Training Needs Assessment of Jamaica's Information and Communications Technology Sector

FINAL REPORT
On a Survey of ICT Firms, Training Institutions, and Other Organizations

Commissioned by:
HEART TRUST / NTA

Conducted by:
Jamaica Computer Society Education Foundation (JCSEF)

October 2005

CONTENTS

1.0 EXECUTIVE SUMMARY

1.1 Introduction:

1.1.1 This report presents the findings of a set of surveys and analysis of the Information and Communication Technology (ICT) sector in Jamaica, in respect of both current status and projected training needs (demand) as well as an assessment of the existing capacity to address those needs (supply). The survey was commissioned by the National Training Agency (HEART/NTA) of Jamaica and undertaken by the Jamaica Computer Society Education Foundation (JCSEF) during the period May to June, 2005. Consistent with its mandate to train and prepare a modern workforce, and recognizing the critical role that technology can play in this process, the HEART/ NTA through this study, is seeking current data on developments in the ICT sector.

1.1.2 The report also presents a background to the development of an ICT sector, and develops a profile of the ICT sector (as defined by technology-driven activities of firms/companies, training institutions and other entities using ICT in development processes and/or in the generation of ICT products and services). In the first part of this assessment, the study focuses on background/secondary data provided from a range of documents. In the second part of the assessment, the study focuses on data provided by a cross-section of the existing industry participants/stakeholders, highlighting specific activities, particularly related to training & certification required for the sector to realize its development potentials.

1.1.3 In preparation for the survey, preliminary research was conducted to establish whether there exists any comprehensive profile of the ICT sector in Jamaica; but no such source of information was found. This report therefore serves to initiate the establishment of an ICT sector profile for Jamaica, with the hope that subsequent characterizations of this development sector will have a useful baseline reference. For the purpose of this survey, components of the ICT sector will be confined to the following entities:

i) ICT Firms and/or Businesses operating in Jamaica;
ii) Education/Training Institutions involved with ICT-related instruction;
iii) Other organizations or entities using ICT in their business processes.

1.1.4 Given the essential mandate and focus of the HEART/NTA on training, this survey is also deliberately characterized as a Training Needs Assessment of Jamaica's ICT sector. For this reason, emphases on aspects of training (program offerings, delivery, and results/outcomes) are deliberate in both data collection and analysis.

1.2 Purpose of the Survey:

The primary purposes of the survey were to:

1.2.1 Investigate the context that defines the ICT Sector, to establish a comprehensive profile of this sector in Jamaica.

1.2.2 Conduct a comprehensive assessment and analysis of training needs within the ICT Sector of Jamaica, to inform strategic planning decisions for skills training.

1.2.3 Provide details on existing ICT industry stakeholders and organizations, including training providers, and highlight specific interventions particularly in regard to training and certification, and the existing capacities to deliver same.

1.2.4 Present an analysis of the current state of affairs in the sector to provide the basis for HEART Trust/NTA's strategic decisions on related standards and training delivery.

1.3 Methodology:

1.3.1 In preparation for the survey, a set of data collection instruments was designed and pilot-tested with a sample of ten (10) organizations. The survey instruments were developed into three (3) components or sections as follows:

i) Section A. Targeting respondents in ICT Firms/Companies and other business entities using ICT, this survey consists of 15 items or sub-sections.

ii) Section B. Targeted at institutions offering ICT-related training. This survey consists of 22 items or sub-sections.

iii) Section C: A document scan/review instrument (questionnaire and template) developed to facilitate data capture from existing resources and available reference documents on the ICT industry in Jamaica.

1.3.2 The survey was conducted over three phases:
Phase 1: Instrument design/formulation, orientation, and pilot-testing;
Phase 2: Field work data collection, processing monitoring & validation;
Phase 3: Data processing, analysis, and reporting (draft & final reports).

1.3.3 Interviewers were given orientation and deployed across three economic and geographic zones, representing the three counties of Jamaica:
Zone A: CORNWALL: - (St. James, Westmoreland, Hanover, Trelawny, St. Elizabeth).
Zone B: MIDDLESEX: - (Manchester, Clarendon, St. Catherine, St. Ann, & St. Ann).
Zone C: SURREY: - (Kingston, St. Andrew, St. Thomas, & Portland)

1.3.4 The survey was conducted among 135 organizations - (60 ICT Firms; 50 Other Organizations using ICT; and 25 institutions offering ICT in their curriculum).

Table 1.1: Distribution of participating organizations by parish.

County	Parish	ICT Firms	Other Firms	Training. Institutions
SURREY	Kingston/St. Andrew	29	32	6
	Portland	2	3	2
	St. Thomas	2	2	- - -
MIDDLESEX	Clarendon	- - -	- - -	1
	Manchester	3	1	2
	St. Ann	3	2	3
	St. Catherine	6	3	5
	St. Mary	- - -	1	1
CORNWALL	St. James	13	1	3
	Hanover	- - -	2	- - -
	St. Elizabeth	- - -	- - -	1
	Trelawny	- - -	1	- - -
	Westmoreland	2	2	1
Total		60	50	25

1.4 Constraints and Limitations:

1.4.1 Given the use of a time-consuming (face-to-face interview) means of data collection; and given that some appointments were rescheduled and/or not kept by a few of the respondents, the data collection process was seriously constrained by time.

1.4.2 A few respondents were not cooperative; but some explained that their lack of cooperation was due to the fact that they viewed the client (HEART/NTA) as their competitor, and therefore did not see why they should provide the requested data.

1.4.3 Given that face-to-face interviews were the preferred means of data collection, the elected validation (by telephone follow-up) was not as effective as was expected.

1.4.4 Overall estimated time for execution of the surveys was seriously underestimated.

1.5 SUMMARY OF FINDINGS:

1.5.1 Background data from secondary sources suggest that ICT developments in Jamaica are far advanced and well supported by Government policies & provisions. The evidence provided by secondary data sources support that there are significant initiatives and developments the following areas:

- ❖ Development of a Government Industrial policy, with significant projections and supports for ICT activities in both education and business sectors.
- ❖ Development of an ICT Policy and Strategic Plan for the ICT Sector.
- ❖ The phased liberalization of the Telecommunications sector.
- ❖ Development of an ICT Policy for the Education System.
- ❖ Significant usage of information technologies in the education system.
- ❖ Private/public sector partnerships in technology interventions/initiatives.
- ❖ Establishment of an ICT Advisory Council and Central Information Technology Office (CITO).
- ❖ The emergence of new ICT training entities (e.g., CIT & CISCO)
- ❖ JAMPRO attracted firms engaged in ICT activities (e.g., AIS).
- ❖ Continued ICT interventions in schools under various private & public sector sponsored projects – including those by: JCSEF, NHT, USAID, IDB, etc.

1.5.2 The data from this current survey, however, reveal several major challenges along with the many commendable developments and successes.

1.5.3 According to internationally accepted definitions if "ICT Sector", as provided by the OECD, EUROSTAT, and the VOORBURG GROUP (a group of national statistical offices acting as a task force sponsored by the United Nations):

"For the manufacturing industries, the products of an industry candidate to be chosen as an ICT industry must: Be intended to fulfill the function of information processing and communication, including transmission and display; or use electronic processing to detect, measure or record physical phenomena, or to control a physical process.

For the service industries, the products of a candidate must: Be intended to enable functions of information processing & communication by electronic means.

1.5.4 This survey reveals that the ICT sector in Jamaica is not well defined. There is not yet an established/accepted set of criteria for classifying characteristics of so-called "ICT firms/companies in Jamaica". Furthermore, there is no comprehensive or near complete directory of the existing ICT firms/organizations operating in the country.

The HEART Trust/NTA has described the ICT Sector as comprising two broad components: i) ICT Firms; (firms directly employed in providing goods and services classified under the heading "ICT", including software development, telecommunications, call-contact centres, hardware and software purveyors, providers of networking and other ICT services; ii) Employers of ICT skilled labour – Public, Private, and non-governmental organizations, across sectors.

This survey has found that there is no common understanding or acceptance of the two categories suggested by HEART Trust/NTA. We have found instead that the ICT sector in Jamaica is rather loosely defined and characterized by three main features:
i) Type and technical quality of ICT infrastructure that exist in the country;
ii) Popularity of job-titles that serve to define the nature of ICT activities;
iii) Levels of access to & utilization of current hardware/software resources.

There is therefore the immediate need to have an officially established or adopted approved definition for the ICT Sector in Jamaica.

1.5.3 There is a wide range of job-titles that are used in the ICT sector but the seven most popular job-titles that serve to characterize the profile and nature of ICT activities are: Technical Support/Maintenance Personnel (71.7%); Customer Service Representatives (70.0%) ICT Managers/Executives (68.3%); ICT Clerical Support Staff (62.0%); Network Administrators/Engineers (55.0%); Marketing and Sales Representatives (50.0%); and Systems Administrators/Operators (41.7%); are the seven most popular job titles/categories that (along with the others titles listed) help to characterize the profile and nature of ICT businesses in the Jamaica.

1.5.4 Given the popularity of the main software packages in use – e.g., Windows (85%); Microsoft Office (80%), Accounting/Statistical (65%); Linux/Unix (46%); Internet Service (41.6%); DBMS (36.6%); Graphics (40%), it is clear that there is significant capacities for a wide range of information communication activities. The level and types of technology in use across the ICT sector are also indicative of a fairly sophisticated ICT sector in Jamaica.

1.5.5 The outlook on the future of the ICT sector, through the views of participants in the survey, is fairly positive. When asked what changes they envisaged in the sector organizations over the next 12-18 months, the respondents predicted the following:

- ❖ Expansion in the business (46.6%);
- ❖ No change in the current operations (33.3%);
- ❖ Introduction of new technologies (23.3%)
- ❖ Possible cut in staffing levels (11.7%)
- ❖ Business process redesign/modification (8.3%)
- ❖ Likely closure/termination of the business (3.3%)

1.5.6 The respondents identified the following five major factors that pose the most serious challenges or threats to the respective ICT firms/organizations:

- ❖ The current state of the national economy;
- ❖ Lack of experienced workers with high levels of ICT skills;
- ❖ High levels of competition, particularly from external sources;
- ❖ Crime and violence in the Jamaican society;
- ❖ Lack of industry standards to ensure consistent quality outputs.

1.5.7 When asked to identify the most distinctive highlights (success stories) of their ICT operations, four major achievements were repeatedly mentioned by respondents:

i) Growth in their ICT businesses (products/services) in recent years;
ii) Customer satisfaction, resulting from enhanced customer service;
iii) Improved productivity, as a result of investment in staff training/orientation;
iv) Innovations with the development and/or adoption of new technologies.

Other achievements mentioned by individual respondents include:

- ❖ Creative strategies used in promotion and public education;
- ❖ Interconnectivity to all locations of the business operations;
- ❖ Improved efficiencies in areas of operation due to new technologies.

1.5.8 The profile of institutions involved with ICT training, suggests that there is a wide range of training delivery levels, methods, resources, and standards that are being applied to ICT training in Jamaica. Given that this complex training delivery is now dominated by independent providers of training, it is uncertain how standards are addressed in this system; and specifically how quality in ICT training is ensured.

1.5.9 Assessment of the gap between what the ICT sector needs (demand) and what the education/training system provides (supply) reveals the following:

- ❖ Some skills in relatively high demand by ICT firms and other organizations, for example i) Network Engineering and ii) Programming, are fairly well covered in the curriculum offerings of ICT training institutions. See tables 3.1 and 4.1d. of the Main Report for further details.

- ❖ The top three job titles in demand:
  i) Technical Support & Maintenance (71.7% in ICT Firms & 30% other Firms)
  ii) Customer Service Representative (70.0% in ICT Firms & 34% other Firms)
  iii) ICT Managers (68.3% in ICT firms & 48% in other organizations), are not directly targeted by the curriculum of ICT Training Institutions, relative to the focus on skills sets required for these jobs.

- ❖ Given that most of the jobs titles in high or medium range demand require skills training at the professional & advanced levels, there is a significant gap in the output levels of ICT training institutions – where only 6% of annual outputs from training are at the professional/specialist level and only 26% are at the advanced level. See table 4.1e for output levels; and definitions of levels in Appendix B.

1.5.10 In respect of an overall assessment of capacities and capabilities in this system to deliver the required quality ICT training, it is beyond the scope of this survey to make a final and true evaluation at this point. This would require Front-End Analysis (FEA) of the existing training environment and learning conditions, as well as in-depth Training Needs Assessment (TNA) of recipients - through direct access to the learners, instructors, and resources/support systems.

1.5.11 While it is beyond the scope of this survey to make any systematic and objective assessment of the capacities in the system to offer sophisticated ICT training, it is clear that with the existing range of institutions the potential for quality delivery of sophisticated & high level ICT training exists in this system. However, the data also shows that a significant amount of institutions offering ICT training are operating relatively unsophisticated and mostly unaccredited programmes.

1.5.12 The specific matter of the capabilities of individual staff in the training institutions to deliver the required sophisticated ICT training is more evident that they are not yet at the desired levels. This is indicative of some lacking in capacity of the existing ICT training institutions to offer advanced level training. One indicator of this state of affairs is the relatively low number of staff members with advanced training.

- ❖ Administrators/Principals (60%)
- ❖ ICT Technical Staff (82%)
- ❖ Instructors – including non-technical staff (88%).

1.5.13 Given a rating scale of 1-4 (where 1 is low and 4 is high), respondents were asked to assess and rate various aspects of the provision for training and certification in the ICT Sector and overall impact of ICT on the organizations. While there was no significant difference in the ratings of provisions for training and certification across the organizations, it is noticeable that ratings by ICT Training Institutions were generally slightly higher than the ratings by ICT firms and other organizations.

THE MAIN REPORT:

2.0 Focus on the Jamaican ICT Sector

2.1 Background to ICT Developments:

2.1.1 Perhaps the first serious focus on the potentials of information and communication technologies as a means of empowering and enhancing development efforts in Jamaica started in the early 1990's, with initiatives from both the private and public sectors. In the private sector, a number of IT-related businesses were established; and the Jamaica Computer Society (JCS), through its Education Foundation arm (JCSEF) initiated a drive for schools to begin to utilizing computer technology in preparing students for the world of work – where technology was already beginning to transform businesses.

2.1.2 In 1992, the JCSEF in partnership with the HEART Trust/NTA, the Private Sector (through the Business Partners), and the Ministry of Education (through its school system) launched the Jamaica 2000 Project, which introduced information and communication technology (ICT) into school curriculum by establishing computer laboratories in about 170 schools. Simultaneously, a Private/Public Sector Think Tank, with support from the Inter-America Development Bank, initiated the EdTech 20/20 Project, which placed computer facilities in four clusters of schools island-wide for the primary purpose of impacting on Literacy & numeracy.

2.1.3 In 1996, the National Industrial Policy of Jamaica made projections about the use of ICT by its declaring that: "opportunities also exists for information technologies to be the driver in development of interactive training programmes and distance education that will complement training efforts within the information technology industry itself as well as through the entire education system (p.125).

2.1.4 In 1998 the Ministry of Education Youth & Culture presented a draft ICT Policy for education which presented, among others, the following key objectives:

a) to promote equitable access to educational resources through application of ICT;
b) to make school leavers computer literate – with skills for employment and further specialized training for the then emerging information economy;
c) to employ new ICT tools to increase online learning & communication, community stakeholder participation, and improved management of the sector.

2.1.5 In 1999/2000, a significant milestone in the quest for ICT-enhanced development in Jamaica was achieved with the agreement which ended the monopoly of Cable & Wireless on telecommunication and opened up access to a wide range of telecom-munication systems providers and services.

2.1.6 In 2002, the Government of Jamaica published a 5-year IT Strategic Plan in which it laid out its vision for facilitating use of Information & Communication Technologies (ICT) in the country. The following are short-terms goals of the plan:

- ❖ Clearly articulate the information technology strategic vision for Jamaica;
- ❖ Commission an assessment of status of ICT use in both private & public sectors.
- ❖ Allocate 2-4% of the budget to jump start the industry;
- ❖ Accelerate the installation of computer labs in educational institutions;
- ❖ Facilitate private sector initiatives to increase public access to the Internet;

- ❖ Utilize JAMPRO to promote investment & facilitate partnerships in the IT industry.
- ❖ Encourage individual ministries to develop tactical plans to complement this strategic ICT Plan.

2.2 Profile & Status of the Jamaican ICT Sector

2.2.1 The ICT sector in Jamaica is poorly defined, and there is no comprehensive or near complete directory of the existing ICT firms/companies to assist with characterization of this sector. Furthermore, there is no established/accepted criteria for classification or referencing of the characteristics of ICT firms/companies operating in Jamaica.

2.2.2 According to the 2002 ICT Strategic Plan, "the IT industry in Jamaica has been limited to: i) data entry; ii) software development; and iii) computer assembly. At that stage there were about 96 companies & affiliated institutions in the sector working in the following areas:

- ❖ Software distribution and dealers;
- ❖ Professional services (i.e., consulting, technical support & software dev.)
- ❖ Computer training companies;
- ❖ Internet service providers (ISP's); and
- ❖ Export services providers – (Data Entry; Telemarketing; Geographic Information Systems; Customized Software Services; and CAD/CAM Operators).

2.2.3 It has been reported that the ICT Sector has shown a trend in employment growth in recent years; and it seems poised for even further growth in the near future. Dr. Paul Robertson, Minister of Development, (speaking in the 2004/2005 Sectoral Debate) declared that - "In the Information and Communication Technology Sector, there was increased activity continuing the trend established since the liberalization of the communication sector in 2002". According to Minister Robertson, "as a result of expansion in the sector, employment has grown from over 15,000 and is expected to reach 20,000 by 2005".

Table 2.1: Employment by Main Line Business (2000-2002)
SOURCE: Labour Market Information Newsletter, PIOJ, March 2005 pg19

Main ICT Business Activity	No. of workers in March:			2002	
	2000	2001	2002	No. of jobs per company	No. of companies
Distribution	699	705	874	13	67
Voice telephony	4,904	5000	1913	971	3
Data Transmission	168	199	191	18	11
Call centre/telemarketing	734	811	812	115	7
Transaction processing	110	106	620	70	9
Fax, paging, teleconferencing	18	8	23	7	4
IT consulting	379	398	254	11	21
Training	243	265	397	9	34
Software development	214	248	654	19	34
Data processing	578	976	4,031	190	21
Maintenance & repair	96	103	329	10	34
Graphic and web content	101	104	193	10	10
Other	494	493	673	57	12
TOTAL	**8,741**	**9,504**	**11,873**	**43**	**275**

2.2.4 In support of its Strategic ICT Plan, the Government of Jamaica has:

i) Approved the first universal access programme, under the provision of the Telecommunications Act, to support its "E-learning Project" – which will ensure the provision of Internet access for schools, libraries and post offices.

ii) Established a Central Information Technology Office (CITO), with a Board "to collect and manage the funds (from "a universal service levy on all incoming international minutes terminated on both the fixed and mobile networks).

iii) Established links between CITO and the Ministries to serve as the focal point for implementing the strategic plan – with specific emphasis placed on the education sector as the spring-board.

iv) Proposed the goal of allocating some 2 - 4% of the budget for the ICT sector.

2.2.5 In his contribution to the 2004/2005 budget debate, Minister Phillip Paulwell (MICT) declared that following as some of the positive developments in the ICT Sector:

i) "The Global Information Technology Report (2005), ranked Jamaica 49th out of 104 countries in network readiness, first in the Caribbean, and following only behind the United States, Canada, Chile, and Brazil in this hemisphere."

ii) "Other rankings achieved by Jamaica, include:
- 44th in ICT Usage;
- 51st in Regulatory Environment;
- 43rd in Individual Usage;
- 54th in Business Usage.

2.2.5 According to Minister Paulwell, "the latest international update on Jamaica's readiness status, released in April 2005 by the Economic Intelligence Unit (EIU) - the business information arm of the Economist Group, ranks Jamaica 41st out of 65 of the world's major economies. He further noted that "CITO had made the request for Jamaica to be included in this e-readiness rankings, because CITO sought to ensure that the country's Information & Communication Technology (ICT) development could be benchmarked, in order to facilitate accurate ICT strategic planning within a global context".

2.2.7 While the data above are useful to indicate positive developments in the ICT Sector, indicated levels of employment across the sector are at best crude specifications of the state of affairs with respect to the employment situation in the ICT sector. While the data (particularly in table 2.1 above) may be useful to indicate employment levels at a point in time, there was no useful indication of specific trends in jobs in the ICT sector. Furthermore, it is noticeable that in cases where employment levels were high, these were concentrated across a limited number of crude job categories and across relatively few organizations.

2.2.8 This current survey attempts to present a more accurate profile of the Jamaican ICT Sector with respect to actual job titles/categories across these organizations, not just by their employment figures. Table 2.2 below indicates a complete characterization of the ICT sector in Jamaica by summarizing the frequency of job titles represented across these organizations.

Table 2.2: Distribution of Jobs Titles/Categories Across ICT Firms.

ICT Job Titles (Categories)	Number of Firms	Freq. of Titles Across ICT Firms
1. ICT Technical Support & Maintenance	43	71.7%
2. Customer Service Representative	42	70.0%
3. ICT Managers / Executive	41	68.3%
4. ICT Clerical Support Personnel	37	62.0%
5. Network Administrator/Controller	33	55.0%
6. Marketing & Sales Representatives	30	50.0%
7. Systems Administrators/Controllers	25	41.7%
8. Programmers/Designers	24	40.0%
9. ICT Help Desk Support Personnel	18	30.0%
10. Data Entry Clerks	18	30.0%
11. Web Masters / Internet Specialists	16	26.7%
12. ICT Business Analysts / Planners	15	25.0%
13. IT Project Coordinators/Managers	15	25.0%
14. Software Developers/Engineers	12	20.0%
15. Call Centre/Telemarketing	12	20.0%

2.2.9 As shown in table 2.2, Technical Support/Maintenance Personnel (71.7%); Customer Service Representative (70.0%) ICT Managers/Executives (68.3%); ICT Clerical Support Staff (62.0%); Network Administrators/Engineers (55.0%); Marketing & Sales Representatives (50.0%); and Systems Administrators/Operators (41.7%); are the seven most popular job titles/categories that serve (along with the others titles listed) to characterize the profile and nature of ICT businesses in the Jamaica.

2.2.10 The other very critical factor that serves to characterize the ICT sector in Jamaica is the type of ICT infrastructure that exists in the country. Perhaps the best indication of the state of the ICT sector is the summary of types of technologies in use across ICT Firms/Businesses. Table 2.3 indicates the frequency of each form of hardware & software in use across the ICT firms/businesses that participated in this survey:

Table 2.3: ICT Infrastructure (Hardware & Software in use by Jamaican ICT Firms/Businesses.

ICT Hardware	Frequency of Use Across ICT Firms		ICT Software/Applications	Frequency of Use Across ICT Firms
Computers (PC's)	100%		Windows(95/98/2000/XP)	85.0%
Servers	83.3%		Microsoft Office)	80.0%
Lap Tops	78.3%		Accounting/Statistical	65.0%
Telecom-System	30.0%		Linux / Unix	45.0%
Other (e.g. PDA's)	6.6%		Graphics	40.0%
			HTML	33.3%
			Database (DBMS)	36.6%
			Java Script	25.0%
			Customized	23.3%
			Oracle	18.3%

2.2.11 As shown in table 2.3, all ICT firms in Jamaica use computers (PC's), while the lap top version of computers are utilized in about 78.3% ICT firms. While this survey made no attempt to establish the level of firms operating in networked environment, the fact that a significant number of these organizations (83.3%) use a server is an indicator of networked activities, or the capacity for such activities.

2.2.12 Given the popularity of the main software packages in use – e.g., Windows (85.0%); Microsoft Office (80.0%), and Accounting/Statistical (65.0%); it is clear that there is significant capacity for a wide range of information communication activities.

2.2.13 Given the levels & types of technology in use across the ICT sector (as indicated by the popularity of both hardware and the types of software), it is clear that Jamaica's ICT sector is operating at a fairly sophisticated level. While it is expected that some of the current stock of computers will naturally need upgrading, it is strongly indicated that the systems in use are fairly modern and should be capable of sustaining fairly complex and sophisticated ICT activities for at least the next 12 to 18 months.

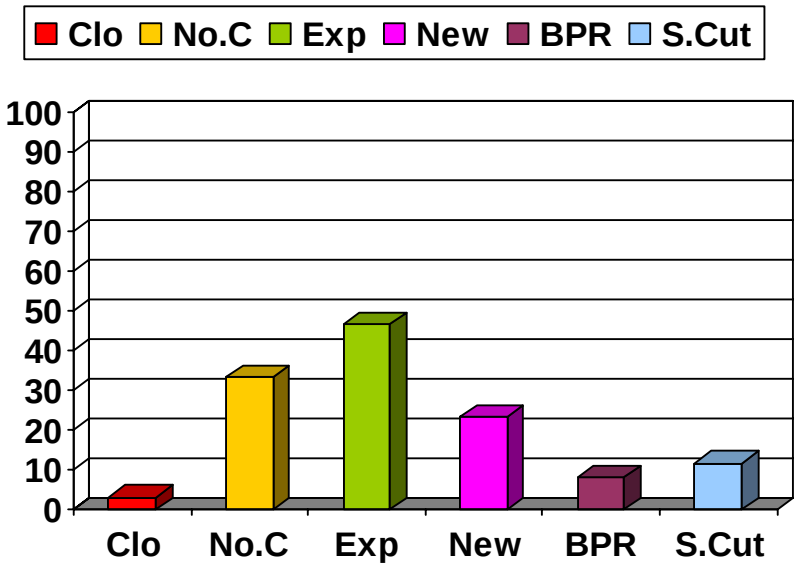
2.2.14 The wide range of choices among technology hardware and software in use may have serious implications for standards in both operation and quality control for performance assessment. The Jamaican ICT sector seems in desperate need of the systematic establishment of operating standards.

2.2.15 While it was beyond the scope of the current study to accomplish this, there is the need to take a closer look at utility levels and effectiveness among the varying hardware and software technologies in use across the sector. This would serve to inform planning, selection and evaluation of inputs/resources to enhance the ICT sector.

2.3 Challenges, Successes & Growth Potential

2.3.1 The prospects for growth and development of the Jamaican ICT sector, beyond the clear indication of growth in employment figures (discussed in section 2.1.3 & 2.1.4 above), are predicated not just on the current sophisticated levels of infrastructure in the sector (as indicated in table 2.3), but on the current state of affairs with ICT businesses, as indicated by the expressed opinions of the respondents who are the leaders in this sector. Chart 2A below presents a summary picture of the outlook for the sector, based on the projections and predictions of the respondents.

Chart 2A: Changes Envisaged in the ICT Sector by Participants



KEY: Closure (Clo); No Change (No.C); Expansion (Exp); New Technology (New); Business Process Redesign (BPR); Staff Cut (S.Cut).

2.3.2 The above chart indicates the outlook on the future of the ICT sector, through the expressed views of participants in the survey. When asked what changes they envisaged in their ICT organizations over the next 12-18 months, the following are the top six predictions made by respondents:

- ❖ Expansion in the business (46.6%);
- ❖ No change in the current operations (33.3%);
- ❖ Introduction of new technologies (23.3%)
- ❖ Possible cut in staffing levels (11.7%)
- ❖ Business process redesign/modification (8.3%)
- ❖ Likely closure/termination of the business (3.3%)

2.3.3 The respondents identified the following as the top five major factors that pose the most serious challenges or threats to the respective ICT firms/organizations:

- ❖ The current state of the national economy (26.7%);
- ❖ Lack of experienced workers with high levels of ICT skills (21.7%);
- ❖ High levels of competition, particularly from external sources (18.3%);
- ❖ Changing technologies and related demands including costs (15.0%);
- ❖ Crime and violence in the Jamaican society (11.7%);

2.3.4 When asked to identify the most distinctive highlights (success stories) of their ICT operations, four major achievements were repeatedly mentioned by respondents:

i) Growth in their ICT businesses (products/services) in recent years;
ii) Customer satisfaction, resulting from enhanced customer service;
iii) Improved productivity, as a result of investment in staff training/orientation;
iv) Innovations with the development and/or adoption of new technologies.

Other achievements mentioned by individual respondents include:

- ❖ Creative strategies used in promotion and public education;
- ❖ Interconnectivity to all locations of the business operations;
- ❖ Improved efficiencies in areas of operation due to new technologies.

2.4 Training and Employment in ICT Firms

2.4.1 Perhaps the most difficult item on the survey for respondents to deal with was the one related to estimated percentage of annual budget spent on training and related activities (both current and projected). For unexplained reasons, a significant number of respondents chose not to respond to this item. However, those that responded gave some indications (rough estimates) of amounts they have spent, and are likely to spend in future. Tables 2.4a & 2.4b below present summaries of such estimates for both current and future/projected expenditures on ICT Training.

Table 2.4a: Percentage of Budget spent on ICT Training

Spending	< 1%	1-5%	6-10%	11-15%	16-20%	Over 20%
% of Firms	22.2%	55.6%	15.5%	6.7%	-----	-----

Table 2.4b: Estimated Percentage of Budget likely to be spent on Future ICT Training

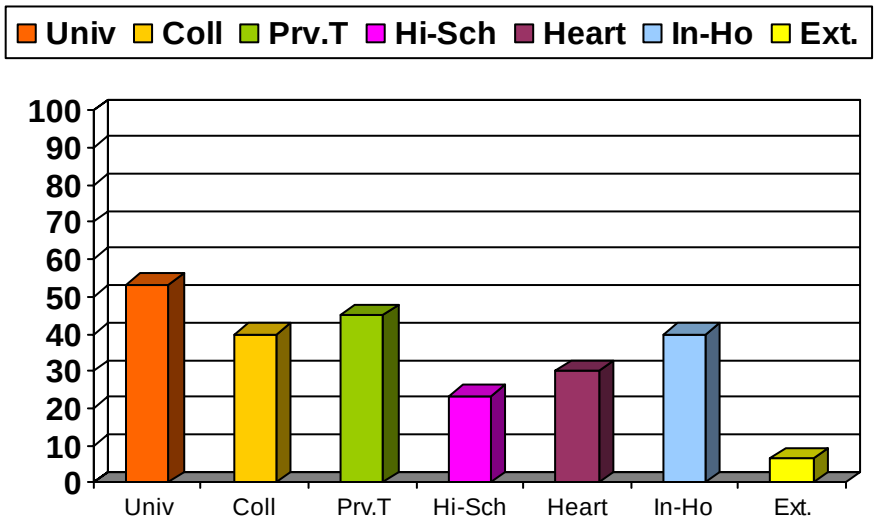
Spending	< 1%	1-5%	6-10%	11-15%	16-20%	Over 20%
% of Firms	15.5%	48.8%	17.8%	13.3	2.3%	2.3%

2.4.2 Two fairly strong indicators of the prospects for employment opportunities in the ICT sector were identified in section 2.2.2 above – where it was predicted/projected by participating firms that:

i) Expansions of ICT businesses are likely - (predicted by 46.6%);
ii) New technologies are also likely to be secured- (predicted by 23.3%)

2.4.3 Another useful indicator of the prospects for spending on training and the creation of job opportunities is the source from which these ICT sector firms get their workers. It is reasonable to expect that if the ICT sector is getting employees from higher education institutions and advanced ICT skills training programmes, there is likely to be less need for spending on the training of workers, than if they were getting them from lower level institutions with a little more than basic skills training in ICT.

Chart 2B: Sources of Workers for the ICT Sector



KEY: University (Univ); College (Coll); Other Tertiary/Private (Prv.T); High School (Hi-Sch); Heart; In-House (In-Ho); External (Ext).

2.4.4 Based on the data in Chart 2B above, it is clearly indicated that ICT firms get their workers from a variety of sources – representing varying levels of ICT training programmes and types of training institutions. It is noticeable that the popularity of these sources are fairly equal or evenly distributed across the ICT Firms: The top fiver sources include: Universities (53.3%); Colleges (40%), Other Tertiary/ Private (45%); In-House Training (40%); and HEART/NTA (30%). While it is reasonable to conclude from this data that there is no single main source of ICT workers, the data also reflect a wide range of offerings in ICT training, consistent with the wide range of job-titles in these organizations.

2.4.5 Given that the main sources of ICT workers are those most likely to offer specialized ICT training programmes, it is reasonable to conclude that the sector has been getting fairly well trained ICT workers. However, this is not obvious from the data. It is important to note that this data merely identifies sources, and does not offer any real representation of skills levels in any of these ICT organizations. Further analysis would be required to determine the mix of competencies within & across ICT Firms.

2.5 **Ratings of Provisions for ICT Training & Certification**

2.5.1 Given a rating scale of 1-4, where 1= low and 4 is high, respondents were asked to assess and rate the HEART Trust/NTA as a source of workers for the ICT sector; to assess and rate aspects of training and certification provisions by other entities, to determine priority on training within their organizations, and the quality and overall impact of ICT on in-house training in the organization overall. Table 2.5, presents a summary of this assessment by respondents.

Table 2.5: Rating of HEART/NTA & Other Training and Certification Providers

Aspects of Training & Certification	% Unaware	Average Rating
HEART/NTA as a source ICT Workers	6.6%	2.2
NCTVET Certification (Recognition)	15.0%	2.2
CISCO Technical Certification	16.6%	2.9
MicroSoft Certification	10.0%	3.0
CIT (Tech. Skills) / Advanced	18.3%	2.1
Private ICT Certification	- - - -	2.4
Priority on Training	- - - -	3.4
In-house ICT Training	- - - -	3.5
Overall impact of ICT Training	- - - -	3.5

2.5.2 The respondents have rated the HEART Trust /NTA as a source of ICT workers at a level that is just above average (2.2/ 4, or 55%). This rating is fairly consistent with data presented earlier (in Chart 2B) – where popular sources of ICT workers were compared. It is important to note that 6.6% of the respondents indicated that they were not aware that HEART/NTA produces trained/skilled ICT workers.

2.5.3 The respondents have rated In-house ICT training as the best training provision. However, a straight comparison with other training providers should be avoided, since those in-house training provisions are not normally complete and they do not include certification provision.

2.5.4 It is clear that, in respect of the four main recognized ICT training and certification providers, MicroSoft; and CISCO training/certification were given relatively high ratings (3.0 and 2.9 or 75% and 72.5% respectively). It is also noticeable that a significant amount of respondents (10% and 16.6% respectively) were not aware of the related training & certification programmes within the institutions.

2.5.5 While the CIT provision was given the lowest rating (2.1), it should be noted that the highest number of persons (18.3%) were also unaware of ICT training & certification provided by this organization.

2.5.6 The respondents have given a very high rating (3.4) to priority on training in their organizations. However, due to some limitations on the survey instrument it was not made clear from whose perspective the priority was assessed – (whether it was to be done from the individual's perspective or the organization's).

3.0 OTHER ORGANIZATIONS USING ICT

3.1 ICT Focus in Other Organizations

3.1.1 One strong indicator of progress in any ICT sector is the evidence of how well ICT products and services are being utilized in other organizations outside of the sector. In respect of employment, so-called ICT jobs are not always within the "pure" ICT sector. In fact, organizations both within and outside the sector often find that they are competing for certain categories of skilled persons for jobs. Table 3.1 below shows a comparative view of such commonality between ICT & Other Firms.

Table 3.1**:** Jobs Titles Across ICT Firms & Other Organizations.

ICT Job Titles (Categories)	No. of Firms	Job-Titles **ICT** Firms	No. of Firms	Job-Titles **Other** Firms
1. Technical Support /Maintenance	43	71.7%	15	30.0%
2. ICT Managers / Executives	42	68.3%	24	48.0%
3. ICT Clerical Support Personnel	41	67.7%	20	40.0%
4. Customer Service Representatives	37	62.0%	20	40.0%
5. Network Administrators/Controllers	33	55.0%	20	40.0%
6. Marketing & Sales Representatives	30	50.0%	10	20.0%
7. Systems Administrators/Controllers	25	41.7%	20	40.0%
8. Programmers / Designers	24	40.0%	16	32.0%
9. ICT Help Desk Support Personnel	18	30.0%	12	24.0%
10. ICT Data Entry Clerks	18	30.0%	Nil	- - - -
11. Web Masters / Internet Specialists	16	26.7%	4	8.0%
12. ICT Business Analysts / Planners	15	25.0%	6	12.0%
13. IT Project Coordinators/Managers	15	25.0%	8	16.0%
14. Software Developers/Engineers	12	20.0%	3	6.0%
15. Call Centre/Telemarketing	12	20.0%	Nil	- - - -

3.1.2 A first look at the data in table 3.1 practically confirms there are similarities between ICT firms and several other organizations in respect of ICT-related job titles found in both. However, a closer look will reveal some striking differences. For example, in all cases, the percentage representation of jobs in other firms generally less than in the ICT firms; and two titles/categories (Data Entry Clerks, & Call Centre/Telemarketers) are absent from other organizations.

3.1.3 It is also interesting to note that, in respect of a few jobs, such as: #4 - Systems Administrators/Controllers, and #9 - ICT Help Desk Support Personnel, demand levels are fairly similar across ICT firms and other organizations.

3.1.4 On the matter of the other very critical factor that serves to characterizes the ICT sector in Jamaica (the technology infrastructure), it is also interesting to note that requirements for these in both sets of organizations are fairly similar. Tables 3.2a & 3.2b below reveal other similarities and some differences.

Table 3.2a: ICT Infrastructure (Hardware) Across ICT Firms & Other Organizations.

ICT Firms/Businesses			Other Organizations	
ICT Hardware	Freq. of Use		ICT Hardware	Freq. of Use
Computers (PC's)	100%		Computers (PC's)	100%
Lap Top	78.3%		Lap Top	75%
Servers	86.7%		Servers	64%
Telecomm	30%		Telecomm	16%
Other (e.g. PDA's)	6.6%		Other (e.g. PDA's)	4%

3.1.5 As in the case of job titles/categories across both types of organization, the data in table 3.2a indicates that there are similarities in respect of uses being made of technology hardware.

3.1.6 It is important to note however that, except in the case of computers (PC's) levels of uses being made of technology hardware are generally less in Other Firms

Table 3.2b: ICT Software in Use Across ICT Firms & Other Organizations

ICT Firms/Businesses			Other Organizations	
ICT Software/Applications	Level of Use		ICT Software/Applications	Level of Use
Windows(95/98/2000/XP)	85.0%		Windows(95/98/2000/XP)	91.7%
Microsoft Office)	80.0%		Microsoft Office)	76.7%
Linux / Unix	45.0%		Linux / Unix	26.7%
Oracle	18.3%		Oracle	6%
Database (DBMS)	36.6%		Database (DBMS)	68.3%
Graphics	40.0%		Graphics	21.7%
Accounting/Statistical	65.0%		Accounting/Statistical	66.7%
Internet Service	41.6%		Internet Service	61.7%
HTML	33.3%		HTML	23.3%
Java Script	25.0%		Java Script	25.5%
Customized	23.3%		Customized	48.0%

3.1.7 While levels of ICT software uses in ICT firms are generally higher than in the case of other organizations, the existence of modern technologies is not significantly less sophisticated in the other organizations.

3.1.8 Again the comparison between ICT firms and other organizations, with respect to types and levels of software being utilized, remains pretty much the same. There are commonalities in uses of technology software, but the levels of use in ICT firms are generally higher than in other organizations.

3.1.9 The reader might be tempted to ask at this stage: "In light of all these commonalities, what is the big difference between ICT firms and other organizations. The answer is rather simple: Its in the nature of business. Table 3.3 below shows the striking differences between ICT firms and Other organizations in respect of the "nature of business" aspect of the profiles of both sets of organizations.

Table 3.3: Comparative Profiles of ICT Firms & Other Organizations
(Based on 60 ICT Firms & 50 Other Firms participating in this survey).

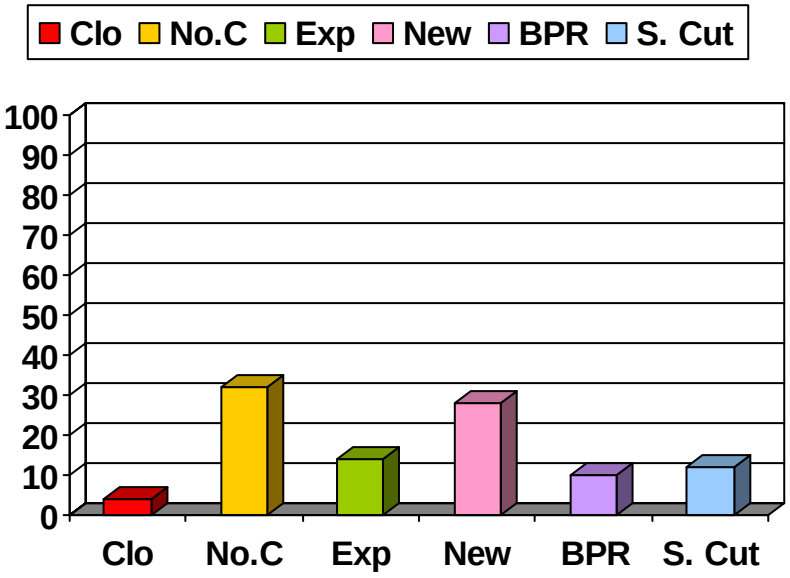
ICT Firms Businesses	Freq./Level		Other Firms Businesses	Freq./Level
Hardware Dealership	46.7%		Manufacturing	6.0%
Consulting Services	13.3%		Hotel/Tourism Products	6.0%
Repairs & Maintenance	25.0%		Financial Services	18.0%
Retailers/Distributors	25.0%		Retail & Distribution	24.0%
Software Development	30.0%		Insurance Sales	4.0%
Tech. Marketing & Sales	30.0%		Marketing Sales/Services	16.0%
Telecommunication Sys	18.3%		Legal Services	2.0%
Call Service/Center Opr.	10.0%		Government Services	12.0.%
Application Ser Providers	12.0%		Other	24.0%
Utilities Services.	6.7%			
Others	18.3%			

3.1.10 As shown in the table of comparison above, the nature of business in ICT firms is generally different from those of other organizations in the context of this survey. It is also noticeable that frequency levels of these businesses are generally lower in other organizations. One simple explanation for this is that, while most ICT firms are often involved in multiple businesses/operations, the other organizations are usually single business oriented.

3.2 Challenges, Successes & Growth Potential

3.2.1 The prospects for growth and development or significant change in the other organizations are far less certain than in the case of ICT firms. Chart 3A. below presents a summary of the outlook for the other organizations, based on the projections and predictions of the respondents.

Chart 3A: Changes Envisaged in the Other Organizations



KEY: Closure (Clo); No Change (No.C); Expansion (Exp); New Technology (New); Business Process Redesign (BPR); Staff Cut (S. Cut).

3.2.2 When asked what changes they envisaged in their organizations over the next 12-18 months, the respondents in the other organizations predicted the following:

- ❖ No change in the current operations (32%);
- ❖ Introduction of new technologies (28%)
- ❖ Expansion in the business (16%);
- ❖ Possible cut in staffing levels (12%)
- ❖ Business process redesign/modification (10%)
- ❖ Likely closure/termination of the business (2%)

3.2.3 Respondents in the other organizations identified the top five major factors that pose serious challenges or threats to their organizations' development.

- ❖ The state of the Jamaican economy (25.0%);
- ❖ Competition for & lack of highly trained ICT workers (20.0%);
- ❖ Crime and violence in the Jamaican society (16.7%);
- ❖ Changing/new technologies and their related costs (11.7%);
- ❖ The demands for training and related costs (8.3%).

3.2.4 When asked to identify the most distinctive highlights (success stories) of their businesses, three major achievements were generally mentioned by respondents:

i) Growth in their businesses (products/services) in recent years;
ii) Customer satisfaction, resulting from enhanced customer service;
iii) The introduction of computers and new communication technologies.

3.3 **Training & Employment in Other Organizations**

3.3.1 This question of what estimated percentage of annual budget is spent on training and related activities proved to be just as difficult for participants in these other organizations, as it was for the ICT Firms. A significant number of respondents in this group also chose not to respond to this item. Those who responded gave the following estimates:

Table 3.4a: Percentage of Budget spent on Training in Other Organizations

Spending	< 1%	1-5%	6-10%	11-15%	16-20%	Over 20%
% of Firms	28%	46%	18%	8%	- - - -	- - - -

Table 3.4b: Estimated Percentage of Budget likely to be spent on Future ICT Training

Spending	< 1%	1-5%	6-10%	11-15%	16-20%	Over 20%
% of Firms	10%	56%	26%	4%	4%	- - - -

3.3.2 The distribution of estimated percentage of budget spending on training (current and projected) are similar in range to those presented by the ICT firms.

3.3.3 Spending on training and the creation of job opportunities seems to be generally unknown, and where estimates are made they may have very little to do with actual expenditures, since many of the respondents expressed uncertainty and were also tentative about supplying this kind of information in the first place.

3.4 Ratings of Provisions for ICT Training & Certification

3.4.1 Given a rating scale of 1-4, where 1= low and 4 is high, respondents were asked to assess and rate the HEART Trust/NTA as a source of skilled workers for their organizations; to assess and rate aspects of training and certification provisions by other training and/or or certification providers; to determine the priority on training within their organizations, and the overall impact of ICT on the organization.

Table 3.5: Summary of Rating of HEART/NTA & Training & Certification Providers

Aspects of Training & Certification	% Unaware	Average Rating
HEART/NTA as a source ICT Workers	16%	2.5
NCTVET Certification (Recognition)	26%	2.7
CISCO Technical Certification	26%	3.1
MicroSoft Certification	12%	3.2
CIT (Tech. Skills) / Advanced	24%	2.8
Private ICT Certification	4%	2.6
Priority on Training	- - - -	3.0
In-house ICT Training	- - - -	2.8
Overall impact of ICT Training	- - - -	3.3

3.4.2 Respondents in other organizations rated the HEART Trust/NTA and other training/ certification providers generally higher than respondents in the ICT organizations.

3.4.3 ICT firms, however, rated the following items higher than the other organizations: i) Priority on Training; ii) In-house Training; and iii) Overall Impact of ICT.

.

3.4.4 Another significant difference between the ratings of ICT organizations and those of other organizations is the fact that participants in other organizations were generally more unaware of the training provisions and certification products offered by the these training entities. Approximately 25% of respondents were unaware of provisions & services of: NCTVET, CISCO, CIT; and a significant 16% were also unaware of the training & certification provisions of HEART/NTA; while 12% were unaware of the Microsoft Certification.

4.0 INSTITUTIONS OFFERING **ICT** TRAINING

4.1 Profiles, Capacities, & Capabilities of ICT Training Institutions

2.5.1 Institutions offering ICT training fall into four basic grouping:
i) Public learning institutions; ii) Private sector institutions; iii) Church-based training institutions; iv) NGO operated training centres.

Table 4.1a: Profile of Institutions by Groupings

Public	Private	Church-based	NGO
20%	60%	12%	8%

2.5.2 There are six distinctive levels of training institutions generally involved with ICT training, and these status levels of institutions often determine the level of training that is usually accessed from these training delivery entities. It is important to note that the majority (80%) of these training institutions are not governed by the Ministry of Education. An even more significant point to note is that most of these institutions are not accredited to offer the training they do.

Table 4.1b: Profile of Institutions by Levels

University	College	Other Ter.	Sec./Mix	Trng Cntr.	Prvt./Infor
4%	20%	12%	20%	28%	16%

2.5.3 The profile of institutions involved with ICT training, as shown in tables 4.1a; 4.1.b & 4.1c suggests that there is a wide range of training delivery means, methods, and technology resources, being applied to ICT training. The data in table 4.1c indicates that the utilization of technology for training activities is significant in over 60% of the training institutions.

4.1.4 Given that this complex training delivery is dominated by relative independent providers (80% private), it is uncertain how standards are generally addressed in this system; and specifically how ICT training standards are ensured.

Table 4.1c: Profile of Institutions by Computer Utilization

No. of Computers In use	1-10	11-20	21-50	51-100	Over100
	8%	40%	28%	8%	16%
% of Computers used for training.	1-15%	16-30%	31-50%	51-75%	Over 75%
	- - - -	- - - -	8%	32%	60%

4.2 Assessment of ICT Skills Gap: Between Sector needs (demand) and what the education/training system provides (supply):

Table 4.1d: Programme Offerings Across Training Institutions

Programme/Course	Frequency		Programme/Course	Frequency
Desk Top Publishing/Word.P.	76.0%		Software Design & Develop-	36.0%
Web Design & Development	64.0%		Linux, Java, Pearl, XM, Etc.	24.0%
Programming Languages	56.0%		Communication Skills	20.0%
Network Engineering	44.0%		Marketing, Sales & Services	12.0%
Accounting/Statistical Packs	40.0%			

4.2.1 Table 3.1 above indicates that the top seven job titles in demand by ICT Firms are:

i) Technical Support & Maintenance (71.7% in ICT firms & 30% other firms)
ii) Customer Service Representative (70.0% in ICT firms & 34% other firms)
iii) ICT Managers (68.3% in ICT Firms & 48% in other organizations),
iv) Customer Service Representatives (62.0% in ICT firms & 40.0% in others);
v) Network Administrators (55.0% in ICT Firms and 40.0% in others);
vi) Marketing & Sales Representatives (50.0% in ICT firms & 20.0% in others);
vii) Systems Administrators/Controllers (41.7% in ICT firms & 40.0% in others).

4.2.2 These job titles should provide the basis or main focus of the curriculum of the ICT training institutions. However, it is noticeable that the top three programmes/courses in ICT training institutions are not directly related to the top three jobs in demand across ICT firms and other organizations.

4.2.3 While programme offerings of the training Institutions vary according to categories/ levels of the institutions, the curricula of ICT training are fairly similar in respect of the titles of courses offered across programmes. However, it is not yet known to what extent training in the institutions are derived from job functions in the ICT firms and other organizations.

4.2.4 Given that most of the job titles in high or medium range demand require skills training at the professional and advanced levels, there is a significant gap in the output levels of ICT training institutions; where only 26% of annual outputs from these training institutions are at the advance level; and only 6% are at the professional/specialist level. See definitions of levels in Appendix B.

4.2.5 In respect of an overall assessment of capacities and capabilities in this system to deliver the required quality ICT training, it is beyond the scope of this survey to make a final and true evaluation at this point. This would require Front-End Analysis (FEA) of the existing training environment and learning conditions, as well as in-depth Training Needs Assessment (TNA) of recipients - through direct access to the learners, instructors, and resources/support systems.

4.2.6 While it is beyond the scope of this survey to make any systematic and objective assessment of the capacities in the system to offer sophisticated ICT training, it is clear that with the existing range of institutions the potential for quality delivery of sophisticated & high level ICT training exists in this system. However, the data also shows that a significant amount of institutions offering ICT training are operating relatively unsophisticated and mostly unaccredited programmes.

Table 4.1e: ICT Training Levels of Staff Across Institutions

Staff	Category	Advance	Intermediate	Basic	None
Level of ICT-related Training By Category	Principal/Vice	60%	36%	4%	- - -
	ICT Technical	82%	18%	- - -	- - -
	Instructors	88%	12%		
	Admin. Staff	12%	80%	8%	
	Other Support	20%	40	40%	

4.2.7 Capabilities of staff in ICT training institutions to deliver the required sophisticated training is not yet at the desired levels. This is also indicative of some lacking in capacity of the existing ICT training institutions to offer advanced level training. Delivery staff with advanced level training in ICT skills include:

- ❖ Administrators/Principals (60%)
- ❖ ICT Technical Staff (82%)
- ❖ Instructors (88%).

4.2.8 Any reasonable assessment of capacities in this system must include a thorough Front-End Analysis (FEA) of the existing training environment and learning conditions, as well as in-depth Training Needs Assessment (TNA) with direct access to the learners, instructors, and resource/support systems. Given the inherent limitations of this survey (with only a superficial scan of the environment and opinion data of participants), it is not possible to make a true assessment of the capacities and capabilities for ICT training delivery at this point.

4.3 Internet Access & Online Facilities in ICT Training Institutions:

4.3.1 One of the key indicators of the capacity of a modern training delivery system in the ICT sector is the presence, or absence, of alternative electronic modes of delivery through web-based facilities such as the Internet and online learning facilities.

4.3.2 One feature of the existing capacity for ICT training is access to and use of the Internet to augment and enhance instructional delivery. Another technology-supported/enhanced training delivery system is online learning. The table below presents the current and projected state of both instructional delivery systems, as perceived and envisaged by the respondents:

Table 4.1e: Internet Access & Online Learning in Training Institutions

Internet Access & Location					Online Learning Used	
Classroom	Laboratory	Staffroom	Office		YES	NO
25.0%	20.0%	15.0%	40.0%		15.4%	84.6%
Students have access to the Internet:		YES	NO		Future Online Learning	
		92.3%	7.7%		YES	NO
Students required to pay for Internet access:		YES	NO		76.9%	23.1%
		30.8%	69.2%			

4.3.3 Two strong indicators of the level of ICT integration into the training process are:

i) use of the Internet to supplement instructional contents;
ii) use of online learning as an alternative mode of instructional delivery.

4.3.4 While it is unknown how sophisticated the support systems are for Internet uses and online learning, it is obvious from the data in tables 4.1e and 4.3c that these are already two popular means/resources for ICT training support in Jamaica.

4.3.5 While the presence of online learning facility in and of itself is not necessarily an indication of quality in related training programmes, it is interesting to note that a significant amount (92.3%) of trainees have access to the Internet, even if over 30% of them are required to pay for such access. While the data on utilization of online learning is currently low (15.4%), it is rather encouraging that this picture is projected to be reversed in the future.

4.4 **Comparative Ratings of ICT Provisions by All Organizations.**

4.4.1 Given a rating scale of 1-4 (where 1 is low and 4 is high), respondents were asked to assess and rate various aspects of the provision for training and certification in the ICT Sector and overall impact of ICT on the organizations. Based on the data in the table of comparative ratings by the groups of respondents, all aspects of provisions for ICT training and certification are generally highly rated (above the average on all items) by all three types of organizations in the ICT sector.

Table 4.4: Summary of Ratings on ICT Training & Certification Provisions
(Rating scale 1-4, where 1 is lowest and 4 is highest)

Provisions of Training And Certification	Ratings by ICT Firms	Ratings by Other Firms	Ratings by Institutions
HEART/NTA as source of skilled workers	2.2	2.5	2.7
NCTVET Certification - (Recognition)	2.2	2.7	2.5
CISCO Training & Certification	2.9	3.1	3.2
MICROSOFT Training & Certification	3.0	3.2	3.3
C I T Training & Certification	2.1	2.8	3.0
Private ICT Training & Certification	2.4	2.6	3.2
Priority on Training in the Organization	3.4	3.0	3.0
In-house ICT Training	3.5	2.8	3.6
Overall impact of ICT on the Organization	3.5	3.3	3.8

4.4.2 While there is no significant difference in the ratings of provisions for training and certification across the organizations, it is noticeable that ratings by ICT Training Institutions are generally slightly higher than the ratings by ICT firms & other organizations.

4.4.3 While ratings of HEART/NTA & NCTVET as ICT Training & Certification providers are above average, they both have the lowest overall ratings across all respondents. This result may be pointing to more than just some customer dissatisfaction with the quality of their ICT provisions; and may be indicating the need for enhanced public education and specific promotion of ICT training by HEART/NTA, and Certification of ICT outputs by the NCTVET.

5.0 Conclusions and Recommendations

Background data from secondary sources suggest that ICT developments in Jamaica are far advanced and well supported by Government policies & provisions. The evidence provided by secondary data sources support that there are significant initiatives and developments the following areas:

- Development of a Government Industrial policy, with significant projections and supports for ICT activities in both education and business sectors.
- Development of an ICT Policy and Strategic Plan for the ICT Sector.
- The phased liberalization of the Telecommunications sector.
- Development of an ICT Policy for the Education System.
- Significant usage of information technologies in the education system.
- Private/public sector partnerships in technology interventions/initiatives.
- Establishment of an ICT Advisory Council .
- Establishment of the Central Information Technology Office (CITO).
- The emergence of new ICT training entities (e.g., CIT & CISCO)
- JAMPRO attracted firms engaged in ICT activities (e.g., AIS).
- Continued ICT interventions in schools under various private & public sector sponsored projects – including those by: JCSEF, NHT, USAID, IDB, etc.

Results of the current survey, however, reveal that there are several major challenges along with ICT developments in Jamaica. The following are some of the results and major challenges, as revealed by this survey:

The ICT sector in Jamaica is not well defined. There is no complete directory of the existing ICT organizations; and no established criteria for classification or referencing; and there are variations in job-titles being used in the ICT sector. The level and types of technology in use across the ICT sector are also varied; and there are no established performance standards.

According to internationally accepted definitions if "ICT Sector", as provided by the OECD, EUROSTAT, and the VOORBURG GROUP (a group of national statistical offices acting as a task force sponsored by the United Nations):

> "For the manufacturing industries, the products of an industry candidate to be chosen as an ICT industry must: Be intended to fulfill the function of information processing and communication, including transmission and display; or use electronic processing to detect, measure or record physical phenomena, or to control a physical process.
>
> For the service industries, the products of a candidate industry must: Be intended to enable the functions of information processing and communication by electronic means."

This survey has found that there is no common understanding or acceptance of the two categorizations suggested by HEART Trust/NTA; but the ICT sector in Jamaica is rather loosely characterized by three main features:

i) Type and technical quality of ICT infrastructure that exist in the country;
ii) Popularity of job-titles that serve to define the nature of ICT activities;
iii) Levels of access to & utilization of current hardware/software resources.

There is therefore the immediate need to have an officially established or adopted and approved definition for the ICT Sector in Jamaica.

Recommendation #1:

> In collaboration with the Ministry of Commerce, Science & Technology, establish an ICT Sector Committee (or Lead Group) with the mandate to examine the existing contextual realities in which ICT organizations operate in Jamaica; and develop a comprehensive profile of the sector, with definitions of terms & operating standards.

The ICT training delivery system is dominated by relative independent providers, most of which are operating informal/unaccredited programmes below the recognized tertiary level. It is also uncertain how matters of standards and quality assurance are addressed.

Recommendation #2:

> Actively advocate and pursue the establishment of a directory of ICT Training Institutions, and encourage/facilitate the registration and accreditation of such institutions operating in the education & training sector.

Assessment of the gap between ICT sector needs (demand) and the provisions of the education/training system (supply) reveals that: i) Some skills in relatively high demand by ICT firms and other organizations are fairly well covered in the curriculum offerings of some ICT training institutions. However, there are several skills/competencies recognized and used in the ICT sector that are not targeted by the curricula of most training institutions. There is also a significant gap in the output levels of ICT training institutions – where only 6% of annual outputs from training are at the professional/ specialist level and only 26% are at the advanced level.

Recommendation #3:

> HEART/NTA should immediately commission the design & development of new courses & programmes and/or collaborate with tertiary level institutions to design and customize new professional & advanced skills training for the ICT sector.

Recommendation #4:

> Training in ICT should also focus on the critical competencies/skills-sets required for the "Top Seven" high-demand jobs identified in this survey:
> - ICT Technical Support & Maintenance;
> - ICT Managers/Executives;
> - ICT Clerical Support Personnel;
> - ICT Customer Representatives;
> - Network Administrators/Controllers;

- ❖ Marketing & Sales Representatives;
- ❖ Systems Administrators.

Recommendation #5:

> Existing “Language and Communication” courses in training institutions should be redesigned based on a re-definition of the term “communication”, with more focus on modern communication means and strategies.

Overall assessment of capacities and capabilities in this system to deliver ICT training is not yet at the desired levels. It is also indicated that some institutions are lacking in the capacity to offer sophisticated/advanced or professional/specialist ICT training.

Recommendation #6:

> Immediately commission a comprehensive Front-End Analysis (FEA) of the existing training environment, delivery system, and learning conditions for ICT; and conduct an in-depth Training Needs Assessment (TNA) within selected institutions to form the basis for a pilot project in institutional strengthening for ICT training and development.

Recommendation #7:

> Encourage and facilitate the formation of an ICT Board of Studies within and across institutions involved with ICT skills training at the tertiary level; and develop an ICT Strategic Planning Workshops Series for these and other institutions to enhance individual competencies and the instructional delivery system for ICT in Jamaica.

APPENDIX A: List of Participating Organizations

1. List of ICT Firms/Companies

Name of Institution / Address	Parish	County
Compu-Max	Manchester	Cornwall
Computer Services & HiTech Print	Manchester	Cornwall
CompuTouch	Manchester	Cornwall
ACS BPS JA. Ltd.	St. James	Cornwall
Apple Vacations (Ja) Limited	St. James	Cornwall
Bay Telemarketing Agency Ltd	St. James	Cornwall
BML	St. James	Cornwall
Computer Plus Sales & Service	St. James	Cornwall
Computers '4' Less	St. James	Cornwall
Home & Office Technology Systems	St. James	Cornwall
Indusa Global Services	St. James	Cornwall
Media Track Inc	St. James	Cornwall
Office Equipment Sales & Service	St. James	Cornwall
Sitel Caribbean Limited	St. James	Cornwall
Standard Data Ltd.	St. James	Cornwall
VistaPrint	St. James	Cornwall
Computaz & Beyond Ltd.	Westmoreland	Cornwall
Westcom Jamaica Ltd.	Westmoreland	Cornwall
Anngel.com	St. Ann	Middlesex
Brown's Town Computers	St. Ann	Middlesex
Comtac Computer Studies Ltd.	St. Ann	Middlesex
Caribbean Computers	St. Catherine	Middlesex
Computer Genie	St. Catherine	Middlesex
Computers & Peripherals Ltd.	St. Catherine	Middlesex
Cybervale	St. Catherine	Middlesex
Spanish Town Technology Centre	St. Catherine	Middlesex
Syscom	St. Catherine	Middlesex
Advanced Digital Services	St. Catherine	Middlesex
D-Tech Computer Care	Portland	Surrey
Ela Systems Ltd.	Portland	Surrey
Advanced Integrated Systems	St. Andrew	Surrey

Cable & Wireless	St. Andrew	Surrey
Cablepro Data Services Ltd.	St. Andrew	Surrey
commNett Jamaica Ltd.	St. Andrew	Surrey
Complete Solutions Jamaica	St. Andrew	Surrey
Computer Sales & Services Ltd.	St. Andrew	Surrey
Computers & Controls (Ja) Ltd.	St. Andrew	Surrey
D3 Technologies Ltd.	St. Andrew	Surrey
Digicel	St. Andrew	Surrey
Digital Transtec Ltd.	St. Andrew	Surrey
Emoquad	St. Andrew	Surrey
Fiscal Services (EDP) Ltd.	St. Andrew	Surrey
Fujitsu-ICL	St. Andrew	Surrey
IBM	St. Andrew	Surrey
Illuminat (Ja.) Ltd.	St. Andrew	Surrey
IMEX Technologies Ltd	St. Andrew	Surrey
InfoChannel	St. Andrew	Surrey
Innovative Systems	St. Andrew	Surrey
Intcomex	St. Andrew	Surrey
Kasnet Online	St. Andrew	Surrey
Logic Microsystems	St. Andrew	Surrey
Management Control Systems	St. Andrew	Surrey
Mona Informatix Ltd.	St. Andrew	Surrey
Mossel	St. Andrew	Surrey
Port Computer Services Ltd.	St. Andrew	Surrey
TouchPoint Systems Ltd.	St. Andrew	Surrey
Ultimate (Jamaica) Ltd.	St. Andrew	Surrey
Visnet Solutions Ltd.	St. Andrew	Surrey
CompuVillage Computer Sales & Accessories	St. Thomas	Surrey
Professional Software Co. Ltd.	St. Thomas	Surrey

2. List of **Other** Organizations Using ICT.

Name of Institution / Address	Parish	County
Hanover Co-Op Credit Union Ltd.	Hanover	Cornwall
Tryall Hotel	Hanover	Cornwall
Mandeville Couriers	Manchester	Middlesex
Crichtons Automotive	St. James	Cornwall
National Commercial Bank	Trelawny	Cornwall
Bank of Nova Scotia	Westmoreland	Cornwall
Hedonism II	Westmoreland	Cornwall
Beaches Boscobel Resort & Golf Club	St. Ann	Middlesex
Western Sports Ltd.	St. Ann	Middlesex
Carreras Group Ltd.	St. Catherine	Middlesex
Jamaica Broilers Ltd.	St. Catherine	Middlesex
MegaMart	St. Catherine	Middlesex
St. Mary Co-op Credit Union Ltd.	St. Mary	Middlesex
Courts Ja. Ltd.	Portland	Surrey
Jamaica Palace Hotel	Portland	Surrey
JPS	Portland	Surrey
Air Jamaica	St. Andrew	Surrey
Cari-Med	St. Andrew	Surrey
COK	St. Andrew	Surrey
Courtleigh / Knutsford Court Hotels	St. Andrew	Surrey
Dunn Cox	St. Andrew	Surrey
EXIM Bank	St. Andrew	Surrey
Facey Commodity	St. Andrew	Surrey
First Caribbean International Bank	St. Andrew	Surrey
First Global Financial Services	St. Andrew	Surrey
Fiscal Services (EDP) Ltd.	St. Andrew	Surrey
Fraser, Fontaine & Kong	St. Andrew	Surrey
Garbage Disposal & Sanitation Systems Ltd.	St. Andrew	Surrey
Grace Kennedy	St. Andrew	Surrey
IGL	St. Andrew	Surrey
Inland Revenue	St. Andrew	Surrey
Jamaica Bottling Co. Ltd.	St. Andrew	Surrey
Jamaica Flour Mills	St. Andrew	Surrey

Jamaica International Insurance Co. Ltd.	St. Andrew	Surrey
Jamaica Observer	St. Andrew	Surrey
JAMPRO	St. Andrew	Surrey
JDF	St. Andrew	Surrey
JMMB	St. Andrew	Surrey
Milex Security Services Ltd.	St. Andrew	Surrey
Ministry of Commerce, Science & Technology	St. Andrew	Surrey
Motor Sales & Service	St. Andrew	Surrey
National Baking Company Ltd.	St. Andrew	Surrey
NHT	St. Andrew	Surrey
Office of Registrar of Companies	St. Andrew	Surrey
Paymaster	St. Andrew	Surrey
Sangsters	St. Andrew	Surrey
T. Geddes Grant	St. Andrew	Surrey
Sherwin Williams	St. Andrew	Surrey
Morant Villa Hotel	St. Thomas	Surrey
Serge Island Dairies Ltd.	St. Thomas	Surrey

3. List of Institutions Offering ICT Training in their Curriculum

Name of Institution / Address	**Parish**	**County**
Church Teachers' College	Manchester	Cornwall
Institute of Bus &Technical Skills	Manchester	Cornwall
The Education Centre	St. Elizabeth	Cornwall
Almena Computer School	St. James	Cornwall
Montego Bay Comm College	St. James	Cornwall
Undregrad College	St. James	Cornwall
3D Computer Center	Westmoreland	Cornwall
Knox Community College	Clarendon	Middlesex
Browns Town Computers	St. Ann	Middlesex
Comtac Computer Studies Ltd.	St. Ann	Middlesex
Unique Enterprise & Call Centre	St. Ann	Middlesex
Computer Genie	St. Catherine	Middlesex
Computer Sage Skills Training Centre	St. Catherine	Middlesex
Jamaica 4H Clubs	St. Catherine	Middlesex

Spanish Town Technology Centre	St. Catherine	Middlesex
TechniSoft Computing	St. Catherine	Middlesex
International School of Ja. Ltd.	St. Mary	Middlesex
Don J Computer Centre	Portland	Surrey
Institute of Business & Professional Studies	Portland	Surrey
Educentres Information Services Ltd.	St. Andrew	Surrey
Excelsior Community College	St. Andrew	Surrey
InfoServ Institute of Technology	St. Andrew	Surrey
Quality Academics Ltd.	St. Andrew	Surrey
Software Training Centre Ltd.	St. Andrew	Surrey
Vector Technology Institute	St. Andrew	Surrey

APPENDIX B: Survey Instruments & Document Review Template

HEART TRUST / NTA

Training Needs Assessment in ICT Sector, Jamaica – 2005

CONDUCTED BY: Jamaica Computer Society Education Foundation (JCSEF)

SURVEY A: Interview Instrument – (ICT Firms / Other Organizations)

1. Profile of ICT Firm/Organization: - (Name & Notes).

→ Í Hardware & Peripherals. Í Software Development.
Í Consulting Services. Í Sales & marketing
Í Repairs/maintenance Í Telecomms/ Services
Í Retailer/Distributor Í Government Services
Í Call/Contact Centre Í Other _____

2. Location & Size : - (Address & Other Notes)

→ Í Kingston Metropolitan/E Í Montego Bay/NW
Í Mandeville/SC. Other: _____
SIZE: - (based on number of employees):
Í Very Small (1-29). Í Small (30-79)
Í Medium (80-119). Í Large (120 or more).

3. Types/Levels of IT Infrastructure: - (Special Notes)

→ Computers: Í PC's; Í Laptops; Í Servers; Í Other
Operating System: Í Unix; Í Java; Í Windows (.....)
Í Pearl; Í XML; Í Linux; Í Other: .....
Software/Appli/Languages: Í DBMS; Í Office; Í Graphical
Í Accounting Software; Í Statistical; Í Oracle; Í IP/
Internet; Í HTML; Í JavaScript; Í Other: _____
Í Call Service Management System Í Customized Systems

4. Categories of Employees/Jobs:
(Special notes on staffing).

→

Job Title	Current	Projected
Programmer / Designer		
Software Engineer/Developer		
Network Administrator/Operator		
Systems Administrator/Controller		
ICT Executive/Manager/Consultant		
Systems / ICT Business Analyst		
ICT Project Manager/Coordinator		
Web Master / Internet Specialist		
Technical Maintenance Support		
Marketing & Sales Representative		
Customer Service Representative		
ICT Help Desk Resource Person		
Clerical Support Staff.		

5. Factors that influence or impede staffing in this ICT company or organization.

6. Changes envisaged in this ICT firm/ organization over next 12-18 months and reasons for the expected change

7. Does your firm/organization use distance / online learning? If so, how? And, will this methodology be used in the future?

SURVEY A: ICT Firms / Other Organizations - (Cont'd):

8. Skills in Immediate demand in your company:
(Notes on related training needs or problems). →

Skill Areas/Competencies	Criti	Imprt	Option	Not
Programming (C; C++; Etc.)				
Linux, Java, Pearl, XML, etc.				
Network Engineering				
Web Design / Maintenance				
Software Development				
Desk Top Publishing / Word				
Technical- Electronic/Electric				
Customized Tech. Solutions				
Marketing and Sales				
Accounting Skills/Packages				
Mathematical & Statistical				
Problem Solving/Trouble Sh.				
Communication Skills				
Other: …….…….……..				

9. Skills from the list or others likely to be in great demand in the future, and why?
List: ↓

10. What are the top three sources of required skilled workers for your business?

A: _____

B: _____

C: _____

RATING: U = unaware & 1 = lowest.	U	1	2	3	4
HEART: source of skilled workers					
HEART / NCTVET Certification					
CISCO Tech. Skills Certification					
CIT Tech. Skills Certification					
MICROSOFT Skills Certification					
Prvt./Pub. ICT Trng./Certification					
Priority on Training in this Firm					
In-house (Staff) ICT Skills Training					
Overall impact of Training on Firm.					

11. Estimated percentage of your annual budget spent on training & related activities? _____

12. Estimated percentage of your annual budget likely to be spent on training in future?_____

13. What are the greatest threats/impediments to the operation of your business in Jamaica?

14. What are the most distinctive highlights (success stories) in the operation of your business in Jamaica?

15. Any other Comment:

HEART TRUST / NTA

Training Needs Assessment in ICT Sector, Jamaica – 2005

CONDUCTED BY: Jamaica Computer Society Education Foundation (JCSEF)

SURVEY B: Interview Instrument – (Training Institutions)

1. Name, Type and Level of Institution:

   Name: _____

TYPE:
Í Public Í Private Í Church-based Í NGO

LEVEL:
Í University Í College Í Other Tertiary Í Mixed/Sec.
Í Training Centres (ICT Specialists) Í Other:_____

2. Contact, Location & Size of the Institution:

   Contact No. _____ Contact Person:_____

   Enrolment: _____ Male ____ Female ____ E-mail Address: _____

   Location: _____

3a. Number of Computers in the Institution:
Pc's _____ Desktops ____ Handheld _____

3b. How many are used mainly for training/learning activities:
PC's _____ Desktops _____ Handheld _____

3c. Peripherals:
Printers _____ Scanners _____ Digital Cameras ____

3d. Multimedia Projectors: ____ Video Cameras ____

3e. Number of staff with their own/personal computers: _____

4. # of computers in the following areas.
   Inside the classrooms _____ In Laboratories _____
   In Staff Rooms: _____ In Admin. Offices: _____
5. Type / Level of Internet Connection:
   Í Dial-up Modem Í Non-broadband ISDN/ISDN2.
   Í Broadband (ADSL) Í Higher Speed.
6. Indicate which of the following areas have internet access.
   Inside Classrooms: _____ In Laboratories ____
   In Staff Rooms: _____ In Admin. Offices: ____
7. Do students have access to the Internet? Í Yes Í No.
8. Do students pay directly for Internet use ? Í Yes Í No.

9. Does your institution offer online / distance learning courses? Í Yes Í No
10. Will online/ distance learning courses be offered in future? Í Yes Í No.
11. To what extent is ICT used in the following training/curriculum areas:

12. Highlights of ICT Uses In this Institution:

	Signif.	Some	Little	None
Specialist (advance) ICT Skills Training				
Introductory & General ICT Training				
Technical / Vocational Skills Training				
Literacy / Language (Remedial) Training				
Numeracy / Mathematical Training				
Personal & Social Health Education				
Social Studies & Civics Education				
Staff Training in Computer/Technology Uses				
General Staff Dev. & Technology Integration				
Adult Learning & Community Education				
Online Instruction & Learning				
Visual & Performing Arts Training				
Other (Specify): _____				

SURVEY B: - Training Institutions (Cont'd)

13. Which of the following ICT training program/course does your institution offer? Check all that apply:

☐ Programming (e.g., C. & C++)	☐ Telecommunications & Call Centre Skills
☐ Lang: (Linux, Java, Pearl, XML, etc).	☐ Marketing & Sales and/or Customer Service
☐ Network Engineering/Maintenance Skills	☐ Desk Top Publishing & Word Processing
☐ Software Design & Development	☐ Accounting ☐ Mathematics ☐ Statistics
☐ Web Design/Maintenance ☐ Communication Skills	☐ Other: _____

14. To what extent are the majority of the following groups of persons in your institution ICT trained?

STAFF CATEGORY	Adv.	Inter.	Basic	None
Principal/Vice-Principal	☐	☐	☐	☐
ICT/Technical Staff	☐	☐	☐	☐
Teachers/Instructors	☐	☐	☐	☐
Admin./Support Staff	☐	☐	☐	☐
Other: _____	☐	☐	☐	☐

LEVELS:
Adv: Advanced/professional /certified
Inter: Intermediate (CXC/GCE Level)
Basic: Introductory/beginners/self-help

15. Which of the following best characterizes the confidence level of staff with use of ICT in day-to-day work?
☐ All staff members are very confident with using ICT ☐ Most staff members are confident using ICT
☐ Some (less than 50%) are confident with using ICT ☐ Staff confidence with using ICT is very low.

16. What are the main sources of ICT-related professional development training/advice/support for staff?
Tick all that apply to your institution:
☐ ICT Consultants/Trainers (Public/Private) ☐ Professional or Subject Associations
☐ Advanced Skills instructors (Colleagues) ☐ Other (Specify): _____
☐ Government Ministries/International Agencies

17. What are the main sources of technical & maintenance support for ICT used by your institution?
(Tick all that apply): ☐ External service supplier ☐ Institution's Own IT Support Staff
☐ Funding by local or International agencies ☐ No special ICT provision is in place.

18. What are the estimated annual outputs/results of the following levels of ICT training by your institution?
Informal ICT Training/Orientation: _____ Basic IT Training- (IT Literacy) _____
Intermediate (CXC/O'Level) Training. _____ Advance (Cert./ Diplomat) Level _____
Specialized/Professional Training _____ Other: _____ _____

19. Which of the following levels of ICT training you expect to expand in next 12-18 months?
☐ Informal ICT Training/Orientation
☐ Intermediate (CXC/O'Level) Training.
☐ Specialized/Professional Training
☐ Basic IT Training (Computer Literacy)
☐ Advanced (Cert,/Diploma) Level

21. What are the major challenges/impediments to ICT training in your institution?

20. RATING: U = unaware & 1 = lowest.	U	1	2	3	4
HEART: source of skilled workers					
HEART / NCTVET Certification					
CISCO Tech. Skills Certification					
CIT Tech. Skills Certification					
MICROSOFT Skills Certification					
Prvt./Pub. ICT Trng./Certification					
Priority on Training: This Institution					
In-house (Staff) ICT Skills Training					
Overall impact of ICT Training					

22a. What percentage of graduates of your training programmes are placed in jobs by the institution? ____

22b. What overall percentage of graduates of your training programmes normally find jobs after training? ____

ICT Surveys: Training Needs Assessment in ICT Sector - 2005

DOCUMENT REVIEW TEMPLATE

Information Source: ……..……..

Reference Document: ……..

1. Background:

General Lay-of-the-Land Description of ICT Context:

Types of Business	Products / Services	Locations / Coverage	Sizes / Employment

2. ICT Businesses in Jamaica:

Characterizations of the ICT Businesses:

2.1. Summary: Scope of ICT Businesses.

Core Businesses	Optional Businesses	Current Investment Levels	Projected Investments

3. General ICT Infrastructure:

Status of ICT Infrastructure in the Country:

3.1 ICT Specifications:

Technology	Level / Capacity	Basic Features	Extra Features

3.2 ICT Skills Utilization:

Current Skills Utilization	Projected Skills Demand

4. Characterization of ICT Industry Challenges:

5. Evaluation of ICT Successes & Progress:

APPENDIX C: Sources of Information – (Documents Review)

A. Printed Documents:

1. The Five-Year Strategic Information Technology Plan for Jamaica, Govt. of Jamaica (2002). Allied Research Associates Ltd. Jamaica's E-readiness Assessment, 2002, p.24.

2. Information and Communication Technology Policies & Strategies: Extract from the Sectoral Debate by Minister Phillip Paulwell, (MCST - Jamaica), June 2005.

3. Employment by Main Line Business between ICT Sub-sectors. Labour Market Information Newsletter, PIOJ, 2005.

4. Information and Communication Technology (ICT) Statistics: A Progress Report of Hong Kong, China. Asia Pacific Meeting, 2004.

5. UNESCO Information for All: A Caribbean Information for All Programme, Final Report. Maritiza Hee Houng, 2003.

6. Canadian ICT Sector Profile: Based on Survey Conducted by Statistics Canada, June to December, 2003.

7. Measuring the Information Economy: Building Partnership for Progress. Organization for Economic Cooperation and Development (OECD), 2002.

8. Readiness for the Networked World: Jamaica Assessment. Conducted by Rohan Kariyawasam, Berkman Centre for Internet & Society, Harvard Law School, 2002.

9. Measuring the Importance of ICT: Discussion Paper No.2. Statistics and Information Network Branch, UNIDO, 2001.

10. Spectrum, Information Technologies and Telecommunications Sector Statistical Review (ICTSR), Industry Canada, 1993-1998.

11. "Draft ICT Policy Framework" for use in the Education System, Ministry of Education Youth and Culture, 1998.

12. Landscape Assessment on ICT-Enabled Development Initiatives and Stakeholders in Jamaica : Dr. Paul A. Golding and Lloyd St. George Waller III, June 2003

A. Electronic Documents (Web Sites):

i) http://www.mct.gov.jm

ii) http://www.moec.gov.jm

iii) http://www.golocaljamaica.com

iv) http://www.internetpolicy.net

v) http://www.iicd.org/countries/jamaica

vi) http://www.caricom.org/archive/regional%Oict_main_page.htm