
- 56 Application Service Manager
- 57 Business Development Executive
- 58 Business Development Manager
- 59 Customer Engineer/Executive
- 60 Customer Engineering Manager
- 61 Customer Service Engineer/Executive
- 62 Customer Service Manager
- 63 Field Engineer
- 64 IT Planner
- 65 Market Analyst/Researcher
- 66 Marketing Engineer/Executive
- 67 Marketing Manager
- 68 Product Specialist/Marketer
- 69 Sales Engineer/Executive
- 70 Sales Manager

Specialist Support Services

- 71 Database Administration Manager
- 72 Database Administrator
- 73 Database Analyst/Engineer/Specialist
- 74 Information Centre Specialist
- 75 IT Audit Manager
- 76 IT Auditor
- 77 IT Security Administrator
- 78 IT Security Analyst/Engineer/Specialist
- 79 IT Security Manager
- 80 Quality Assurance Analyst/Engineer/Specialist
- 81 Quality Assurance Manager
- 82 Technical Writer
- 83 Test Engineer

IT Management

- 84 Chief Information Officer
- 85 EDP Manager
- 86 IT Director/Manager/Administrator/Department Head
- 87 IT Vice President
- 88 Others (please specify)

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Section 2 - Skills Profile

- Q2. For each skill listed below, please rate your competency level for those skills that are relevant to you on a scale of 1 to 5, where 1=No competency at all, 2=Basic, 3=Competent, 4=Advanced and 5=Expert. Please tick the skills that you will like to acquire or enhance over the next 2 years?

SKILL SET	Skill Competency Rating (Please circle the relevant skills on scale of 1 to 5)					Skills to Acquire/ Enhance (Please tick)
	1	2	3	4	5	
1. E-Commerce	1	2	3	4	5	
2. Internet Development	1	2	3	4	5	
3. Multimedia/Video Development	1	2	3	4	5	
4. Mobile/Wireless Communication	1	2	3	4	5	
5. Network Protocols/Topologies	1	2	3	4	5	
6. Internet Telephony	1	2	3	4	5	
7. Voice/Language	1	2	3	4	5	
8. Telecom Systems Engineering	1	2	3	4	5	
9. Enterprise Resource Planning (incl. SCM & CRM)	1	2	3	4	5	
10. Knowledge Management	1	2	3	4	5	
11. Project Management	1	2	3	4	5	
12. Database Administration	1	2	3	4	5	
13. Workflow/Groupware	1	2	3	4	5	
14. Applications/Systems Development	1	2	3	4	5	
15. Interpersonal Skills	1	2	3	4	5	
16. Presentation Skills	1	2	3	4	5	
17. Creative Thinking Skills	1	2	3	4	5	
18. Technical/Biz Writing	1	2	3	4	5	
19. Strategic Planning	1	2	3	4	5	
20. Change Management/BPR	1	2	3	4	5	
21. Marketing/Sales Skills	1	2	3	4	5	
22. Customer Service Skills	1	2	3	4	5	
23. XML	1	2	3	4	5	
24. DCOM	1	2	3	4	5	
25. CORBA	1	2	3	4	5	
26. JAVA	1	2	3	4	5	
27. ACTIVE X	1	2	3	4	5	
28. UNIX/ LINUX	1	2	3	4	5	
29. NT/Novell Netware	1	2	3	4	5	
30. C++	1	2	3	4	5	
31. Others (please specify)	1	2	3	4	5	

Section 3 - IT Experience

Q3. What is your current employment status?

Employment Status	Please tick one only
1. Full-time Employment	
2. Part-time Employment	
3. Self-Employed	
4. Others (please specify).....	

Q4. How many years of total work experience do you have? How many years of IT related work experience do you have?

	Years
Total Work Experience	
IT Related Work Experience	

Q5. How many different organizations have you worked in? How many different organizations have you worked in where you held IT related jobs?

	No. of Different Organizations
Total Work Experience	
IT Related Work Experience	

Section 4 - Training

Q6A. Please indicate the types of training institutions which you have undertaken your training, the number of training courses that you had taken in 1998 and the total number of training days received in 1998.

Types of Training Institution	1998	
	No. of Courses Taken	No. of Training Days Received
Universities		
Polytechnics or equivalent		
Professional or non-professional body		
Commercial providers		
Suppliers/Vendors		
Others (please specify).....		

Q6B. Through which method was this training provided? How would you rate your preference for each method on a 5 point scale, where 1=don't prefer at all and 5=high preference.

Methods of Training	1998	Preference Rating
Classroom Training		
Computer-Based eg CD-Rom		
Web-Based		
On-the-Job (OJT)		
TOTAL	100%	

Q6C. Who sponsored this training ? Please indicate the number of courses taken and number of training days received.

Sponsors	1998	
	No. of Courses Taken	No. of Training Days Received
Employer		
Supplier		
Self-financed		

Q6D. Amount of training cost you personally paid for in 1998? US\$ _____

Section 5 - Career Satisfaction

Q7. On the following job related factors, please rate their importance and satisfaction to **you** (e.g. how important salary is to you and how satisfied you are with your current salary) on a scale of 1 to 10 (where 1=not important at all/not satisfied at all, and 10=very important/very satisfied).

Job Related Factors	<i>Please rate on scale of 1-10</i>	
	Level of Importance	Level of Satisfaction
a. Salary		
b. Stock Options		
c. Employee Benefits		
d. Relationship with supervisor		
e. Job Security		
f. Work load		
g. Flexible work hours		
h. Co-worker relationships		
i. Job content		
j. Training provided by the organization		
k. Career advancement		
l. Recognition from management		
m. Job responsibility		
n. Achievement of goals/targets		
o. Overseas travel		
p. Job Titles		
q. Image of IT Profession		
r. Social Networking Exposure		
s. Challenging Job		
t. Image of your company		
u. Others (please specify)		
.....		

Section 6 - Demographics

Q8. What is your residential status in this country?

- Citizen
- Permanent resident
- Foreigner

Q9. Please indicate your country-of-origin:

Country-of-origin	Please tick one only	Country-of-origin	Please tick one only
1. Australia		11. Pakistan	
2. Canada		12. Philippines	
3. China		13. Singapore	
4. Hong Kong		14. Sri Lanka	
5. India		15. Taiwan	
6. Indonesia		16. Thailand	
7. Japan		17. UK	
8. Malaysia		18. USA	
9. Nepal		19. Others (please specify)	
10. New Zealand			

Q10. Gender Male Female

Q11. Age ₁ < 20 years old ₄ 30-34 years old ₆ 40-49 years old
 ₂ 20-24 years old ₅ 35-39 years old ₇ ≥ 50 years old
 ₃ 25-29 years old

Q12. Gross Annual Remuneration/Compensation

- | | | |
|--|---|---|
| ₁ <input type="checkbox"/> < US\$3K | ₆ <input type="checkbox"/> US\$17K-<26K | ₁₁ <input type="checkbox"/> US\$87K-<100K |
| ₂ <input type="checkbox"/> US\$3K-<5K | ₇ <input type="checkbox"/> US\$26K-<35K | ₁₂ <input type="checkbox"/> US\$100K-<125K |
| ₃ <input type="checkbox"/> US\$5K-<8K | ₈ <input type="checkbox"/> US\$35K-<44K | ₁₃ <input type="checkbox"/> ≥US\$125K |
| ₄ <input type="checkbox"/> US\$8K-<12K | ₉ <input type="checkbox"/> US\$44K-<58K | |
| ₅ <input type="checkbox"/> US\$12K-<17K | ₁₀ <input type="checkbox"/> US\$58K-<87K | |

Q13. Educational qualifications, discipline and location from which the qualification was acquired (Please circle all that applies and indicate the year attained for the highest qualification).

Discipline

- Computer Science/IT = 1
 Business = 2
 Engineering = 3
 Science (excluding Computer Science) = 4
 Others = 5

Qualifications	Types of Discipline Attained Locally	Types of Discipline Attained Overseas	Year Highest Qualification Obtained
PhD	1 / 2 / 3 / 4 / 5	1 / 2 / 3 / 4 / 5	
Masters or equivalent	1 / 2 / 3 / 4 / 5	1 / 2 / 3 / 4 / 5	
Bachelor or equivalent	1 / 2 / 3 / 4 / 5	1 / 2 / 3 / 4 / 5	
Diploma or equivalent	1 / 2 / 3 / 4 / 5	1 / 2 / 3 / 4 / 5	
Others (please specify)	1 / 2 / 3 / 4 / 5	1 / 2 / 3 / 4 / 5	

Q14. With reference to your answer in Q1, do you think there is a critical shortage of qualified professionals in your country in your category of IT profession? (Please rate on a 10 point scale, where 1=No Shortage Exists and 10=Extreme Shortage Exists)

1 2 3 4 5 6 7 8 9 10

THANK YOU FOR YOUR COOPERATION

Annex C: Country Reports

