and training organizations by setting up and supervising the operations of Industry Training Advisory Boards (ITABs). The ITABs are responsible for identifying competency standards for each industry sector, and also for working in close collaboration with industries to assist in business development and the provision of relevant training at all levels.

In a subsequent White Paper, presented in 1994, the following initiatives were recommended:

- Increasing industry's role in determining the direction of training reform
- Increasing competition within the training market, with an emphasis on encouraging training organizations to become progressively less dependent on Government funding
- Revision of entry-level training
- New system of training wages
- Increased flexibility and responsiveness
- Measures to facilitate training in small to medium sized businesses

One of the key features of this reform phase was to provide unemployed and disadvantaged workers with greater access to the national vocational education and training system by removing many of the obstacles which had separated them from mainstream training opportunities. Also it gave industries greater opportunities to organize their own training arrangements.

A new strategy was incorporated in "Towards a Skilled Australia: A National Strategy for Vocational Education and Training". The basic features of this strategy were:

- Responsiveness - maximizing choice and cooperation between training providers (public and private) and industry
- Quality - support for those achieving benchmark standards
- Accessibility - opening up the system to include those who were traditionally disenfranchised on the basis of location, time, cost, literacy requirements, gender bias etc.
- Efficiency - accountability and value for money and simplification of administrative requirements

In a policy initiative called "Working Nation: The White Paper on Employment and Growth", the thrust of the reform agenda changed to incorporate the following:

- Reduction in the level of unemployment by re-skilling and re-employing long-term unemployed
- Improving the skills and competitiveness of job-seekers

- Developing a training system that was more relevant to the needs of clients and employers

The prerogatives of the National Training Reform Agenda in the period 1993 to the present have been:

- A growing focus on competencies and competency standards for *individual industries*
- The development of a national framework to expand the size and level of competition in the training market
- A move towards adoption of quality standards and more flexible arrangements for accreditation and provider recognition

One of the significant impacts of the reforms has been to alter the locus of control of vocational education and training by reducing the previously dominant role of providers in prescribing training outcomes. (This has provoked fervent opposition from some sections of the educational sector, particularly TAFE institutes and Higher Education institutions, which have feared an attack on the autonomy of their curricula).

(2) Major constraints to reform and strategies used to address them

1) Regulatory requirements of the TVET sector

Lack of coordination between the states and the Commonwealth has impeded reform. There is a multiplicity of decision makers, all wanting to be involved in the decision-making process. Thus although there have been excellent achievements, including the development of national standards and curricula, implementation of traineeships, acceptance of a training wage and *improvements to links between schools, TAFE and industry,* cumbersome and bureaucratic structures continue to be an impediment.

What has been proposed is the achievement of agreed national competency standards, through effective assessment and skills recognition, in the absence of centrally prescribed accreditation processes. In this manner, industry is required to take a leading role in the determination, development and implementation of training and standards development for its workforce within a quality assurance framework

2) Industrial relations and training reform

Industrial relations perhaps pose the greatest potential danger, which impedes training reform. "The experience of some employers leads them to see the training reform agenda as an extension of the industrial relations agenda of the trade union movement" (Business Council of Australia 1994). The Joint Industry and Training Council put out a statement that competency standards were not a platform to raise wages, but many employers were still cynical. The fact still remains, however, that it is impossible to make any significant progress without consensus with the industrial parties.

(3) Towards a future training market

The industry-led nature of the training reform process, particularly in the development of competency standards, has shifted the control of training outcomes to the key industrial parties and away from training providers and educationalists. This has brought a new meaning to the industrial relations/training nexus and it is this new meaning, which has caused the industrial relations/training relationship to be highlighted.

Issues, such as the identification of skills levels, the assessment of competence, recognition of prior learning, determination of competency standards, training time, off and on-the-job training, are no longer the province of the training bureaucracy, but have real currency in the determination of wage rates, career structures, performance agreements and workplace promotion. Given the historical perspective of both the industrial parties and the training bureaucracy, it is difficult to foresee either group surrendering control of its jurisdiction.

Focus for reform will centre on promoting greater interaction between the client and the provider at the local level. Enterprises are the key clients of the training market, but it is clear that current publicly funded training arrangements are not adequately meeting client needs.

ANTA has also proposed the following key reforms:

- Reform of state training systems to separate the roles of regulator, founder, purchaser and provider.
- Free up and commercialize TAFE to compete, at the same time as establishing competitive neutrality.
- Open more public funds to competitive arrangements, with emphasis on the demand side.
- Change the regulation system to remove excessive bureaucracy.
- Improve information dissemination to clients.
- Clarify training products, with better-defined descriptors.
- Identify what Federal and State Governments should pay for.

(4) Conclusions

Although initial training reform sometimes lacked a cohesive and uniform approach, it must be acknowledged that it occurred in the context of dramatic changes in the economic and industrial transformation of the Australian workforce, when CBT and training reform were unknown. TVET reform in Australia in general, however, has continued to be a dynamic process, and its most important achievements, especially over the period of the last twenty years, have been the consolidation of Government infrastructure, proliferation of CBT resources and acceptance of training reform by the major stakeholders.

Particular achievements of Australian TVET reform include:

- Formulation of a clear national policy which, above all else, frames national objectives for TVET, which are capable of being measured and monitored, so that progress can be reviewed.
- Development of a system, which encourages life-long learning, which is broad in coverage and scope and which is no longer predominantly focused on preparation of youth for entry into the workforce. Moreover, the system better enables a systematic response to technological changes stemming from globalization of economies around the world, by enabling people in (and outside) the workforce to re-train.
- Provision of diversity and comprehensiveness, with coverage from short programmes of training to intensive, advanced programmes across a wide range of areas.
- Adoption of a CBT approach to training which has been developed to meet more relevantly the needs of the country's industries and enterprises, by identifying competency standards required by all sectors and specifically designing training programmes to inculcate these competencies.
- The development of a sustainable industry-led training sector, through the creation of an overarching authority (ANTA) and Industry Training Advisory Boards with predominant responsibility for determining and monitoring training directions.
- Creation of a modular training system, which is better suited to alternative modes of training delivery, such as in-plant and distance-learning. This has promoted the enrolment of a more diverse range of students for TVET programmes, who can undertake short courses and longer term programmes, in full and part-time modes, at night and weekends as well.
- Establishment of a competitive system of training providers, which comprises Government-funded and private organizations. Government-funded training organizations are encouraged to reduce progressively their dependency on the Government budget by making direct contractual arrangements for training provision with individual enterprises and industries.
- Establishment of a framework for national recognition of TVET, which enables industry to determine TVET qualifications according to ANTA and endorsed guidelines.
- Development of a focus on outputs and outcomes, which has accompanied the shift from a predominantly provider (or supplier) determined training system to an industry and demand-led system.

6.1.6 South Africa: TVET under reformation

The Republic of South Africa is a leading country in Africa in vocational education and training. In order to learn the experience in South Africa, the Study team visited Pretoria, the capital of South Africa, from 9 to 14 November 2000 and visited relevant agencies and institutions, including the Department of Education (DoE), South African Qualification Authority (SAQA), Technikon Pretoria, and University of South Africa (UNISA). The major objective of the visit was to learn about the reform process of vocational education and training in South Africa, which started from the early 1990s. Some of the findings are relevant to and useful for the Study to strengthen technical education in Ghana

(1) Reform of vocational education and training (VET) system

1) The VET system

The South African VET system has been the responsibility of the Departments of Labour and Education. Technical education institutions at the postsecondary level are mainly universities, technikons and technical colleges, which are run by the Department of Education. The main institutions responsible for the vocational training system are the Department of Labour, the National Training Board (NTB), Industrial Training Boards (ITBs), employers, and public and private training providers.

The VET reform in South Africa, which started in the early 1990s, based its process on consensus building, rather than creating new institutions to implement the reform process. The core of the team designing the reform strategy was drawn from the NTB, and prepared the report "National Training Strategy Initiative" in 1993. This report proposed a national integrated framework for education and training qualification.[1]

The National Economic Development and Labour Council (NEDLAC) was launched in 1995 for reaching consensus on economic issues among three main stakeholders -- unions, business, and government. NEDLAC set up the Counterpart Group to oversee research projects on the financing and management of the training system commissioned by the NTB. The ITBs have also played an important role in the VET reform process. Industrial sectors established voluntarily ITBs, concerned with accreditation and setting standards.

(2) South African Qualification Authority (SAQA)

The South African Qualification Authority (SAQA) was established through the SAQA Act of 1995 to oversee the development and implementation of the National Qualifications Framework (NQF). The functions of the SAQA are essentially two[2]:

[1] Ian Bellis, "The Process of Changing in Vocational Education and Training." In Finley, Ian, Stuart Niven and Stephanie Young (Eds.) 1998. *Changing Vocational Education and Training.* London and New York: Routledge

[2] Mamphela Ramphele, February 2000, The National Qualifications Framework: An Overview, South African Qualifications Authority, pp.11-12.

- "To oversee the development of the NQF, by formulating and publishing policies and criteria for the registration of bodies responsible for establishing education and training standards or qualifications and for accreditation of bodies responsible for monitoring and auditing achievement in terms of such standards and qualifications,"
- "To oversee the implementation of the NQF by ensuring the registration, accreditation and assignment of functions to the bodies referred to above, as well as the registration of national standards and qualifications on the framework. It must also take steps to ensure that provisions for accreditation are compiled with and where appropriate, that registered standards and qualifications are internationally comparable."

SAQA has established twelve National Standards Bodies (NSBs)[3] as follows.

i) Agriculture and nature conservation,

ii) Culture and arts,

iii) Business, commerce and management studies,

iv) Communication studies and language,

v) Education, training and development,

vi) Manufacturing, engineering and technology,

vii) Human and social studies,

viii) Law, military science and security,

ix) Health science and social services,

x) Physical, mathematical, computer and life sciences,

xi) Services, and

xii) Physical planning and construction.

Members of NSBs are drawn from six constituencies: state departments, organized business, organized labour, education and training providers, critical interest groups, and community/learner organizations. The NSBs recommend standards and qualifications for registration on the NQF. Each of these NSBs is responsible for establishing Standards Generating Bodies (SGBs), which develop standards and qualifications and recommend them to the NSBs for registration.

SAQA consists of representatives from all major stakeholders in education and training. The partners of the SAQA are illustrated in Figure A-6.1.1. Under the Ministry of Labour, the Department of Labour is responsible for the field of skill development, and it established the National Skills Authority (NSA) and the Sector Education and Training Authorities (SETAs). One of the primary functions of the SETAs is to assure the quality

[3] Ibid. p. 14.

of education and training provision in their sectors. In order to do this, they will have to be accredited by SAQA as Education and Training Quality Assurance bodies (ETQAs).

Under the Ministry of Education, the Department of Education is responsible for higher education, and it created the Council for Higher Education (CHE). One function of the CHE is to assure the quality of education and training provision in higher education through its Higher Education Quality Committee (HEQC). In order to perform this, the CHE will have to be accredited by SAQA as Education and Training Quality Assurance bodies (ETQA). In addition, the Department of Education is proposing the establishment of a General and Further Education and Training Quality Assurance Council (GENFETQA) to be responsible for assurance of the quality of education and training provision and assessment in general and further education and training.

There are a number of professional bodies and statutory councils, which have a responsibility for assuring the quality of provision and assessment in their own particular areas of operation. These bodies too have to be accredited by SAQA as ETQAs.

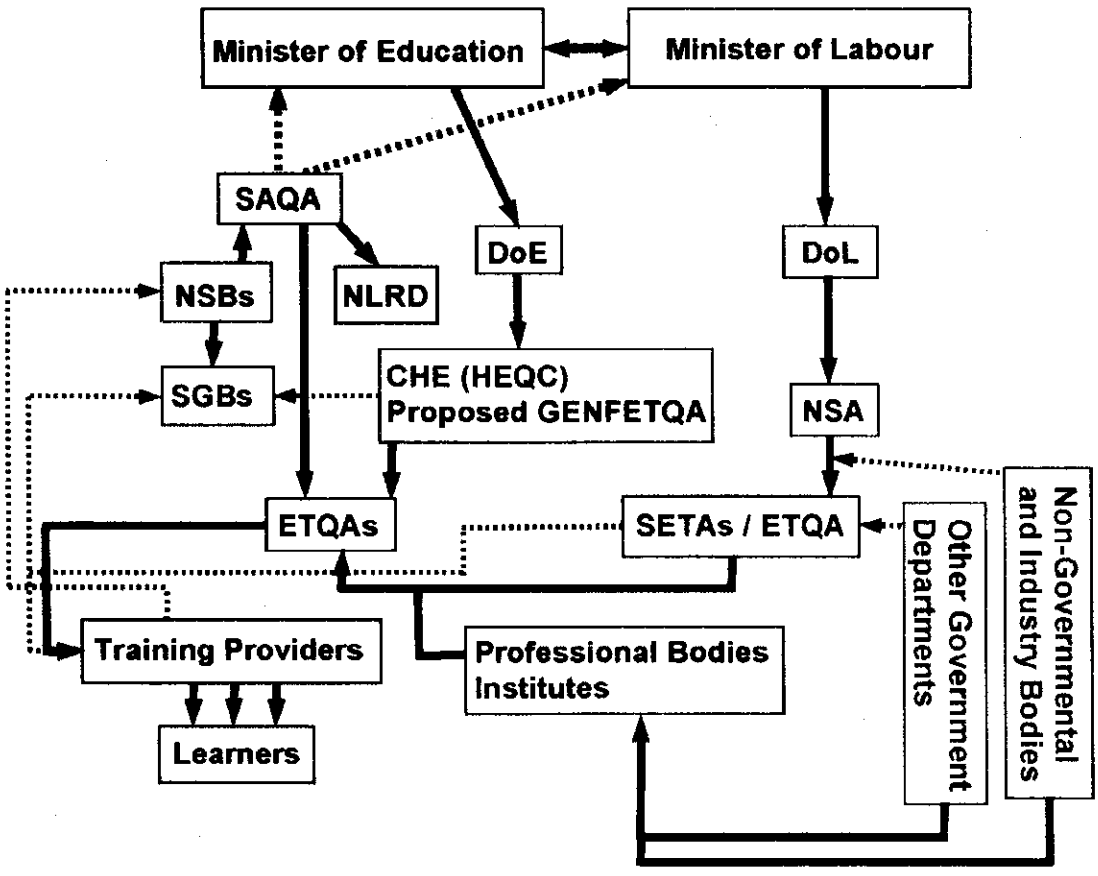

Figure A-6.1.1 The Social Partners of the South African Qualifications Authority (SAQA)

3) National Qualification Framework (NQF)

The NQF provides a comprehensive mechanism for awarding qualifications based on credits for achieving learning outcomes, agreed by education and training stakeholders throughout the country. The South African Qualification Authority (SAQA) developed and implemented the NQF. The NQF was designed to[4]:

- combine education and training into a single framework, and bring together separate education and training systems into a single, national system;
- make it easier for learners to enter the education and training system and to move and progress within it;
- improve the quality of education and training in South Africa;
- open up learning and work opportunities for those who were treated unfairly in the past because of their race or gender; and
- enable learners to develop to their full potential and thereby support the social and economic development of the country as a whole.

The SAQA has adopted an eight-level framework as outlined in Table A-6.1.9. Level 1 is the least complex, and level 8 is the most complex. The NQF level 1 is general education and training taking nine years, which is provided by formal schools or adult basic education and training providers. The NQF from level 2 to level 4 is the area of further education and training, which is provided by senior secondary schools, technical colleges, private providers, etc. The NQF from level 5 to level 8 is the area of higher education and training, which is provided by universities, technikons, and colleges.

Table A-6.1.9 Structure of the NQF

NQF level	Band	Qualification type
8	Higher Education and Training	Post-doctoral research degrees
		Doctorates
7		Masters degree
		Professional Qualifications
6		Honours degrees
		National first degrees
5		Higher diplomas
		National diplomas
		National certificates
Further Education and Training Certificate (FETC)		
4	Further Education and Training	National certificates

[4] Source: A brochure provided by the SAQA

6.1.7 Ireland: National strategy and TVET Reform

(1) Long term strategic focus by the government

Since early 1970's, the government of Ireland started to develop and implement a long term strategy to develop industries for employment. This task was taken by a government office of Enterprise Ireland, which concluded that high value added / high technology sectors such as software, digital / media, e-business and health sciences.

The recent boom of the economy has been largely driven by the software industry, which saw employment increase by 55% between 1995 and 1997. The Economist in London has called Ireland "the back office of Europe," because they are engaged in telemarketing, customer service and technical support.

About 24,000 people are employed in the software industry with the combined annual revenues in excess of £ 5.2 billion (euro6.6 billion). In the Irish owned company sector, more than 50 companies are started up annually with the following recent performances.

- Revenue growth: 85% (1995-98)
- Export growth: 97% (1995-98)
- Exports represent 70% of production (1998)
- USA is the largest market for Irish software companies - 43% of exports (1998)

The government is assisting these private companies through provision of 30% fund for product development and incubators in Boston, Silicon Valley of the USA and Tokyo in Japan.

(2) Higher education system

Higher education in Ireland is provided mainly by universities, institutes of technology and colleges of education. Most higher education is provided in institutions that are supported by the State (e.g. universities and institutes of technology receive more than 90% of their income from the State). Tuition fees for EU nationals attending full-time undergraduate courses in state funded higher education institutions in Ireland were abolished in 1996.

At tertiary level the Government has pursued a policy of providing easier access for more students through simplified process of entry and of providing additional places for students. In addition, the Government has received support for major capital development initiatives from the European Structural Fund and has stressed the importance of higher education in all agreements with the social partners. The significant increase in participation rates has resulted in a fourfold increase in full-time enrolments in higher education, rising from 21,000 in1965 to nearly 97,000 in 1997. The Report of the Steering Committee on the Future Development of Higher Education (1995) projected a total enrolment in higher education of 120,000 by the year 2005. Economic growth and technological development have been the main forces behind the unprecedented expansion of higher education in recent decades.

The Employment and Training Strategy Unit under the Higher Education Authority is engaged in the following activities.

1) Initiatives to upskill people in employment

The Unit is responsible for the development of policy on the training of people for and in employment. In addition, the Unit is working on the introduction of the National Training Fund (see below).

ii) The National Training Fund

The National Training Fund Act has recently been passed (December 2000) and the Minister for Finance announced the creation of a National Training Fund to raise the skills of those in employment, to give prospective employees relevant skills and to facilitate lifelong learning. The National Training Fund will be managed by the Department of Enterprise, Trade and Employment and will be resourced through a levy on employers equivalent to 0.7% of PRSI (Pay-Related Social Insurance) contributions. There will be no additional financial imposition on employers, as the cost of the levy will be offset by a comparable cut in employers' PRSI.

iii) Expert Group on Future Skills Needs

The Unit participates in the work of the Expert Group on Future Skills Needs to systematically identify the skills needs of different sectors, and advise on how to improve awareness among job seekers/school leavers of sectors where there are demands for skills, the qualifications required.

iv) Apprenticeship System

The Unit has policy responsibility for the Apprenticeship system. The Unit monitors and evaluates trends and developments on the Apprenticeship system including costs and levels of training provision.

v) National Framework of Qualifications

The Unit was closely involved in the preparatory phase of Qualifications (Education and Training) Act, 1999 brought forward by the Minister for Education and Science and enacted in July, 1999. The main objects of this Act are to

- establish and develop standards of knowledge, skill or competence
- promote the quality of further and higher education and training
- provide a system for co-ordinating and comparing education and training awards
- promote and maintain procedures for access, transfer and progression

The Act provides for the establishment of the National Qualifications Authority of Ireland established in 2001, one of whose main functions will be the establishment and maintenance of a framework for the development, recognition and award of qualifications in the State. Two awarding bodies, to be known as the 'Further Education

and Training Awards Council' and the 'Higher Education and Training Awards Council' are also provided for in the legislation.

vi) Lifelong Learning

Within the framework of the Programme for Prosperity and Fairness, the Unit has established a Lifelong Learning Task Force in collaboration with the Department of Education and Science. The Task Force includes representatives of the social partners and other relevant parties. The objectives of the Task Force are to:

- identify existing Lifelong Learning providers and programme provision
- map existing provision in terms of its adequacy and cover; and
- identify, propose and cost priority actions on Lifelong Learning, based on expanding or modifying existing provision or the development of new initiatives.

Two Sub-Groups have been formed to:

- Examine the issue of access for adults to existing education and training provision outside of the formal schooling system, and to identify existing/potential barriers to participation by adults to such education and training.
- Examine and make recommendations for action on moving Ireland towards best international practice in the provision of learning for those in employment.

(3) Certification framework of FAS (National Training and Employment Authority)

The following principles are incorporated in the certification framework of Ireland.

- Skill focus: FAS certificates skills and skill levels, rather than certifying courses.
- Modular focus: Modular training is matched by modular assessment programmes.
- Competence focus: The emphasis is on practical and personal skills as well as related knowledge - not just knowledge alone.
- Industry standards: Industrial endorsement is essential for national recognition of vocational training awards.
- Assessment based on criterion-referenced standards: Each assessment is presented in terms of key objectives identifying the skills and knowledge. These performance standards are derived from business requirements.
- Local administration and marketing: The primary responsibility for administering assessment lies at local level. Training assessment and certification are subject to national monitoring to assure the reliability and integrity of the system.

(4) Overseas Training Programme

By selecting graduating students in the final year of tertiary education in their education and training program performance, cultural flexibility, and language capabilities, the programme places newly qualified Irish graduates into full-time employment with companies abroad. The programme has provided more than 900 new graduates with practical work-experience opportunities since 1983. In the recent years, the program focuses on Asian countries, such as Japan, Korea and Taiwan.

The initial arrangement is normally for two years overseas at companies. This arrangement may be extended if both the company and the graduate agree. In achieving this, the programme benefits both the companies and the graduates themselves. The FAS intention is that a sizeable number of graduates in the programme would return to take up positions in Ireland within a period of five to ten years.

The cost of the program is small since FAS bears only the one way ticket to overseas companies and the remaining to be covered by the graduates and their companies.

Disciplines include:

Business	Finance, Economics and Languages, Marketing and Languages
Engineering	Civil and Structural Engineering, Computer Engineering, Electrical Engineering, Electronic Engineering, Mechanical Engineering Software Engineering
Sciences	Biochemistry, Biotechnology, Chemistry, Computers (Science, Applications), Physics

(5) Standards-Based Apprenticeship

This apprenticeship comprises typically 7-phases of on-the-job training with the employer and off-the-job training normally in FAS Training Centres or Educational bodies to achieve certain pre-set standards of skill and competence. During the apprenticeship the trainee will receive an apprentice wage for the on-the-job phases from the employer and while off-the-job the trainee will receive a training allowance if appropriate. On successful completion of the apprenticeship, the trainee will receive a National Craft Certificate, recognised in Ireland as well as other EU and non-EU countries. The normal duration of apprenticeship is 4 years.

During the apprenticeship, the trainee will be required to follow a specific course of training and undergo a series of assessments to confirm that the trainee has reached the required standards.

During on-the-job phases the competence will be assessed in terms of the trainee's skill, knowledge and attitudes.

During off-the-job phases the trainee will be assessed on the basis of exercises and projects together with standardised practical and theory tests.

6.1.8 The United Kingdom: Transformed "post-1992 universities."

Ghana's technical education systems, including the Polytechnics, were originally based on those of the U.K. To study the experience of Polytechnics in the U.K., the Study team visited London from 8 to 12 October 2000, and visited several ex-Polytechnics located in London. They were London Guildhall University (LGU), University of East London (UEL), Middlesex University (MU), and University of Westminster (UW), which had been transformed into "Universities" under the Education Reform Act of 1988 and the Further and Higher Education Act of 1992. These universities are commonly called "post-1992 universities."

The major objectives of the visit to the post-1992 universities in the U.K. were to learn the historical background of the transformation of status from Polytechnics to universities and their characteristics of management and operations, including courses and programmes, financial aspects and employment of graduates. Some of the findings are useful for the study to strengthen technical education in Ghana

(1) Historical background

The historical background of the transition from Polytechnics to universities is briefly described as follows[5]:

- In the early 1960s, a report by the economist Lionel Robbins, "The Robbins Report," recommended that higher education in the U.K. should be expanded. Robbins suggested that higher education should comprise two kinds of institutions.
- Universities taking mostly full time students and other (non-university) institutions taking mostly part time students. This is known as "binary policy" in higher education. Following this proposal, the government established "polytechnics" as the leading institutions of the "non-university" sector.
- After the mid-1960s existing technical and other colleges, which had been under local authorities, were converted into polytechnics. Some remained under close control of the local authorities, while others operated more independently. The polytechnics had grown during the early 1970s and by 1973 30 polytechnics had been established.[6] A principal objective of the polytechnics was to expand the access to higher education to all social classes.
- In the late 1980s, the polytechnics were removed from local authority control and became independent under the Education Reform Act of 1988. However, they were still not authorized to grant degrees, and operated under the aegis of the Council for National and Academic Awards (CNAA).

[5] See John Pratt, The Polytechnic Experiment: 1965-1992, The Society for Research into Higher Education and Open University

[6] By 1991, 4 additional polytechnics were designated. Ibid. p. 3.

- Later, the Further and Higher Education Act 1992 was enacted and polytechnics were permitted to change their names to universities and confer degrees. The object of this was unification of the two higher educational systems. Nevertheless, the older universities are still dominant in respect of research, while the post-1992 universities continue to focus on technical and vocational training to meet local needs. They also provide part-time programmes and High National Diploma (HND) courses.

(2) Summary of the interviews with the post-1992 universities

In interviews with managers of the post-1992 universities in the London area, they raised advantages and some disadvantages as follows resulting from the transformation:

- The number of students in higher education in the U.K. has increased substantially, but it is claimed that Government funding to the new universities has not increased in proportion.
- Improved access to higher education has been achieved. It is estimated that about 35 percent of the 18-20 years old group now go through higher education, as compared to about 5 percent about 20 years ago.
- Women have derived benefit from the reforms. The gender balance in many post-1992 universities is now roughly 50:50.

As compared to the traditional universities, the post-1992 universities have, or claim that they have, the following characteristics:

- A greater concern for employability.
- A more open access for students from lower social classes.
- Greater innovation and flexibility in courses development.
- Emphasis on teaching students, rather than teaching subjects.
- Concentration on applied programmes, which have direct links to employment.
- A tendency to prepare students in respect of basic aptitudes and attitudes, rather than in specific areas or skills.
- A very different student profile, including a higher proportion of mature students; of students from lower social classes; and of students from ethnic minorities.
- Lower income, as post-1992 universities generate much less income from research and do not have income from foundations or inherited assets.

The post-1992 universities have made a strong effort to strengthen linkages with the private sector. In fact, all the post-1992 universities in the London area are members of London First[7], a non-profit organization, which provides opportunities for discussion between educational institutions and the private sector. Degrees may be accredited by

[7] London First is a non-profit organization supported by the private and public sectors located in London. See more details in 3.1.5.1.3.8 of this section.

professional associations, which consequently assist in curriculum development and evaluation of demand from private sector. More specifically, the post-1992 universities visited have made the following efforts in this respect:

- LGU has been accustomed to have meetings with professional bodies, especially in the banking and accounting sectors, which have played an important role in the economy of the London area and the U.K. as a whole.
- At UEL, the departments have established advisory groups for curriculum development, on which there are representatives from the private sector as well as the public sector.
- At MU, the academic schools have established advisory groups, which have external representation from the private sector.
- UEL and UM have played an important role not only in higher education, but also in the economic regeneration of poor parts of London.

The characteristics of the courses and programmes provided by the post-1992 universities are summarized as follows:

- Complete autonomy has been given to the post-1992 universities, in respect of decisions on what courses and programmes to run or not to run.
- Changes in courses and programmes are based on the requirements of the market, although it is extremely difficult to anticipate trends and demand. At present, there is little demand for engineering, but very strong demand for information technology and computer courses.
- Industrial placement is frequently offered, by means of so-called sandwich courses, in which 6-12 months of practical experience is built into 3-year courses.
- Credit may be given for prior learning and for companies' in-house training.

It was difficult to collect information on financial aspects, as they varied from institution to institution. The following are some points learned from the interviews with personnel from the post-1992 universities.

- The Government, through Higher Education Funding Council for England (HEFCE), pays an important part of the cost of education and training for each student. The students pay tuition fees and many students work part-time to fund their tuition. The government funding per student is the same for all universities.
- Tuition fees are unregulated in respect of overseas students and of PhD courses. Considerable effort is put into the recruitment of students from overseas, as well as the development of partnerships, both local and overseas, with so-called collaborative institutions.
- Teachers' pay scales are negotiated and set on a national basis.

(3) London Guildhall University (LGU)[8]

1) Profile of the students at LGU

There are many education institutions in London, so that competition for students is intense. Its location in central London, which can be reached by means of an extensive public transportation system, gives LGU a wide catchment area and makes it possible for over three-quarters of LGU's students to live at home. Many are not school leavers.

There were about 7,700 undergraduate students in 2000, of whom 94 percent were full-time students.[9]

Women have received benefit from the evolution of the education systems. The gender balance has changed and is now roughly 50:50.

About 1,000 undergraduate students (13 percent) come from overseas, including European Union.

Graduate destinations are employment (53 percent), un-employed (9 percent), further study (25 percent) and others (13 percent).

2) Demand for courses

Some courses offered by LGU are unique, such as Restoration and Conservation, Silver-smithing, Jewelry etc. Since LGU has the required staff and facilities, it continues to offer these courses, even though the number of students who apply for them may become small. There is, at present, very strong demand for computer courses. In general, LGU measures the demand for courses by the number of applications received and this drives operating decisions.

LGU has been accustomed to have meetings with professional bodies in order to obtain their views as to the future needs of their professions, especially the banking and accounting sectors. However, it was the opinion that the importance and influence of these bodies is declining, because banks no longer wish employees to be trained in banking, but rather employ MBAs and/or specialists in areas such as Human Resources, Information Technology.

Higher National Diploma (HND) courses, which were taught by polytechnics, continue to be taught by the post-1992 universities, including LGU. However, demand for HND courses has been declining, because there is public perception that degree courses are better than HND courses for careers. In fact, about 60 percent of those taking HND courses go on to degree courses. LGU offers the following HND courses:

[8] Based on an interview with Professor Max Weaver, Deputy Provost, London Guildhall University.

[9] London Guildhall University, Undergraduate Prospectus for Entry 2001, p.10.

- Business
- Business and Finance
- Business and Marketing
- Business and Personnel
- Computing, European Business, Design (Interior Design)
- Design (Silver-smithing, Jewelry and Allied Crafts)
- Furniture (Design and Realization)
- Furniture (Manufacture and Management)
- Furniture (Restoration)
- Musical Instrument Technology

(4) University of East London (UEL)[10]

1) Differences from traditional universities

Although it was the view that, in a unified educational system, it was not always easy to maintain differences, it was the opinion that, as compared to the traditional universities, the characteristics of the post-1992 universities were:

a) A greater concern for employability.

b) A more open access for those students who are socially less well endowed.

c) Greater innovation in courses, with an emphasis on teaching students, rather than teaching subjects.

d) A very different student profile, including a higher proportion of mature students; of students from lower social classes; and of students from ethnic minorities (nearly 50 percent in UEL are from ethnic minorities).

e) Lower income, as post-1992 universities are unable to generate anything like as much income for research (UEL has about UKP1.0 million, as compared to traditional universities which may generate as much as UKP50.0 million); and post-1992 universities do not have income from foundations or inherited assets.

2) Courses and programmes

Initiatives for new courses, or modifications to existing courses, normally start in the departments. They must then be justified and defended, and approved by a quality assurance body. Departments have advisory groups, on which there are representatives of the private sector. In general, it was the view that employers find it difficult to predict

[10] Based on an interview with Professor F. W. Gould, Vice-Chancellor, and Professor John Pratt, Director of Center for Institutional Studies, University of East London.

their future needs. UEL trains about 300 employees/year of Ford Motor Company, which has a manufacturing plant nearby.

Recently, demand for business information systems has been very strong. Engineering is not a popular field. Furthermore, Engineering is very expensive to run. Consequently, it has been suggested that the engineering facilities should be merged with those of other universities in order to reduce expenses.

UEL is entirely autonomous in respect of its decisions to run or not to run courses. The polytechnics never emphasized technical subjects. They developed other professions (librarianship, business administration, etc). The following are the list of undergraduate programmes in 2001-2002[11]:

- Accounting, Finance and Economics: Accounting and Finance, Economics
- Architecture: Architecture
- Art and Design: Fashion and Marketing, Fine Art, Graphic Fine Arts, History of Art, Design and Film, Product Design, Textile Design and Surface Decoration
- Business and Management: Business Studies
- Computing: Computing and Business Information Systems
- Conservation and Environment: Archaeological Science, Environmental Science
- Engineering: Civil Engineering, Electronic Systems Engineering, Manufacturing Systems Engineering
- Geography and Land Management: Geography, Geo-Informatics, Surveying
- Health Studies and Sports Sciences: Applied Sports Science, Health Studies, Physiotherapy
- Humanities: Cultural Studies, Education and Community Studies, Education and Community Studies, Gender and Women's Studies, History of Art, Design and Film, Linguistics, Literature, South Asian Studies
- Information Technology Studies: Information Technology, Information and Communication Technology
- Law and Criminology: Criminology and Criminal Justice, Law
- Life Sciences: Biochemistry and Biotechnology, Biology, Microbiology and Parasitology, Physiology and Pharmacology
- Media and Communications: Communication Studies, Languages, Media Studies
- Psychology: Psychology

[11] University of East London, Guide to Undergraduate Programmes 2001-2002.

- Social and Political Studies: Anthropology, European Studies, Politics, Psycho-social Studies, Social Policy and Social Research, Social Science, Social Work Studies, Third World Development

3) Financial aspects

The new Dockland campus of UEL, which opened about 1 year ago, cost UKP40.0 million. Of this, UKP20.0 million (50 percent) was provided as a government grant, because the new campus was built in a regeneration area.

Government grants and student tuition fees, together, account for over 50 percent of the income of UEL. Fees paid by students, who are residents of UK are set by government and are the same for all universities. The universities may charge whatever fees they deem appropriate for overseas students, who are normally charged considerably more than UK residents. Fees for PhD courses are also not set by the government.

The government, through HEFCE, pays UKP2,000/year for each student of the humanities and UKP4,000/year for each engineering student. The students pay tuition fees of UKP1,000/year, but there is discussion that this may be increased.

Teachers' pay scales are negotiated and set on a national basis. It is difficult to recruit staff in growth areas (Business/ Information Technology etc.), since there is competition from both within the education system and from the private sector. It was noted that teachers are not required to be PhDs, but that an increasing number of staff with PhDs are being recruited.

4) Industrial attachments

UEL offers so-called sandwich courses, in which 6-12 months of practical experience by industrial placement is built into 3-year courses. The companies pay the students a small amount during the attachment. Industrial placement is seen by the students as an opportunity to obtain permanent employment after graduation.

5) Employment

Universities are required to undertake so-called first destination surveys. Graduates are surveyed by mail, but not all reply. The indications are that it takes about 6-24 months for the graduates to find their first permanent jobs.

(5) Middlesex University[12]

1) The characteristics of MU and other post-1992 universities

MU was amongst the first of the polytechnics to be converted into a university and was formed in 1992. It was the view that MU has similar characteristics to those of UEL,

[12] Based on an interview with Professor Jenny Naish, National Center for Work Based Learning Partnerships, Middlesex University

since the areas in which they are located are similar (in terms of the need for social and economic regeneration).

MU is particularly active in partnerships, both local and international. It works with so-called collaborative institutions in many countries. Students from collaborative institutions may undertake study periods at MU and programmes are validated by MU. MU has offices manned by MU staff in a number of countries (Malaysia, Australia, India, Greece, Israel, Brazil), the function of which is chiefly to recruit undergraduate students and also to run some programmes in these countries.

The post-1992 universities tend to be very large institutions (for example, there are about 22,000 students at MU). Many students work part-time to fund their tuition fees.

2) Courses and programmes

The tendency at MU is to concentrate on applied programmes, which have direct links to employment. For example, courses in pure sciences are not offered. There are substantial opportunities for work placements (for example, Performing Arts, Art and Design). Credit may be given for prior learning and companies' in-house training programmes may be accredited.

MU uses the term "learning outcomes" to define its approach to curriculum design (the word "competency" is not used, since it is held to apply chiefly to vocational training). Compulsory modules in key skills (for example, Information and Communication Technology, Inter-Personal Management) are now included in all courses. Some of the traditional universities, such as Cambridge University, are considered to be advanced in vocational training, but others are not.

Criteria for (internal) assessment, which vary for each department, include analytical skills, problem solving etc.

3) Demand for courses

At MU all aspects of policy are reviewed every 5 years. Other universities may be structured differently. Each university has autonomy in respect of its courses and programmes, and can determine which courses are offered. An important factor is that each university is competing with other universities to attract more students.

The demand for Business Studies is very strong at present. On the other hand, there is a diminishing demand for Engineering and for Social Sciences.

It was the opinion that it is extremely difficult for MU to anticipate trends or declines in demand. There are advisory groups for academic schools, which have external representation from Government and the private sector, and boards of studies, which have student representatives. In addition, MU has recently formed an internal planning group, with the objective of looking 15 years ahead.

4) Financial aspects

The fees which students pay are the same at all universities. The payments for each student, received from the UK government through HEFCE, vary by bands of subjects, but are the same for all universities. MU does a lot of training of health service students, funded by payments from the National Health Service.

5) Employment

A first destination survey of graduates is carried out, annually, by mail. Graduates may join the alumni association, which has about 20,000 members (not very many in relation to the fact that 7,000-8,000 students graduate each year) and which monitors the activities of its members.

(6) University of Westminster[13]

1) The transition from Polytechnics to universities

The University of Westminster (UW) was founded as a polytechnic in 1831, and it was the oldest polytechnic in the U.K. The change took place because the government of the U.K. wanted to improve access to higher education. The Polytechnics had generally greater access to the lower social classes than the traditional universities. There was also a desire to unify the perceptions by which graduates of universities and polytechnics were viewed.

UW is now serving an international clientele, whereas as a polytechnic it served chiefly the London area and South East England. There is a cultural mix of students, but staffs are still largely white Anglo-Saxon. The changes which have been made are the result of market forces, not the change in the status of the institution from Polytechnic to university.

2) Financial aspects

Access to financial support is now widely available for the students, but government funding has not increased in proportion. UW is financially very strong and has a large surplus. Especially, UW has joint research activities with the private sector, such as business, communications and media.

A high proportion (25 percent) of students are from other countries, world-wide, but relatively few from African countries. There are study abroad programmes. UW is working on the development of a programme with a number of the states of Nigeria.

3) Courses and programmes

UW has recently closed courses for civil engineering, mechanical engineering, languages and education, for lack of demand. Degrees are accredited by professional associations,

[13] Based on an interview with Mr. Howard Tyers, International Project Officer, University of Westminster.

and some members of the accreditation board come from industries or the private sector. These connections tend to assist in the evaluation of demand for UW's courses and programmes.

In order to improve courses and programmes, strong connections with the private sector are essential for the universities. For this purpose, UW has links with London First, a non-profit local authority providing training and research, and with many companies which require services (legal, telecommunications, for example).

(7) London First[14]

1) Background of the organization

London First (LF), a private non-profit organization, was founded in the early 1990s, after the disbandment of the Greater London Council (GLC), which, among many other activities, had been responsible for management of certain educational facilities. The principal objectives of LF were 1) to get better governance for London, 2) to improve transportation, and 3) to solve problems of environment, especially waste disposal, in London. Activities in respect of education were recently added. All universities in London are currently members and pay fees of UKP10,000/year.

2) Demand from the private sector

It was noted that about 35 percent of the 18-20 years age group now undertake higher education, as opposed to about 5 percent about 15-20 years ago. On the other hand, there are a diminishing number of the management jobs, which have traditionally been available to graduates. Furthermore, employers complain that the graduates they employ often lack the basic skills and knowledge required and so prefer to employ persons with work experience, who are more ready to accept the disciplines of the work place, and whom they will train in what they need to know. However, in London there is a shortage of skilled people.

The private sector has difficulty in predicting what its future requirements will be in respect of trained manpower. Consequently, there is a trend towards preparing students in respect of basic aptitudes and attitudes, rather than in specific areas or skills.

3) What is being, or should be, taught in the post-1992 universities

It was the view that the post-1992 universities have a good reputation for the quality of teaching in all areas. The universities also maintain an emphasis on life-long learning. For instance 45 percent of the students at the University of Greenwich, one of the post-1992 universities, are over 26 years of age.

In London there are about 500,000 students in further education (FE) and about 300,000 students in higher education (HE). It was the opinion that most students had a good idea

[14] Based on an interview with Mr. John Edmundson, Executive Director of Post 16 Education, London First.

of what jobs they would like to obtain, so that it was necessary to assist them to find out where it would be most appropriate for them to study in order to prepare for the jobs. LF is trying to develop a website, which will assist students to match their job ideas to where they should study.

There is the view that too much emphasis on training for very specific jobs would not be practical in higher education, because demand tends to change very quickly. It became clear that considerable resources are now being put into training in Information Technology.

APPENDIX

CHAPTER 7 A MASTER PLAN TO STRENGTHEN TECHNICAL EDUCATION

7.1 Development Scenarios

7.1.1 Shift of employment demand in education levels and specialties

In this section, a shift of employment demand of the formal and informal sectors was forecasted for 2000 to 2020 in terms of education levels and specialties. This analysis was based on the local survey done by the JICA Study Team and was summarized as follow:

Basic assumptions

- 40 enterprises interviewed with more than 6 employees are considered as part of the formal sector, while 50 enterprises interviewed with less than 5 employees are considered as the informal sector.
- Specialties are divided into four groups, i.e., (1) engineering from university and polytechnic, (2) non-Engineering from university and polytechnic, (3) secondary technical from TI, NVTI and private technical training institute and (4) general from SSS, JSS and others.

Procedures of analysis

- Distribution shares were calculated for 2000, 2005 and 2015 from the interview results by education levels and by the formal and informal sectors, by which distribution shares in 2010 and 2020 were estimated in assumption of linear shift over years. (See Table A-7.1.1)
- The distribution shifts were calculated using differences between 2000 and 2020. (See Table A-7.1.2)
- Weighted average of the distribution shift were calculated for a total employment demand in the formal and informal sectors. (See Table A-7.1.2)

Findings (See Table A-7.1.2)

- From the analysis by academic career, the formal sector prefers engineering and secondary technical employees to non-Engineering and general ones. There is a forecast for the highest increased demand for employees from TI and NVTI.
- The forecast of demand shift in the informal sector shows an expansion of employers in the areas of engineering, non-engineering and secondary technical, particularly the shares of TI and NVTI graduates with the largest expansion of 16%.

- In weighted total, the shares of engineering, non-engineering and secondary technical increase by 6.8%, 4.4% and 16.0% respectively, whilst the share of general decreases sharply by 27.2%.

Table A-7.1.1 Demand of employees by education levels

(Formal sector)

	Graduate from	Background	Average employees per enterprise				Share of Employees by education levels				Estimated labor market in the country			
			Year 2000 (persons/ enterprise)	Year 2005 (persons/ enterprise)	Year 2010 (persons/ enterprise)	Year 2015 (persons/ enterprise)	Year 2000 (%)	Year 2005 (%)	Year 2010 (%)	Year 2015 (%)	Year 2000 (Person)	Year 2005 (Person)	Year 2010 (Person)	Year 2015 (Person)
		(# of enterprises interviewed) 40												
1	University	Engineering	1.00	1.83	2.10	2.55	1.8%	3.3%	3.7%	3.8%	7,685	14,026	16,139	19,598
2		Non-engineering	1.30	1.73	2.08	2.15	2.4%	3.1%	3.6%	3.2%	9,991	13,257	15,947	16,524
3	Polytechnic	Engineering	2.55	4.25	4.20	5.60	4.6%	7.7%	7.4%	8.3%	19,598	32,663	32,278	43,038
4		Non-engineering	1.00	1.78	1.85	2.40	1.8%	3.2%	3.2%	3.6%	7,685	13,642	14,218	18,445
5	TI	Technical	4.38	7.23	7.80	9.18	7.9%	13.1%	13.7%	13.6%	33,623	55,527	59,946	70,513
6	NVTI	Technical	5.50	8.28	8.70	12.00	9.9%	15.0%	15.3%	17.8%	42,269	63,596	66,863	92,224
7	SSS		17.13	12.63	12.28	13.53	31.0%	22.9%	21.5%	20.1%	131,612	97,028	94,338	103,944
8	JSS		20.83	16.43	16.88	18.70	37.7%	29.9%	29.6%	27.7%	160,047	126,232	129,690	143,716
9	Others		1.63	0.90	1.13	1.35	2.9%	1.6%	2.0%	2.0%	12,489	6,917	8,646	10,375
	Total		55.30	55.03	57.00	67.45	100.0%	100.0%	100.0%	100.0%	425,000	422,887	438,065	518,377

(Informal sector)

			Average employees per enterprise				Share of Employees by education levels				Estimated labor market in the country			
			Year 2000 (persons/ enterprise)	Year 2005 (persons/ enterprise)	Year 2010 (persons/ enterprise)	Year 2015 (persons/ enterprise)	Year 2000 (%)	Year 2005 (%)	Year 2010 (%)	Year 2015 (%)	Year 2000 (Person)	Year 2005 (Person)	Year 2010 (Person)	Year 2015 (Person)
		(# of enterprises interviewed) 50												
1	University	Engineering	0.00	0.00	0.04	0.16	0.0%	0.0%	0.2%	0.5%	0	0	3,030	12,118
2		Non-engineering	0.00	0.06	0.22	0.48	0.0%	0.5%	0.9%	1.4%	0	4,544	16,662	36,354
3	Polytechnic	Engineering	0.00	0.40	1.00	1.78	0.0%	3.0%	4.2%	5.2%	0	30,295	75,738	134,814
4		Non-engineering	0.02	0.44	1.14	1.80	0.5%	3.3%	4.8%	5.2%	1,515	33,325	86,341	136,329
5	TI	Technical	0.30	2.24	4.30	6.14	7.4%	16.8%	18.1%	17.8%	22,721	169,653	325,674	465,032
6	NVTI	Technical	0.40	2.14	3.68	5.36	9.9%	16.1%	15.4%	15.6%	30,295	162,080	278,716	405,956
7	SSS		0.50	1.68	2.68	3.82	12.4%	12.6%	11.3%	10.5%	37,869	127,240	202,978	274,172
8	JSS		2.02	6.16	10.42	14.62	50.0%	46.2%	43.7%	42.5%	152,991	466,547	789,191	1,107,291
9	Others		0.80	0.20	0.34	0.44	19.8%	1.5%	1.4%	1.3%	60,590	15,148	25,751	33,325
	Total		4.04	13.32	23.82	34.40	100.0%	100.0%	100.0%	100.0%	305,982	1,008,832	1,804,082	2,605,391

Source: Local Survey, JICA Study Team

Note: Enterprises interviewed in Formal sector have more than 6 employees, while ones in Informal sector have less than 5.
Sample number in Formal sector is 40, while one in Informal sector is 50.
Labor market estimation in 2000 is as follows (See Table 4.3.1):

Formal sector	
Public and semi-public sector	267,000
Private sector	158,000
Total	425,000
Ratio of employees in the formal sector to ones in enterprises surveyed	192

Informal sector	
Total	3,438,000
Agriculture sector	56%
Industrial sector	9%
Service sector	32%
Others	3%
Labor in industrial sector	305,982
Ratio of employees in the informal sector to ones in enterprises surveyed	1,515

Table A-7.1.2 Demand shift in education levels and specialties

	Formal sector						Informal sector						Total (Weighted)					
	Year 2000	Year 2005	Year 2010	Year 2015	Year 2020	Difference 2000-20	Year 2000	Year 2005	Year 2010	Year 2015	Year 2020	Difference 2000-20	Year 2000	Year 2005	Year 2010	Year 2015	Year 2020	Difference 2000-20
By academic career																		
1 University Engineering	1.8%	3.3%	3.7%	3.8%	3.9%	**2.1%**	0.0%	0.0%	0.2%	0.5%	0.8%	**0.8%**	1.1%	1.9%	2.2%	2.4%	2.6%	**1.5%**
2 Non-engineering	2.4%	3.1%	3.6%	3.2%	2.7%	**0.4%**	0.0%	0.5%	0.9%	1.4%	1.9%	**1.9%**	1.4%	2.0%	2.5%	2.4%	2.4%	**1.0%**
3 PI Engineering	4.6%	7.7%	7.4%	8.3%	9.2%	**4.6%**	0.0%	3.0%	4.2%	5.2%	6.2%	**6.2%**	2.7%	5.7%	6.0%	7.0%	7.9%	**5.3%**
4 Non-engineering	1.8%	3.2%	3.2%	3.6%	3.9%	**2.1%**	0.5%	3.3%	4.8%	5.2%	5.7%	**5.2%**	1.3%	3.3%	3.9%	4.3%	4.6%	**3.4%**
5 TI Technical	7.9%	13.1%	13.7%	13.6%	13.5%	**5.6%**	7.4%	16.8%	18.1%	17.8%	17.6%	**10.2%**	7.7%	14.7%	15.5%	15.4%	15.2%	**7.5%**
6 NVTI Technical	9.9%	15.0%	15.3%	17.8%	20.3%	**10.4%**	9.9%	16.1%	15.4%	15.6%	15.7%	**5.8%**	9.9%	15.5%	15.3%	16.9%	18.4%	**8.5%**
7 SSS	31.0%	22.9%	21.5%	20.1%	18.6%	**-12.4%**	12.4%	12.6%	11.3%	10.5%	9.8%	**-2.6%**	23.2%	18.6%	17.2%	16.1%	14.9%	**-8.3%**
8 JSS	37.7%	29.9%	29.6%	27.7%	25.8%	**-11.8%**	50.0%	46.2%	43.7%	42.5%	41.3%	**-8.7%**	42.8%	36.7%	35.5%	33.9%	32.3%	**-10.5%**
9 Others	2.9%	1.6%	2.0%	2.0%	2.0%	**-0.9%**	19.8%	1.5%	1.4%	1.3%	1.1%	**-18.7%**	10.0%	1.6%	1.7%	1.7%	1.7%	**-8.3%**
Total	100.0%	100.0%	100.0%	100.0%	100.0%	**0.0%**	100.0%	100.0%	100.0%	100.0%	100.0%	**0.0%**	100.0%	100.0%	100.0%	100.0%	100.0%	**0.0%**
By specialties																		
Engineering (Univ. and PI)	6.4%	11.0%	11.1%	12.1%	13.1%	**6.7%**	0.0%	3.0%	4.4%	5.6%	6.9%	**6.9%**	3.7%	7.7%	8.3%	9.4%	10.5%	**6.8%**
Non-engineering (Univ. and PI)	4.2%	6.4%	6.9%	6.7%	6.6%	**2.4%**	0.5%	3.8%	5.7%	6.6%	7.5%	**7.1%**	2.6%	5.3%	6.4%	6.7%	7.0%	**4.4%**
Secondary technical (TI and NVTI)	17.9%	28.2%	28.9%	31.4%	33.8%	**16.0%**	17.3%	32.9%	33.5%	33.4%	33.4%	**16.0%**	17.6%	30.1%	30.9%	32.2%	33.6%	**16.0%**
General (SSS, JSS, others)	71.6%	54.4%	53.1%	49.8%	46.4%	**-25.1%**	82.2%	60.4%	56.4%	54.3%	52.2%	**-30.0%**	76.0%	56.9%	54.5%	51.7%	48.8%	**-27.2%**
Total	100.0%	100.0%	100.0%	100.0%	100.0%	**0.0%**	100.0%	100.0%	100.0%	100.0%	100.0%	**0.0%**	100.0%	100.0%	100.0%	100.0%	100.0%	**0.0%**

Source: Local Survey, JICA Study Team

7.1.2 Analysis of three development scenarios

(1) Definition of the three development scenarios

Vision 2020, the only national development plan existing now in Ghana, describes that a target of Vision 2020 is for Ghana to enter the middle-income group by 2020, although it is widely considered that it is extremely difficult to achieve this.[15]

Therefore, assuming that per capita GDP of middle-income country ranges from US$ 1,000 and that an annual growth rate of population is 2.5%, the following three scenarios for the Master Plan to Strengthen Technical Education are presented:

- Scenario 1 (high growth): a target per capita GDP is US$ 1,500 in 2020, which requires an annual GDP growth rate of 8.6%.
- Scenario 2 (mid. growth): a target per capita GDP is US$ 1,000 in 2020, which requires an annual GDP growth rate of 6.7%.
- Scenario 3 (low growth): a target GDP growth rate up to 2020 is as same as the average GDP growth rate between 1993 and 1999, 4.7%, which leads per capita GDP of US$ 665.

Table A-7.1.3 Target of three scenarios

		Scenario 1 (High growth)	Scenario 2 (Mid growth)	Scenario 3 (Low growth)
Per capita GDP	(US$/capita)	1,500	1,000	665
GDP growth rate		8.6%	6.7%	4.7%
GDP	(Mil. US$)	46,497	30,985	20,604

(2) Estimation of labor market size and demand shift by education levels

In order to estimate expansion of the labor market size in 3 scenarios, the following assumptions are used:

- The current labor market size in the formal sector is estimated to be 425,000, as discussed in Section 7.1.1. As for the informal sector, the target for the TVET sector is only the industrial sector, which is 8.9% of the total labor market size of the informal sector (3,438,000). Therefore, the current labor market size is estimated to be 306,000 (= 3,438,000 x 0.089)
- The labor market will grow at the same rate of the annual GDP growth rate.
- The labor market both in the formal and informal sectors will grow at the same rate of the GDP growth until 2020.

[15] There are several economic research institutes such as CEPA (Center for Economic and Policy Analysis), ISER (Institute for Statistical and Economic Research) and IEA (Institute of Economic Affairs). None on them, however, provide reports regarding forecast of economic development in the country.

- Labor distribution by education levels will shift, as discussed in Section 7.1.1.
- Education levels are grouped into 3 categories, i.e., tertiary education, secondary technical education and general education.
- A scale of retired employees is 4% of the current labor market size, assuming an average work period is 25 years.
- Demand of annual recruitment for new graduates is an increase of labor market size together with an estimate of the total of retired employees.
- The current enrolment share of university and polytechnic is 70% and 30%, which will change to 40% to 60% in 2020, respectively, based on the MOE policy.

Demand shift by education levels in three scenarios is demonstrated in Table A-7.1.4. The labor market size is estimated to increase from 731,000 in 2000 to 3,839,000, 2,654,000 and 1,832,000 in 2020 in cases of Scenario 1, Scenario 2 and Scenario 3, respectively. In Scenario 2, the labor market size for tertiary education increases 46,000 in 2000 to 465,000 in 2020, while that for secondary technical education increases from 129,000 in 2000 to 893,000 in 2020.

Table A-7.1.4 Demand shift by education levels in three scenarios

		Year 2000			Year 2010			Year 2020	
Education level	**Institutions**	Formal	Informal		Formal	Informal		Formal	Informal
1 Tertiary education	University/Polytechnics	10.6%	0.5%		17.9%	10.1%		19.7%	14.5%
2 Secondary technical education	TI/NVTI/Private TI	17.9%	17.3%		28.9%	33.5%		33.8%	33.4%
3 General educaton	SSS/JSS/Others	71.6%	82.2%		53.1%	56.4%		46.4%	52.2%
Total		100.0%	100.0%		100.0%	100.0%		100.0%	100.0%

Scenario 1 (High growth) **Growth rate** **8.6%** (1,000 employees)

		Year 2000			Year 2010			Year 2020			Growth rate (2000-2020)
Education level	**Institutions**	Formal	Informal	Total	Formal	Informal	Total	Formal	Informal	Total	
1 Tertiary education	University/Polytechnics	45	2	46	175	71	245	440	232	672	14.3%
2 Secondary technical education	TI/NVTI/Private TI	76	53	129	282	235	517	755	536	1,291	12.2%
3 General educaton	SSS/JSS/Others	304	251	556	517	396	913	1,036	838	1,875	6.3%
Total		425	306	731	974	701	1,675	2,232	1,607	3,839	8.6%

Scenario 2 (Mid growth) **Growth rate** **6.7%** (1,000 employees)

		Year 2000			Year 2010			Year 2020			Growth rate (2000-2020)
Education level	**Institutions**	Formal	Informal	Total	Formal	Informal	Total	Formal	Informal	Total	
1 Tertiary education	University/Polytechnics	45	2	46	145	59	204	304	161	465	12.2%
2 Secondary technical education	TI/NVTI/Private TI	76	53	129	234	195	430	522	371	893	10.2%
3 General educaton	SSS/JSS/Others	304	251	556	430	329	759	717	580	1,296	4.3%
Total		425	306	731	810	583	1,393	1,543	1,111	2,654	6.7%

Scenario 3 (Low growth) **Growth rate** **4.7%** (1,000 employees)

		Year 2000			Year 2010			Year 2020			Growth rate (2000-2020)
Education level	**Institutions**	Formal	Informal	Total	Formal	Informal	Total	Formal	Informal	Total	
1 Tertiary education	University/Polytechnics	45	2	46	121	49	169	210	111	321	10.1%
2 Secondary technical education	TI/NVTI/Private TI	76	53	129	195	162	357	360	256	616	8.1%
3 General educaton	SSS/JSS/Others	304	251	556	357	273	631	495	400	895	2.4%
Total		425	306	731	673	484	1,157	1,065	767	1,832	4.7%

(3) Estimation of enrolment growth to meet with labor market

Enrolment growth to meet with labour market by education levels is estimated in case of Scenario 2, as shown in Table A-7.1.6. Assuming that the enrolment share of university and polytechnic changes constantly, enrolment of university increases from 29,000 in 2001 to 86,000 in 2020, while that of polytechnic increases from 12,000 to 97,000 in the same period. Assuming that the enrolment share of TI in the secondary technical education is constant until 2020, enrolment of TI increases from 12,000 in 2001 to 46,000 in 2020. (For Scenario 1 and Scenario 3, see Table A-7.1.5 and Table A-7.1.7.)

Table A-7.1.5 Estimated growth of labor market in case of Scenario 1 (high growth)

(1,000)

GDP growth rate	8.6%																				
	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Labor market forecast																					
1 Tertiary education	46	55	65	77	90	107	126	149	176	208	245	271	300	332	367	406	449	497	550	608	672
2 Secondary technical education	129	148	170	196	225	258	297	341	392	450	517	566	621	680	745	817	895	981	1,075	1,178	1,291
3 General education	556	584	614	645	678	712	748	787	827	869	913	981	1,054	1,133	1,217	1,308	1,406	1,511	1,624	1,745	1,875
Total	731	787	849	917	993	1,077	1,171	1,276	1,394	1,526	1,675	1,819	1,975	2,145	2,330	2,531	2,750	2,989	3,248	3,531	3,839
Retired employees																					
1 Tertiary education		2	2	3	3	4	4	5	6	7	8	10	11	12	13	15	16	18	20	22	24
2 Secondary technical education		5	6	7	8	9	10	12	14	16	18	21	23	25	27	30	33	36	39	43	47
3 General education		22	23	25	26	27	28	30	31	33	35	37	39	42	45	49	52	56	60	65	70
Total		29	31	34	37	40	43	47	51	56	61	67	73	79	86	93	101	110	120	130	141
Annual recruitment																					
1 Tertiary education		10	12	14	17	20	24	28	33	39	46	36	40	44	48	54	59	66	73	80	89
2 Secondary technical education		24	28	32	37	42	49	56	64	74	85	70	77	84	92	101	111	122	133	146	160
3 General education		51	53	58	59	62	65	68	72	75	79	105	112	121	130	140	150	161	173	186	200
Total		85	93	102	112	124	137	152	169	188	210	211	229	249	271	294	320	348	379	412	449
Annual recruitment by education levels																					
University		7	8	9	10	12	14	16	18	21	24	19	20	22	23	25	27	29	31	33	36
Polytechnics		4	4	5	7	8	10	12	15	18	22	17	20	22	25	29	33	37	42	47	53
TI		4	4	5	6	7	8	9	10	12	13	11	12	13	15	16	18	19	21	23	25
Enrolment to meet with labor market																					2001 to 20
University		34	39	45	52	60	69	80	82	84	84	83	90	96	104	111	120	128	135	140	142	7.9%
Polytechnics		13	17	20	25	30	36	44	54	57	59	59	67	76	87	98	111	126	142	154	160	13.9%
TI		13	15	18	20	23	27	31	35	36	37	37	40	44	48	53	58	64	70	74	76	
Share of tertiary education																					
University	66%	65%	63%	62%	61%	60%	58%	57%	56%	54%	53%	52%	50%	49%	48%	47%	45%	44%	43%	41%	40%
Polytechnic	34%	35%	37%	38%	39%	41%	42%	43%	44%	46%	47%	48%	50%	51%	52%	54%	55%	56%	57%	59%	60%
Share of secondary technical education																					
TI	15.9%	15.9%	15.9%	15.9%	15.9%	15.9%	15.9%	15.9%	15.9%	15.9%	15.9%	15.9%	15.9%	15.9%	15.9%	15.9%	15.9%	15.9%	15.9%	15.9%	15.9%

Table A-7.1.6 Estimated growth of labor market in case of Scenario 2 (mid growth)

(1,000)

GDP growth rate 6.7%	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	
Labor market forecast																						
1 Tertiary education	46	54	62	72	84	97	113	131	152	176	204	222	241	261	284	308	334	363	394	428	465	
2 Secondary technical education	129	145	164	185	209	235	265	299	338	381	430	462	497	535	576	619	666	717	771	830	893	
3 General education	556	573	591	610	629	649	670	691	713	736	759	801	845	891	940	992	1,047	1,104	1,165	1,229	1,296	
Total	731	773	818	868	922	982	1,048	1,122	1,203	1,293	1,393	1,485	1,583	1,688	1,800	1,919	2,047	2,184	2,331	2,487	2,654	
Retired employees																						
1 Tertiary education		2	2	2	3	3	4	5	5	6	7	8	9	10	10	11	12	13	15	16	17	
2 Secondary technical education		5	6	7	7	8	9	11	12	14	15	17	18	20	21	23	25	27	29	31	33	
3 General education		22	23	24	24	25	26	27	28	29	29	30	32	34	36	38	40	42	44	47	49	
Total		29	31	33	35	37	39	42	45	48	52	56	59	63	68	72	77	82	87	93	99	
Annual recruitment																						
1 Tertiary education		9	11	12	14	17	19	23	26	30	35	26	28	30	33	36	39	42	46	50	54	
2 Secondary technical education		22	24	28	31	35	40	45	50	57	64	50	54	58	62	67	72	77	83	89	96	
3 General education		40	41	42	44	45	47	48	50	51	53	72	76	80	85	89	94	99	105	111	117	
Total		71	76	82	89	97	106	115	126	138	152	148	158	168	180	192	205	219	234	250	267	
Annual recruitment by education levels																						
University		6	7	8	9	10	11	13	15	16	19	13	14	15	16	17	18	18	19	20	22	
Polytechnics		3	4	5	6	7	8	10	12	14	16	12	14	15	17	19	21	24	26	29	32	
TI		3	4	4	5	6	6	7	8	9	10	8	8	9	10	11	11	12	13	14	15	
Enrolment to meet with labor market																						2001 to 20
University		29	33	38	43	49	55	62	63	62	61	58	61	65	68	72	76	80	83	85	86	5.8%
Polytechnics		12	14	17	21	25	29	35	42	43	43	42	46	52	58	64	71	79	88	94	97	11.7%
TI		12	13	15	17	19	21	24	27	27	27	26	27	30	32	34	37	40	43	45	46	7.5%
Share of tertiary education																						
University	66%	65%	63%	62%	61%	60%	58%	57%	56%	54%	53%	52%	50%	49%	48%	47%	45%	44%	43%	41%	40%	
Polytechnic	34%	35%	37%	38%	39%	41%	42%	43%	44%	46%	47%	48%	50%	51%	52%	54%	55%	56%	57%	59%	60%	
Share of secondary technical education																						
TI	15.9%	15.9%	15.9%	15.9%	15.9%	15.9%	15.9%	15.9%	15.9%	15.9%	15.9%	15.9%	15.9%	15.9%	15.9%	15.9%	15.9%	15.9%	15.9%	15.9%	15.9%	

Table A-7.1.7 Estimated growth of labor market in case of Scenario 3 (low growth)

GDP growth rate 4.7% (1,000)

	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	
Labor market forecast																						
1 Tertiary education	46	53	60	69	78	89	101	115	131	149	169	181	193	205	219	233	249	265	282	301	321	
2 Secondary technical education	129	143	158	175	194	215	238	263	291	322	357	377	398	421	444	469	495	523	552	583	616	
3 General education	556	563	570	577	584	592	599	607	615	623	631	653	676	700	725	751	778	806	834	864	895	
Total	731	758	788	821	856	895	938	985	1,037	1,094	1,157	1,211	1,267	1,326	1,388	1,453	1,522	1,594	1,669	1,748	1,832	
Retired employees																						
1 Tertiary education		2	2	2	3	3	4	4	5	5	6	7	7	8	8	9	9	10	11	11	12	
2 Secondary technical education		5	6	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	
3 General education		22	23	23	23	23	24	24	24	25	25	25	26	27	28	29	30	31	32	33	35	
Total		29	30	32	33	34	36	38	39	41	44	46	48	51	53	56	58	61	64	67	70	
Annual recruitment																						
1 Tertiary education		8	9	11	12	14	16	18	20	23	27	18	19	20	22	23	25	26	28	30	32	
2 Secondary technical education		19	21	23	26	29	32	35	39	43	47	34	36	38	40	43	45	48	50	53	56	
3 General education		29	30	30	30	31	31	32	32	32	33	48	49	51	53	55	57	59	61	63	65	
Total		57	60	64	68	73	79	85	91	99	107	100	105	110	115	121	127	133	139	146	153	
Annual recruitment by education levels																						
University		5	6	7	7	8	9	10	11	13	14	9	10	10	10	11	11	12	12	12	13	
Polytechnics		3	3	4	5	6	7	8	9	11	12	9	9	10	11	12	14	15	16	18	19	
TI		3	3	4	4	5	5	6	6	7	8	5	6	6	6	7	7	8	8	8	9	
Enrolment to meet with labor market																						2001 to 20
University		25	28	32	35	39	43	48	47	46	43	39	41	42	44	45	47	49	50	51	51	3.7%
Polytechnics		10	12	14	17	20	23	27	32	32	31	29	31	34	37	41	44	48	53	56	57	9.4%
TI		10	11	12	14	15	17	18	20	20	19	17	18	19	20	21	23	24	25	26	27	
Share of tertiary education																						
University	66%	65%	63%	62%	61%	60%	58%	57%	56%	54%	53%	52%	50%	49%	48%	47%	45%	44%	43%	41%	40%	
Polytechnic	34%	35%	37%	38%	39%	41%	42%	43%	44%	46%	47%	48%	50%	51%	52%	54%	55%	56%	57%	59%	60%	
Share of secondary technical education																						
TI	15.9%	15.9%	15.9%	15.9%	15.9%	15.9%	15.9%	15.9%	15.9%	15.9%	15.9%	15.9%	15.9%	15.9%	15.9%	15.9%	15.9%	15.9%	15.9%	15.9%	15.9%	

(4) Proposed enrolment growth schedule by education levels

Three scenarios of enrolment growth by education levels are proposed based on the current enrolment in 2000 and the estimated labor market size in 2020. In this enrolment growth plan, enrolment increases constantly from the current enrolment in 2000 to the estimated labor market size in 2020. Enrolment of university increases from 43,000 in 2000 to 142,000, 86,000 and 51,000 in 2020 in cases of Scenario 1, Scenario 2 and Scenario 3, respectively, while that of polytechnic expands from 22,000 to 160,000, 97,000 and 57,000 for the same period, respectively and that of TI expand from 14,000 to 76,000, 46,000 and 27,000 for the same period, respectively.

Tertiary enrolment per 100,000 inhabitants increases from 343 in 2000 to 977, 593 and 349 in cases of Scenario 1, Scenario 2 and Scenario 3, respectively. These figures can compare to 971 in Malaysia and 2096 in Thailand in 1998.[16]

[16] UNESCO Statistic Book

Table A-7.1.8 Three scenarios of enrolment growth by education levels

(1000)

	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Population	18,000	18,450	18,911	19,384	19,869	20,365	20,874	21,396	21,931	22,480	23,042	23,618	24,208	24,813	25,434	26,069	26,721	27,389	28,074	28,776	29,495	30,232	30,988
Enrolment																							
High growth scenario																							
University	32	37	43	45	48	51	54	58	61	65	69	73	78	83	88	93	99	105	112	119	126	134	142
Polytechnic	13	17	22	25	27	30	33	37	40	45	49	54	60	66	73	80	89	98	108	119	132	145	160
TI	14	14	14	15	17	18	20	22	23	26	28	30	33	36	39	42	46	50	54	59	64	70	76
Total tertiary (Univ + PI)	45	54	65	70	75	81	87	94	102	110	118	128	138	149	161	174	188	203	220	238	258	279	303
Tertiary per 100,000 inhabitants	248	291	343	360	379	398	418	440	463	487	513	540	569	600	632	667	703	742	784	828	875	924	977
Mid growth scenario																							
University	32	37	43	44	46	47	49	51	53	54	56	58	61	63	65	67	70	72	75	78	80	83	86
Polytechnic	13	17	22	24	26	28	30	32	35	37	40	43	47	50	54	58	63	67	73	78	84	90	97
TI	14	14	14	15	16	17	18	19	20	21	23	24	25	27	29	30	32	34	36	38	41	43	46
Total tertiary (Univ + PI)	45	54	65	68	72	75	79	83	87	92	97	102	107	113	119	126	132	140	147	156	164	174	184
Tertiary per 100,000 inhabitants	248	291	343	352	360	369	379	388	398	409	420	431	443	455	468	482	496	510	525	541	558	575	593
Low growth scenario																							
University	32	37	43	43	43	44	44	44	45	45	46	46	47	47	47	48	48	49	49	50	50	50	51
Polytechnic	13	17	22	23	25	26	27	28	30	31	33	34	36	37	39	41	43	45	47	50	52	55	57
TI	14	14	14	15	15	16	16	17	17	18	18	19	19	20	21	21	22	23	24	24	25	26	27
Total tertiary (Univ + PI)	45	54	65	66	68	69	71	73	75	76	78	80	82	84	87	89	91	94	96	99	102	105	108
Tertiary per 100,000 inhabitants	248	291	343	342	342	341	341	340	340	340	340	340	340	340	341	341	342	343	344	345	346	347	349

Growth rate

High growth scenario	99/98	00/99	01/20
University	15.6%	15.6%	6.2%
Polytechnic	32.0%	32.0%	10.4%
TI	0.0%	0.0%	8.8%
Mid growth scenario	99/98	00/99	01/20
University	15.6%	15.6%	3.6%
Polytechnic	32.0%	32.0%	7.6%
TI	0.0%	0.0%	6.0%
Low growth scenario	99/98	00/99	01/20
University	15.6%	15.6%	0.9%
Polytechnic	32.0%	32.0%	4.8%
TI	0.0%	0.0%	3.2%

Source: JICA Study Team

(5) Proposal of Scenario 2 for development of the Master Plan

Comparing the outcomes of enrolment growth plans in three scenarios, the Study Team proposes to use Scenario 2 for the further study in the Master Plan Development by the following reasons:

- For Scenario 1, it is extremely difficult for Ghana to achieve a GDP growth rate of 8.6% until 2020. It is also difficult for technical institutions to increase enrolment of polytechnic and TI at the rate of 10.4% and 8.8%, respectively, maintaining quality of technical education standard.
- For Scenario 3, it might be realistic for Ghana to target the economic growth rate until 2020 at the same level of the past years, that is, 4.7%. However, tertiary enrolment per 100,000 inhabitants will be 349 in 2020, which is one-third of Malaysia and lower than one-fifth of Thailand. The proper economic development is not possible by this low level of capacity in tertiary education.
- For Scenario 2, 6.7% of GDP growth rate might be ambitious, considering the current economic condition in Ghana. However, the target tertiary enrolment per 100,000 inhabitants in 2020, that is, 593, is appropriate, for which enrolment growth rates of polytechnic and TI are 7.6% and 6.0% until 2020, respectively. These enrolment growth rates could be achieved in improving quality of technical education, if the TEVT sector is properly managed to strengthen.

7.2 Preliminary Calculation of Students' Loan

7.2.1 General

In this section, preliminary calculation regarding students' loan is made, and a financial comparison between "option with students' loan" and "option without students' loan" is made.

The objective of this calculation is for "packaged course and short course of pilot program in overall polytechnics".

As previously mentioned, the unit student fee in pilot program shows a relatively high level especially for the case of packaged course. In order to compensate such a relative high level of unit student fee, a students' loan for students is assumed and a preliminary calculation is provided as follows:

7.2.2 Basic assumption of students' loan condition

The objective of students' loan is assumed to be only for a packaged course in pilot program. Considering the characteristics of "short course", students' loan for "short course" is excluded. The share portion of student by type is assumed to be 10%, 10% and 80% for "self-financed" (without subsidy or loan), "bursary" (with subsidy and without loan) and "loan borrower" (without subsidy and with loan), respectively. The share ratio of repayment out of borrowers is assumed to be 90%. The repayment period is assumed

to be 15 years after graduation with an interest rate of 3.0%. The management cost is 1.0% to loan balance. The provision of loan continues until 2020, and repayment of final loan ends in 2037.

7.2.3 Summary of students' loan calculation results

The students' loan calculation results regarding estimated government support are summarized as below:

A. Option: With Scholarship Loan		Accumulated (US$ million)	Period
Total education costs	*1	738	2002 to 2020
Total student fees	*2	286	2002 to 2020
Total of others (residual value of building costs)	*3	164	2002 to 2020
Government subsidy (*1 – *2 – *3)	*4	288	2002 to 2020
Bursary	*5	21	2002 to 2020
Scholarship loan			
Outflow			
Loan		166	2002 to 2020
Management cost		17	2002 to 2037
(Subtotal)	*6	183	
Inflow			
Repaid principal		150	2002 to 2037
Interest		45	2002 to 2037
(Subtotal)	*7	194	
Outflow minus inflow	*8	-12	
(Note: Maximum accumulated value: 128 in 2020)			
Government support (*4 + *5 + *8)	*9	297	

The above results ("option of with students' loan") are compared to the "option of without students' loan". The calculation condition for "option of without students' loan" is as follows:

The unit student fee is assumed to be US$ 60 with a growth rate of 2.0% (short course: 1.5 times packaged course). As a result, student fee is estimated and the summary of calculation results regarding required government support is shown as below:

B. Option: Without Scholarship Loan		Accumulated (US$ million)	Period
Total education costs	*1	738	2002 to 2020
Total student fees	*2	27	2002 to 2020
Total of others (residual value of building costs)	*3	164	2002 to 2020
Government subsidy (*1 – *2 – *3)	*4	548	2002 to 2020

The above two options are compared as below:

Difference of Government support	Accumulated (US$ million)
B. Option: Without Scholarship Loan	548
A. Option: With Scholarship Loan	297
Difference	251

The above results suggest that "option with students' loan" will save the total amount of government support compared to "option without students' loan".

However, it should be noted that financial resources for providing students' loan is to be annually prepared, and the considerable amount of the maximum accumulated balance between outflow and inflow of loan balance appears in year 2020.

APPENDIX

CHAPTER 8 IMPLEMENTATION MEASURES FOR PILOT POLYTECHNICS AND PILOT PROGRAMS

8.1 Economic Structure by Region

Table A-8.1.1 Employment by industrial sector and by region in 1984

Region	Agriculture, Forestry & Fishing	Mining & Quarrying	Manufacturing	Electricity, Gas & Water	Construction	Wholesale and Retail Trade, Restaurant & Hotel	Transport, Storage & Communication	Finance, Insurance, Real Estate & Business Services	Community, Social and Peronal Services	Total
Greater Accra	92,249	1,717	113,907	4,251	20,706	186,025	38,539	15,370	124,909	597,672
% share by sector	15.4	0.3	19.1	0.7	3.5	31.1	6.4	2.6	20.9	100.0
% share by region	2.8	6.4	19.4	27.5	32.0	23.5	31.4	55.9	26.4	11.0
Volta	360,536	162	60,351	1,059	6,688	68,334	8,509	1,239	41,715	548,593
% share by sector	65.7	0.0	11.0	0.2	1.2	12.5	1.6	0.2	7.6	100.0
% share by region	10.9	0.6	10.3	6.9	10.3	8.6	6.9	4.5	8.8	10.1
Eastern	514,978	2,287	69,009	3,551	6,237	87,123	15,864	2,199	60,534	761,782
% share by sector	67.6	0.3	9.1	0.6	0.8	11.4	2.1	0.3	7.9	100.0
% share by region	15.6	8.5	11.7	23.0	9.6	11.0	12.9	8.0	12.8	14.0
Central	325,096	1,722	43,262	1,169	6,163	77,219	9,245	1,319	39,979	505,174
% share by sector	64.4	0.3	8.6	0.2	1.2	15.3	1.8	0.3	7.9	100.0
% share by region	9.8	6.4	7.4	7.6	9.5	9.7	7.5	4.8	8.4	9.3
Western	347,019	9,208	47,807	1,223	5,419	63,207	16,655	1,685	38,005	530,228
% share by sector	65.4	1.7	9.0	0.2	1.0	11.9	3.1	0.3	7.2	100.0
% share by region	10.5	34.3	8.1	7.9	8.4	8.0	13.6	6.1	8.0	9.8
Ashanti	571,919	11,428	84,447	1,768	9,450	128,743	21,727	3,042	90,238	922,762
% share by sector	62.0	1.2	9.2	0.3	1.0	14.0	2.4	0.3	9.8	100.0
% share by region	17.3	42.6	14.4	11.5	14.6	16.3	17.7	11.1	19.0	17.0
Brong Ahafo	427,835	65	28,352	779	3,322	35,863	6,043	1,256	34,206	537,721
% share by sector	79.6	0.0	5.3	0.1	0.6	6.7	1.1	0.2	6.4	100.0
% share by region	12.9	0.2	4.8	5.0	5.1	4.5	4.9	4.6	7.2	9.9
Northen	292,229	37	68,731	592	2,935	74,514	3,484	685	22,426	465,633
% share by sector	62.8	0.0	14.8	0.1	0.6	16.0	0.7	0.1	4.8	100.0
% share by region	8.8	0.1	11.7	3.8	4.5	9.4	2.8	2.5	4.7	8.6
Upper West	150,997	87	26,877	243	930	11,438	889	204	7,118	198,783
% share by sector	76.0	0.0	13.5	0.0	0.5	5.8	0.4	0.1	3.6	100.0
% share by region	4.6	0.3	4.6	1.6	1.4	1.4	0.7	0.7	1.5	3.7
Upper East	228,109	115	45,675	802	2,836	59,681	1,851	476	14,591	354,136
% share by sector	64.4	0.0	12.9	0.1	0.8	16.9	0.5	0.1	4.1	100.0
% share by region	6.9	0.4	7.8	5.2	4.4	7.5	1.5	1.7	3.1	6.5
Total	3,310,967	26,828	588,418	15,437	64,686	792,147	122,806	27,475	473,720	5,422,484
% share by sector	61.1	0.5	10.9	2.6	1.2	14.6	2.3	0.5	8.7	100.0
% share by region	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

Sourse: 1984 Population Census of Ghana Demographic and Economic Charactrestics, Ghana Statistic Service

Table A-8.1.2 Employment in the manufacturing sector by region, 1984

Region	Food Processing	Beverage, Tabacco	Textile, Apparel, Leather	Wood, Wood products, Furniture	Paper & Paper Products	Chemicals, Petroleum, Rubber Products	Non-metalic Mineral Products	Metal Fabrication, Machinery/Equipment	Others	Total of Manufacturing
Greater Accra	45,772	4,701	31,170	8,565	5,842	6,258	2,442	8,085	1,072	113,907
% share by sector	40.2	4.1	27.4	7.5	5.1	5.5	2.1	7.1	0.9	100.0
% share by region	18.8	6.8	22.7	14.1	73.0	26.0	11.5	38.9	28.3	19.4
Volta	27,672	2,956	15,491	8,858	210	1,291	1,731	1,790	352	60,351
% share by sector	45.9	4.9	25.7	14.7	0.3	2.1	2.9	3.0	0.6	100.0
% share by region	11.4	4.3	11.3	14.6	2.6	5.4	8.2	8.6	9.3	10.3
Eastern	30,266	4,224	20,307	7,266	262	1,666	2,547	1,791	678	69,007
% share by sector	43.9	6.1	29.4	10.5	0.4	2.4	3.7	2.6	1.0	100.0
% share by region	12.4	6.1	14.8	12.0	3.3	6.9	12.0	8.6	17.9	11.7
Central	21,804	1,859	10,508	4,847	284	1,193	790	1,717	260	43,262
% share by sector	50.4	4.3	24.3	11.2	0.7	2.8	1.8	4.0	0.6	100.0
% share by region	9.0	2.7	7.6	8.0	3.5	4.9	3.7	8.3	6.9	7.4
Western	19,904	6,466	8,725	7,032	700	1,732	1,200	1,596	452	47,807
% share by sector	41.6	13.5	18.3	14.7	1.5	3.6	2.5	3.3	0.9	100.0
% share by region	8.2	9.4	6.3	11.6	8.7	7.2	5.7	7.7	11.9	8.1
Ashanti	26,800	10,230	28,221	10,678	533	3,583	623	2,956	825	84,449
% share by sector	31.7	12.1	33.4	12.6	0.6	4.2	0.7	3.5	1.0	100.0
% share by region	11.0	14.8	20.5	17.6	6.7	14.9	2.9	14.2	21.8	14.4
Brong Ahafo	10,381	3,454	7,326	3,850	55	1,568	825	819	74	28,352
% share by sector	36.6	12.2	25.8	13.6	0.2	5.5	2.9	2.9	0.3	100.0
% share by region	4.3	5.0	5.3	6.4	0.7	6.5	3.9	3.9	2.0	4.8
Northern	42,178	8,857	7,704	1,892	74	5,119	1,970	885	52	68,731
% share by sector	61.4	12.9	11.2	2.8	0.1	7.4	2.9	1.3	0.1	100.0
% share by region	17.3	12.8	5.6	3.1	0.9	21.2	9.3	4.3	1.4	11.7
Upper West	4,714	15,232	1,460	1,545	16	1,273	2,433	192	12	26,877
% share by sector	17.5	56.7	5.4	5.7	0.1	4.7	9.1	0.7	0.0	100.0
% share by region	1.9	22.0	1.1	2.5	0.2	5.3	11.5	0.9	0.3	4.6
Upper East	13,700	11,111	6,688	6,092	26	422	6,661	959	16	45,675
% share by sector	30.0	24.3	14.6	13.3	0.1	0.9	14.6	2.1	0.0	100.0
% share by region	5.6	16.1	4.9	10.0	0.3	1.8	31.4	4.6	0.4	7.8
Total	243,191	69,090	137,600	60,625	8,002	24,105	21,222	20,790	3,793	588,418
% share by sector	41.3	11.7	23.4	10.3	1.4	4.1	3.6	3.5	0.6	100.0
% share by region	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

Sourse: 1984 Population Census of Ghana Demographic and Economic Charactrestics, Ghana Statistic Service

Table A-8.1.3 Number of manufacturing enterprises by region, 2000

Type of Products	Ashanti	Brong Ahafo	Central	Eastern	Greater Accra	Northern	Upper East	Upper West	Volta	Western	Unknown	Total
Food Products and Beverage	70	5	34	70	285	14	8	1	15	34	6	542
Tabacco Products					2					1	0	3
Textiles	9	1	2	2	57	5			3	2	1	82
Wearing Apparel	4	5	4	4	32	4		2	3	9	4	71
Luggage, Handbags Footwear	8		1	1	16					2	1	29
Wood Products	109	33	19	102	70	1	6	1	21	38	5	405
Paper Products	6		1		29					3	3	42
Publishing and Printing	107	19	9	21	544	6	2	2	11	36	0	757
Coke, Petroleum Products	1		2		17					1	0	21
Chemical Products	33		8	9	147	3	1			5	1	207
Rubber and Plastic Products	9		1	2	88					6	0	106
Other Non-metalic Products	10	2	13	5	93	2	2		4	18	1	150
Basic Metals	1		1		53					5	1	61
Fabricated Metal Products	25	2	3		195	14	1	4	5	4	5	258
Machinery and Equipment	3				21				1	3	0	28
Office and Computing Machinery					22						0	22
Electrical Machinery	1			1	27						0	29
Communication Equipments					30				1		0	31
Medical Instruments, Watches					8						0	8
Moter Vehicles	4		2		12		1		1		0	20
Other Transportation Equipment					3						1	4
Furniture	43	10	9	11	162	2	1	4	18	19	1	280
Recycling					1					1	0	2
Others											8	8
TOTAL	**443**	**77**	**109**	**228**	**1,914**	**51**	**22**	**14**	**83**	**187**	**38**	**3,166**
% share by region	*14.0*	*2.4*	*3.4*	*7.2*	*60.5*	*1.6*	*0.7*	*0.4*	*2.6*	*5.9*	*1.2*	*100.0*

Souce: The data obtained from Ministry of Trade and Industry

8.2 Analysis of Future Employment Demand in Pilot Programs

In this appendix, the future employment demand in pilot programs was estimated until 2020 and a demand-supply gap analysis was conducted based on the enrolment plan discussed in Section 8.4.1.

8.2.1 Estimation of the current labor market sizes by industrial groups

Since there is no labor market statistics described by industrial sectors available, there are significant constraints existing to estimate labor market sizes by industrial groups and by education levels. Nevertheless, the JICA Study Team made an effort to estimate the current labor market sizes by industrial groups by utilizing outcomes from the following three surveys and statistics:

a. UNIDO survey (See Table A-8.2.1)

In this survey conducted by UNIDO in 2000, 3,166 enterprises in the manufacturing sub-sector were interviewed for their numbers of employments and 1,834 enterprises answered. The total number of employments in 3,166 enterprises, thereby, was estimated to be 202,642 and the average number of employments per enterprise was 60, which indicates that enterprises interviewed mostly belong to the formal sector.

Table A-8.2.1 Number of enterprises and employment by types of products

	Type of Products	Number of Enterprises	Number of Enterprises answered	Number of Employments answered	Average Number of Employments by Enterprise	Number of Employments estimated	Percentage share (%)
1	Manufacture of Food Products and Beverage	542	243	20,804	86	46,402	22.9
2	Manufacture of Tobacco Products	3	3	809	270	809	0.4
3	Manufacture of Textiles	82	56	5,790	103	8,478	4.2
4	Manufacture of Wearing Apparel	71	44	2,146	49	3,463	1.7
5	Manufacture of Luggage, Handbags Footwear	29	13	2,000	154	4,462	2.2
6	Manufacture of Wood Products	405	222	24,508	110	44,711	22.1
7	Manufacture of Paper Products	42	27	1,877	70	2,920	1.4
8	Publishing and Printing	757	597	9,717	16	12,321	6.1
9	Manufacture of Coke, Petroleum Products	21	6	579	97	2,027	1.0
10	Manufacture of Chemical Products	207	104	6,970	67	13,873	6.8
11	Manufacture of Rubber and Plastic Products	106	73	6,207	85	9,013	4.4
12	Manufacture of Other Non-metallic Products	150	73	4,822	66	9,908	4.9
13	Manufacture of Basic Metals	61	30	4,665	156	9,486	4.7
14	Manufacture of Fabricated Metal Products	258	117	5,940	51	13,098	6.5
15	Manufacture of Machinery and Equipment	28	21	4,004	191	5,339	2.6

	Type of Products	Number of Enterprises	Number of Enterprises answered	Number of Employments answered	Average Number of Employments by Enterprise	Number of Employments estimated	Percentage share (%)
16	Manufacture of Office and Computing Machinery	22	3	44	15	323	0.2
17	Manufacture of Electrical Machinery	29	11	345	31	910	0.4
18	Manufacture of Communication Equipments	31	9	360	40	1,240	0.6
19	Manufacture of Medical Instruments, Watches	8	7	342	49	391	0.2
20	Manufacture of Motor Vehicles	20	14	437	31	624	0.3
21	Manufacture of Other Transportation Equipment	4	2	81	41	162	0.1
22	Manufacture of Furniture	280	153	6,080	40	11,127	5.5
23	Recycling	2	1	21	21	42	0.0
24	Others	8	5	947	189	1,515	0.7
	TOTAL	3,166	1,834	109,495	60	202,642	100.0

b. JICA Study Team survey (See Table A-8.2.2)

Since the UNIDO Survey covers only the manufacturing sub-sector, the JICA Study Team made a telephone survey to all member companies of Ghana Employers' Association in June 2001. Out of 308 companies interviewed, 234 companies provided information for their numbers of employments. The total number of employments in 308 companies, thereby, was estimated to be 148,682.

Table A-8.2.2 Member list of Ghana Employers' Association and their numbers of employers

	AGRICULTURAL/FISHING INTERESTS	Employees
1	Afariwaa Farms & Livestock Ltd	220
2	Agricare Limited	174
3	Benso Oil Palm Plantation Ltd	563
4	Darko Farms & Co. Ltd.	254
5	Foundries & Agric. Machniery Gh. Ltd.	117
6	Farmers Service (UR) Limited	97
7	Ghana Cotton Company Ltd.	189
8	Ghana Robber Estates Ltd.	406
9	Greater Accra Poultry Farmers Association	
10	Ghana Agro Food Company	1,286
11	Ghana Oil Palm Dev. Corporation	789
12	Irrigation Co. (UER) Ltd.	
13	Kiku Company Limited*	243
14	National Oil Palm Ltd.	569
15	Subri Industrial Plantation	367
16	Twifo Oil Palm Plantation Ltd.	1,044
17	TTV Limited	107
18	Volta River Estates	964
	Sub-total	7,389
	Estimated sub-total	8,313
	AIRWAYS & TRANSPORT INTERESTS	
1	African Ground Operations Limited*	436
2	Air Afrique	
3	Ghana Airways	
4	Ghana Civil Aviation Authority	806
5	KLM	
6	Liner Agencies & Trading Company Limited*	218
7	M. Tabbicca & Sons	86
8	Quancrete Investment Ltd.	861
9	State Transport Co. Ltd	471
10	Volta Lake Transport Ltd.	
	Sub-total	2,442
	Estimated sub-total	4,070
	BANKING/FINANCIAL INTERESTS	
1	Agricultural Development Bank	980
2	Barclays Bank of Ghana Ltd.	699
3	CDH Discount Ltd	108
4	Ecobank Ghana Ltd	179
5	First Ghana Building Society	85
6	Ghana Stock Exchange	115
7	Ghana Commercial Bank	3,256
8	Merchant Bank Ghana Limited	337
9	National Investement Bank	540
10	National Trust Holding Co. Ltd.	94
11	Standard Chartered Bank Ltd.	555
12	Social Security Bank Ltd.	891
	Sub-total	7,839
	Estimated sub-total	7,839
	BUILDING & CIVIL ENGINEERING INTERESTS	
1	ABB Sae SPA	121
2	African Concrete Products	574
3	Architectural Design Partnership	224
4	BCM Ghana Limited	640
5	Bilfinger & Berger	736
6	Construction Pioneers	
7	Cowi Consult	
8	Environmental Development Group Ltd.	490
9	Ghana Stone Quarry Ltd	74
10	Impregilo Recchi Joint Venture	156
11	Interberton BV (Ghana)	127
12	Jubi Mechanical & Electrical Systems	
13	Mentoring Ventures	294
14	Nsemmere Quarry Ltd.	
15	Obosu Company Ltd.	148
16	Skanska Jensen International	
17	Startech Limited	556
18	Taysec Construction Ltd.	2,436
19	Vemeer Ghana Construction Ltd.	
20	Volta River Authority	3,480
21	Wayss & Feytag	1,100
	Sub-total	11,156
	Estimated sub-total	15,618

	MANUFATURING INTERESTS	
1	Accra Brewery Ltd.	484
2	Agric Engineers Ltd.	
3	Akosombo Textiles Ltd.	2,010
4	Alcatel Kabelmetal (Ghana) Ltd.	760
5	Aluworks Ltd.	434
6	Assene Household Enamelware Ltd.	
7	Atlas Mfg. & Engineering Ltd.	
8	Azar Chemical Ltd.	679
9	British American Tobacco Co. Ltd	302
10	BBC Industries Ltd.	
11	Cadbury Ghana Limited	283
12	Clay Products Ltd.	140
13	Carson Products*	60
14	The Coca Cola Bottling Co. Ltd.	486
15	Crocodile Matchets (Ghana) Ltd.	350
16	Crystal Auto Ltd.	200
17	Danafco Group of Companies	560
18	Dannex Ld.	210
19	DL Steel (Ghana) Limited	
20	Domod Company Ltd.	200
21	Duraplast Ltd	510
22	Fan Milk Ltd.	374
23	Freedom Textile Industries Ltd.	
24	Franpac (Ghana) Ltd	200
25	FON Enterprise Ltd.	76
26	Golden Sppon Flour Mill Ltd.	210
27	Chacem Ltd.	779
28	Ghana Aluminium Products Ltd.	93
29	Ghana Carton Boxes Co. Ltd	215
30	Ghana Mat & Carpet Indus. Ltd.	120
31	Ghana Pioneer Alumin. Products Ltd	150
32	Ghana Textile Mfg. Company Lted.	415
33	Ghana Textile Printing Co.	550
34	Ghana Sanyo Electrical Mfg. Corp.	320
35	Ghana Rubber Products Ltd.	300
36	GIHOC Distilleries Co. Ltd.	410
37	Paper Conversion Co. Ltd;	310
38	Gokals Industries Ltd.	200
39	Guiness (Ghana) Limited	179
40	Ghana Agro Food Company Ltd.	1,286
41	Ghana Breweries LTD.	649
42	Household & Aluminum Factory Ltd.	200
43	Instyle Industies Ltd.	150
44	Intravenous Infusions Ltd.	80
45	Iranin Brothers & Others Ltd.	262
46	Interactive Technologies Ltd.	
47	Interplast	220
48	Juapong Txtiles Ltd.	420
49	K Dom Productions	
50	KGM Industries	202
51	Kane-Em Industries Ltd	
52	Latex Foam Rubber Products Ltd.	440
53	Lever Brother Ghana Ltd.	850
54	Major & Co. Manufacturing Ltd.	510
55	Medical Supply (Ghana) Ltd.	100
56	Metalloplastica (Ghana) Ltd	300
57	Metal Continers (Ghana) Ltd.	210
58	M&G Pharmaceuticals Limited*	106
59	Mitsui Electornics (Ghana) Ltd.	150
60	Metal ware Ltd	150
61	Miniplast Limited	200
62	Multiwall Paper Sacks Limited	200
63	Nestle Ghana Ltd.	507
64	Neoplan (Ghana) Ltd.	350
65	Netherlands African Mfg. Co. Ltd.	400
66	Oils & Fats Ltd.	160
67	Packrite Carton & Packaging Ind. Ltd.	200
68	Panbros Salt Industries Ltd.	200
69	Paramount Distilleries Limted	150
70	Pee Cola Company Ltd.	250
71	Pens & Plastics (Ghana) Ltd.	200
72	Peterson Aochois Ghana Limited*	493

	COMMERCIAL INTEREST	
1	African Automobile Limited*	201
2	Accra Markets Ltd.	90
3	Agria Machinery Services & Co. Ltd.	217
4	Ammirati Puris Lintas Ghana Ltd.	
5	Atlantic Chemist Ltd.	57
6	Afromedia Ghana Ltd.	108
7	Auto Import Co. Ltd	65
8	Auto Parts Ltd	119
9	Avery Ghana Ltd.	
10	Barnson company limited*	62
11	Blackwood Hodge (Ghana) Ltd.	370
12	Caspro Company Limited*	773
13	CFAO (Ghana) Ltd	800
14	City Paints Supply	45
15	C. Woermann & Co.	
16	Chimtec Ghana Ltd.	
17	Dambri Company Ltd	74
18	Deloitte & Touche	85
19	Devag Ltd	
20	Deweger, Gruter Brown	56
21	DHL Ghana Ltd	97
22	Dizengoff (WA) Ltd	186
23	Enyidado Industries Ltd	296
24	F. Malawi Engineering Ltd	
25	Ghana Cocao Board	5,160
26	Ghana Inspections Ltd	
27	Ghana Libyan Arab Holding Co. Ltd.	
28	Ghana National Procurement Agency	
29	Glamour (Ghana) Ltd	168
30	Goodwill Associalites Ltd	
31	GAMA Fil Co. Ltd	92
32	Holman Brothers Ltd	38
33	Iam Ltd	120
34	Inter-Associates Ghana Ltd	296
35	Japan Motors & Trading Co. Ltd	263
36	Kwatson Impex*	100
37	Kingsman Enterprises Limited*	75
38	L 'Air Liquide (Ghana) Ltd.	307
39	Mandilas Ghana Ltd	
40	M. Captan Cinema Co. Ltd	
41	Mechanical Lloyd Ltd	204
42	Melcom Limited	67
43	MES Equipment Ltd	
44	Milicom (Ghana) Ltd.	162
45	Nankani & Hagan Ltd.	54
46	Pasico (Ghana) Ltd.	124
47	Pannel Kerr Forster Co.	68
48	Precious Mineral Marketing Company*	78
49	KPMG	139
50	PZ Industries Ghana Ltd	278
51	Rana Motors & Metal Eng. Works	104
52	Reiss & Co. (Ghana) LTD	347
53	Reipco Ltd	
54	SCOA (Ghana) Ltd.	560
55	Securicor Ltd	68
56	Sedco Publishing Ltd.	
57	Scancom*	121
58	Somotex Ghana Ltd	66
59	Silver Star Auto Ltd	101
60	Tractor & Equipment*	272
61	TV3 Network Ltd	89
62	Toyota Ghana Co. Ltd	95
63	Truplast Ghana Ltd	56
64	Tractor & Equipment	370
65	Unilever Ghana Ltd	950
66	Union International Commerce	
67	Vehrad Trading Co. Ltd	
68	Vodi Technik Motors Ltd	168
69	Meridian Security Services	176
70	Wang Computers Services	114
71	Wienco Company Limited*	20
72	Watson Service Ltd.	
	Sub-total	14,970
	Estimated sub-total	19,960

73	Pioneer Food Cannery Ltd	500
74	Peterson Aochois Ghana Limited*	131
75	Poly Products (Ghana) Ltd	215
76	Polytex Industries LTD.	200
77	PZ Industries (Ghana) Ltd	
78	Pioneer Aluminum Factory Ltd.	
79	Rainbow Windscreen Factory Ltd.	26
80	South Akim Manufacturing Co. Ltd.	
81	Starwin Products Ltd.	
82	Super Paper Products Co. Ltd.	
83	Sydals Limited	
84	Scanstyle Mim Limited*	656
85	Scanbech Ghana Ltd.	
86	Tema Chemical Limited	
87	Takoradi Flour Mill Limited	200
88	Top Industries Ltd	
89	Tropical Metallic Const. Co. Ltd	
90	Unilever Ghana Ltd	950
91	United Perfumery Co. Ltd.	
92	Vincom Processing LTD.	
93	Volta Aluminum Co. (VALCO)	1,264
94	Wahome Steel Ltd.	
95	West African Mills Co. Ltd;	
96	Wire Weaving Industries Ltd.	
	Sub-total	26,306
	Estimated sub-total	35,075
	MINING INTERESTS	
1	Analabs Ghana Ltd	250
2	Ashanti Goldfield company Limited*	12,000
3	Ausdrill Ghna Pty Ltd.	
4	African Explosivers Ltd.	
5	BCM Ghana Limited	
6	Ghana Chamber of Mines	13
7	Goldfields Ghana Limited*	1,450
8	Tebrerebie Goldfield Limited*	1,500
9	West African Drilling Services	
	Sub-total	15,213
	Estimated sub-total	27,383
	PETROLEUM & POWER INTERESTS	
1	Elf Oil Ghana Ltd	125
2	Ghana Oil Co. Ltd	281
3	Mobil Oil Ghana Ltd.	118
4	Shell Ghana Service LTD.	148
5	Tema Oil Refinery	
6	Tema Lube Oil Co. Ltd	76
7	Unipetrol Ghana Limited	
	Sub-total	748
	Estimated sub-total	1,047
	PRESS & PUBLISHING INTERESTS	
1	Accra Catholic Press	31
2	Ajumakoman Press Ltd.	20
3	Cootek Limited	35
4	Graphic Communications Group Ltd.	55
5	New Times Corporation	100
6	Presbyterian Book Depot	50
7	Thorpe Road Ent/Fine Print Ltd.	
	Sub-total	291
	Estimated sub-total	340
	SHIPPING/PORT INTERESTS	
1	Atlantic Port Services LTD.	230
2	Ghana Ports & Harbours Authority	3,000
3	Intertek Testing Services	
4	Leopold Ewald (Ghana) Ltd.	54
5	Hull Blyth Ghana Ltd.	
6	Llyods Register of Shipping	
7	Roro Services (Ghana) LTD.	130
8	Redrose Ventures Ltd.	120
9	Scanship (Ghana) Ltd.	150
10	PSC Tema Shipyard Ltd.	250
11	Saga Ghana Limited	200
12	Speedline Stevedoring Co. Ltd.	200
13	Transglobal Freight Services	150
	Sub-total	4,484
	Estimated sub-total	5,829

	HOTEL, CATERING & TOURISM INTERESTS	
1	Ama Hamel & Co. Ltd	40
2	Ankobra Beach Ltd	
3	Avenida Hotel Ltd	98
4	Dynasty Chinese Restaurant	30
5	Golden Tulip Hotel	346
6	Labadi Beach Hotel	
7	La Palm Royal Beach	333
8	Miklin Hotel	52
9	Novotel	180
10	Palmgold LTD	
11	Secaps Hotel	66
12	Wangara Hotel	74
	Sub-total	1,219
	Estimated sub-total	1,625
	INSURANCE INTERESTS	
1	Enterprise Insurance Co. Ltd.	94
2	Ghana Reinsurance Co. Ltd	134
3	Ghana Union Assurance	
4	Great African Insurance Co. Ltd.	
5	Metropolitan Insurance Company Limited*	95
6	Network India Assurance Co. (Gh) LTD.	
7	SSNIT	2,915
8	Vanguard Assurance Company Limited*	131
9	State Insurance Company	1,104
	Sub-total	4,473
	Estimated sub-total	6,710

	TIMBER INTEREST	
1	Dupaul Wood Treatment (Ghana) LTD.	120
2	Forest Products Inspection Bureau	
3	GDC Limited	40
4	Ghana Timber Millers Organisation	30
5	Gliksten (WA) Limited	50
6	Logs & Lumber Limited	60
7	Mahogany Wood Processing Limited	40
8	Mim Timber Co. Ltd.	150
9	Oda Sawmill Limited	50
10	Western Veneer & Lumber Co. Ltd.	250
	Sub-total	790
	Estimated sub-total	878
	OTHER INTEREST (MISCELLANEOUS)	
1	Ghana Investments Promtion Centre	30
2	Ghana Trade Fair Company Ltd.	150
3	Institute of Management Studies	150
4	Sinego Limited	50
5	Technoserve Incorporated	
6	Tema First Baptist School	
7	SGS Ghana Ltd.	
	Sub-total	380
	Estimated sub-total	665
	UTILITY	
1	Westel Ghana Ltd.	250
2	Ghana Water Company	3,000
3	Electricity Company of Ghana	3,613
4	Ghana Telecom Limited	3,467
5	Ghana Postal Company	3,000
	Sub-total	13,330
	Estimated sub-total	13,330

Total	**111,030**
Estimated total	**148,682**

Note:
The survey was done by calling companies in June, 2001, by the JICA Study Team.
Companies marked * are not from the list of Ghana Employers' Association.

c. Ghana Tourist Board Statistics

Since both surveys above do not sufficiently cover the industrial area of tourism and hospitality, the total number of employments of this industrial group was taken from Tourism Statistical Fact Sheet on Ghana in 1995, Ghana Tourist Board, which is 17,000.

Based on these employment data, the current employments by industrial sectors were estimated, as shown in Table A-8.2.3 (and Table A-8.2.4 for the detailed estimation).

Table A-8.2.3 Estimated labor market size by industrial groups

	Industrial Groups	Estimated employees	Share
1	AGRICULTURAL/FISHING INTERESTS	25,393	6.0%
2	AIRWAYS & TRANSPORT INTERESTS	9,717	2.3%
3	BANKING/FINANCIAL INTERESTS	18,716	4.4%
4	BUILDING & CIVIL ENGINEERING INTERESTS	37,289	8.8%
5	COMMERCIAL INTEREST	47,654	11.2%
6	HOTEL, CATERING & TOURISM INTERESTS	40,587	9.5%
7	INSURANCE INTERESTS	16,019	3.8%
8	MANUFACTURING INTERESTS	83,741	19.7%
9	MINING INTERESTS	65,378	15.4%
10	PETROLEUM & POWER INTERESTS	2,500	0.6%
11	PRESS & PUBLISHING INTERESTS	6,627	1.6%
12	SHIPPING/PORT INTERESTS	13,917	3.3%
13	TIMBER INTEREST	24,048	5.7%
14	OTHER INTEREST (MISCELLANEOUS)	1,588	0.4%
15	UTILITY	31,825	7.5%
	Total	**425,000**	**100.0%**

Table A-8.2.4 Estimated labor market size of private formal sector by industrial groups (details)

Industrial Groups		Number of Employees		Estimated employees		
		JICA Survey	UNIDO Survey	Step 1	Step 2	Step 3
1	AGRICULTURAL/FISHING INTERESTS	8,313	47,211	36,899	47,211	25,393
2	AIRWAYS & TRANSPORT INTERESTS	4,070		18,066	18,066	9,717
3	BANKING/FINANCIAL INTERESTS	7,839		34,796	34,796	18,716
4	BUILDING & CIVIL ENGINEERING INTERESTS	15,618		69,328	69,328	37,289
5	COMMERCIAL INTEREST	19,960		88,600	88,600	47,654
6	HOTEL, CATERING & TOURISM INTERESTS	17,000		75,461	75,461	40,587
7	INSURANCE INTERESTS	6,710		29,783	29,783	16,019
8	MANUFACTURING INTERESTS	35,075	96,372	155,692	155,692	83,741
9	MINING INTERESTS	27,383		121,551	121,551	65,378
10	PETROLEUM & POWER INTERESTS	1,047	2,027	4,648	4,648	2,500
11	PRESS & PUBLISHING INTERESTS	340	12,321	1,507	12,321	6,627
12	SHIPPING/PORT INTERESTS	5,829		25,875	25,875	13,917
13	TIMBER INTEREST	878	44,711	3,896	44,711	24,048
14	OTHER INTEREST (MISCELLANEOUS)	665		2,952	2,952	1,588
15	UTILITY	13,330		59,170	59,170	31,825
	Total	**164,056**		**728,224**	**790,165**	**425,000**

Sub-total of 5 industrial groups	45,652	202,642
Ratio of UNIDO survey to JICA Survey for employments in 5 industrial groups		4.4

Note: 1. Number of employees of Hotel, Catering and Tourism Interests comes from Tourism Statistical Fact Sheet on Ghana in 1995, Ghana Tourist Board.

2. In Step 1, estimated employees were calculated from outcomes of JICA Survey by multiplying ratio of UNIDO survey to JICA survey for employments in 5 industrial groups.

3. In Step 2, estimated employees was taken from a larger figure between figures of results of Step 1 and UNIDO Survey.

4. In Step 3, estimated employees in Step 2 were adjusted so that the total employees is as same as 425,000, the total employees in the formal sector identified in Section 3.3.

8.2.2 Estimation of the current labor market sizes for pilot programs

In order to estimate the current labor market sizes for pilot programs, target industrial groups are identified for each pilot program. (See Table A-8.2.5 for the detailed estimation.) For instance, the target industrial group for pilot program of Hospitality and Tourism is only industrial group of Hotel, Catering and Tourism, which current employment is 41,000. The target industrial groups of Business Information Technology are all industrial groups, which current employment is 425,000.

By setting assumptions for ratios of employment of pilot program graduates to the total employment, labor market sizes for pilot program graduates are estimated. For example, it is assumed that 75% of employees working in Hotel, Catering and Tourism industries have their majors in Hospitality and Tourism and that 10% of employees in all industries have their majors in Business Information Technology or related ones. Consequently, labor market size for graduate from Hospitality and Tourism Program is estimated to be 30,000 and that for graduate from Business Information Technology is estimated to be 43,000. (See Table A-8.2.6 for the detailed estimation.)

Table A-8.2.5 Estimated labor market sizes of target industrial group by pilot programs

	Industrial Groups	Employees	Hospitality and tourism	Information technology and communication	Business information technology	Post harvest and food processing	Wood processing technology	Manufacturing technology
		(1,000)	(1,000)	(1,000)	(1,000)	(1,000)	(1,000)	(1,000)
1	AGRICULTURAL/FISHING INTERESTS	25	0	0	25	25	0	25
2	AIRWAYS & TRANSPORT INTERESTS	10	0	10	10	0	0	0
3	BANKING/FINANCIAL INTERESTS	19	0	19	19	0	0	0
4	BUILDING & CIVIL ENGINEERING INTERESTS	37	0	0	37	0	0	0
5	COMMERCIAL INTEREST	48	0	0	48	0	0	0
6	HOTEL, CATERING & TOURISM INTERESTS	41	41	41	41	0	0	0
7	INSURANCE INTERESTS	16	0	16	16	0	0	0
8	MANUFATURING INTERESTS	84	0	84	84	0	0	84
9	MINING INTERESTS	65	0	0	65	0	0	65
10	PETROLEUM & POWER INTERESTS	3	0	3	3	0	0	3
11	PRESS & PUBLISHING INTERESTS	7	0	7	7	0	0	0
12	SHIPPING/PORT INTERESTS	14	0	14	14	0	0	0
13	TIMBER INTEREST	24	0	0	24	0	24	0
14	OTHER INTEREST (MISCELLANEOUS)	2	0	0	2	0	0	0
15	UTILITY	32	0	32	32	0	0	0
	Total	**425**	**41**	**224**	**425**	**25**	**24**	**177**

Table A-8.2.6 Estimated labor market sizes for pilot programs in 2000

		Total employees in target industries	Estimated ratio of jobs related to pilot program	Estimated size of labor market related to pilot program
1	Hospitality and tourism	40,587	75%	30,441
2	IT and communications	223,650	20%	44,730
3	Business IT	425,000	10%	42,500
4	Post harvest and food processing	25,393	75%	19,045
5	Wood processing technology	24,048	50%	12,024
6	Manufacturing technology	177,012	20%	35,402

8.2.3 Demand-supply gap analysis

As discussed in Table A-7.1.2 in Appendix 7.1, the Local Survey made by the JICA Study Team in June 2000 shows that employment share of polytechnic graduates in the formal sector is expected to grow from 6.4% in 2000 to 13.1% in 2020. In addition, because of the assumed economic growth rate of 6.7% in Scenario 2, the labor market size for polytechnic graduate is estimated to grow by 11.2% per annum, as shown in Table A-8.2.7.

Based on this, annual labor demand for graduates from pilot programs were estimated until 2020, which compared to annual labor supply from pilot programs, as planed in the tables in Appendix 8.4.1. The supply capacity includes both packaged courses and distance-learning and the demand-supply gap is calculated, as shown in Table A-8.2.7.

The demand-supply gap analysis indicates that:

- The demand exceeds the supply in all pilot programs for almost all of the entire study period, although there are some cases of supply over in Hospitality and Tourism and Post Harvest and Food Processing.
- The ratio of the supply to the demand in the total figure of 6 pilot programs increases gradually and reaches at 78% in 2020.
- The accumulated supply shortage for all pilot programs reaches 41,000 by 2020.

Since the labor demand was estimated only for the formal sector, the actual supply shortage would be more than this demand-supply gap analysis. It is, therefore, extremely important for industrial development to commence pilot programs as soon as possible in order to meet with labor market needs.

Table A-8.2.7 Demand-supply gap analysis of labor market for pilot programs

		2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	Growth Rate
Labor market sizes by pilot programs																							
1	Hospitality and tourism	1,948	2,166	2,409	2,679	2,979	3,313	3,684	4,097	4,556	5,067	5,635	6,266	6,968	7,749	8,617	9,582	10,656	11,850	13,178	14,654	16,296	11.2%
2	IT and communications	2,863	3,183	3,540	3,937	4,378	4,868	5,414	6,021	6,695	7,445	8,279	9,207	10,239	11,386	12,662	14,080	15,658	17,412	19,363	21,533	23,945	11.2%
3	Business IT	2,720	3,025	3,364	3,741	4,160	4,626	5,144	5,720	6,361	7,074	7,867	8,748	9,728	10,818	12,030	13,378	14,877	16,544	18,398	20,459	22,752	11.2%
4	Post harvest and food processing	1,219	1,355	1,507	1,676	1,864	2,073	2,305	2,563	2,851	3,170	3,525	3,920	4,359	4,848	5,391	5,995	6,667	7,414	8,244	9,168	10,195	11.2%
5	Wood processing technology	770	856	952	1,058	1,177	1,309	1,455	1,618	1,800	2,001	2,226	2,475	2,752	3,061	3,404	3,785	4,209	4,681	5,205	5,788	6,437	11.2%
6	Manufacturing technology	2,266	2,520	2,802	3,116	3,465	3,853	4,285	4,765	5,299	5,893	6,553	7,287	8,104	9,012	10,021	11,144	12,393	13,781	15,325	17,043	18,952	11.2%
Annual demand of recruitment by pilot programs																							
1	Hospitality and tourism		218	243	270	300	334	371	413	459	511	568	631	702	781	868	965	1,074	1,194	1,328	1,476	1,642	
2	IT and communications		321	357	397	441	491	545	607	675	750	834	928	1,032	1,147	1,276	1,419	1,578	1,754	1,951	2,170	2,413	
3	Business IT		305	339	377	419	466	518	576	641	713	793	881	980	1,090	1,212	1,348	1,499	1,667	1,854	2,061	2,292	
4	Post harvest and food processing		137	152	169	188	209	232	258	287	319	355	395	439	488	543	604	672	747	831	924	1,027	
5	Wood processing technology		86	96	107	119	132	147	163	181	202	224	249	277	308	343	381	424	472	524	583	649	
6	Manufacturing technology		254	282	314	349	388	432	480	534	594	660	734	816	908	1,010	1,123	1,249	1,389	1,544	1,717	1,910	
	Total		1,320	1,468	1,633	1,816	2,019	2,246	2,497	2,777	3,088	3,434	3,819	4,247	4,723	5,252	5,840	6,495	7,222	8,032	8,931	9,932	
Annual supply of new graduates by pilot programs (Packaged courses and distance learning only)																							
1	Hospitality and tourism									0	0	160	213	213	293	480	661	777	915	1,055	1,205	1,366	
2	IT and communications									0	0	80	107	107	347	507	597	455	658	727	815	909	
3	Business IT									0	0	80	107	107	347	507	597	695	818	967	1,095	1,235	
4	Post harvest and food processing									0	0	120	160	160	280	440	575	423	626	671	770	874	
5	Wood processing technology									0	0	60	80	80	80	140	208	221	273	306	348	391	
6	Manufacturing technology									0	0	60	80	80	320	460	528	361	553	606	678	754	
	Total									0	0	560	747	747	1,667	2,533	3,165	2,933	3,843	4,332	4,911	5,530	
Demand-supply gap																							
1	Hospitality and tourism		218	243	270	300	334	371	413	459	511	408	418	489	487	388	305	296	279	273	271	276	
2	IT and communications		321	357	397	441	491	545	607	675	750	754	821	925	801	769	822	1,122	1,097	1,224	1,354	1,504	
3	Business IT		305	339	377	419	466	518	576	641	713	713	775	874	743	705	751	804	849	886	966	1,057	
4	Post harvest and food processing		137	152	169	188	209	232	258	287	319	235	235	279	208	103	29	249	121	160	154	153	
5	Wood processing technology		86	96	107	119	132	147	163	181	202	164	169	197	228	203	174	203	198	219	236	257	
6	Manufacturing technology		254	282	314	349	388	432	480	534	594	600	654	736	588	550	595	887	835	939	1,040	1,155	
	Total		1,320	1,468	1,633	1,816	2,019	2,246	2,497	2,777	3,088	2,874	3,072	3,500	3,056	2,719	2,675	3,561	3,380	3,700	4,021	4,402	
	Ratio of Supply to Demand		0%	0%	0%	0%	0%	0%	0%	0%	0%	16%	20%	18%	35%	48%	54%	45%	53%	54%	55%	56%	
	Accumulated total		1,320	2,789	4,422	6,238	8,257	10,503	13,000	15,777	18,865	21,739	24,812	28,312	31,368	34,086	36,761	40,323	43,702	47,402	51,423	55,825	

8.3 National TVET Qualifications Framework

Table A-8.3.1 National TVET qualifications framework

Indicative Learning Outcomes of Each Proposed TVET Qualification

CERTIFICATE I	CERTIFICATE II	CERTIFICATE III	CERTIFICATE IV	DIPLOMA	ADVANCED DIPLOMA
Demonstrate knowledge by recall in a narrow range of areas	Demonstrate basic operational knowledge in a moderate range of areas	Demonstrate some relevant theoretical knowledge	Demonstrate understanding of broad knowledge base incorporating some theoretical concepts	Demonstrate understanding of broad knowledge base incorporating some theoretical concepts, with substantial depth in some areas	Demonstrate understanding of specialized knowledge with depth in some areas
Demonstrate basic practical skills such as the relevant use of tools	Apply a defined range of skills and apply known solutions to a limited range of predictable problems	Apply a range of well developed skills and Knowledge Apply known solutions to a variety of predictable problems	Apply solutions to a defined range of unpredictable problems	Analyse and plan approaches to technical problems and management requirements	Analyse, diagnose, design and execute judgements across a broad range of technical or management functions
Perform a sequence of routine tasks, given clear direction	Perform a range of tasks where choice between a limited range of options is required	Perform processes that require a range of well developed skills requiring where some discretion and judgement are necessary	Identify and apply skill and knowledge areas to a wide variety of contexts with depth in some areas	Transfer and apply theoretical concepts and/or technical or creative skills to a range of situations	Demonstrate a command of wide-ranging, highly specialized technical, creative or conceptual skills
Receive and pass on information	Assess and record information from varied sources	Assess and record information from varied sources and critically analyse the information	Identify, analyse and evaluate information from a variety of sources	Evaluate information and use the information to forecast for planning or research purposes	Generate ideas through the analysis of information and concepts at an abstract level
	Take limited responsibility for own outputs in work and learning	Take responsibility for own outputs in work and learning and limited responsibility for the output of others	Take responsibility for own outputs in relation to specified quality standards	Take responsibility for own outputs in relation to broad quantity and quality parameters	Demonstrate accountability for personal outputs within broad parameters
			Take limited responsibility for the quantity and quality of the output of others	Take limited responsibility for the achievement of group outcomes	Demonstrate accountability for group outcomes within broad parameters

8.4 Indicative Training Packages

Indicative training packages for the pilot programs are summarized in the following tables.

Table A-8.4.1 (1) Indicative training packages for Information Technology / Communications (Core Modules)

CERTIFICATE I	CERTIFICATE II CORE MODULES	CERTIFICATE III CORE MODULES	CERTIFICATE IV CORE MODULES	CERTIFICATE V
NOT INCLUDED IN THIS EXAMPLE	***Complete all 11Core Modules*** Work effectively in an Information Technology environment Communicate in the workplace Apply Occupational Health and Safety procedures Operate computer hardware Operate computing packages Maintain equipment & consumables Design organisational documents using commercial computing packages Integrate commercial computing packages Connect hardware peripherals Install software applications Maintain system integrity	***Complete all 11 Core Modules*** Migrate to new technology Provide basic system administration Run standard diagnostic tests Develop macros and templates for clients using standard products Create user & technical documentation Provide advice to clients Use advanced features of computer applications Install and optimise system software Create User and Technical Documentation Run Standard Diagnostic Tests Install and Manage Network Protocols	***Complete all 17 Core Modules*** Guide application of project integrative processes Manage scope Manage cost Manage quality Develop configuration management Develop software Determine client business expectations and needs Manage the testing process Develop and conduct client acceptance tests Develop detailed component specification from project specification Develop detailed technical design Develop detailed test plan Perform integration test Confirm client business needs Develop and present a feasibility report Prepare disaster recovery/ contingency plans Maintain custom software	NOT INCLUDED IN THIS EXAMPLE

Table A-8.4.1 (2) Indicative training packages for Information Technology / Communications (Optional Modules)

CERTIFICATE I	CERTIFICATE II OPTIONAL MODULES	CERTIFICATE III OPTIONAL MODULES	CERTIFICATE IV OPTIONAL MODULES	CERTIFICATE V
	Complete any 4 Optional Modules from: Receive and process oral and written communication Maintain equipment/software inventory Interact with clients Identify components of multimedia Access the Internet Record client support requirements Apply problem solving techniques to achieve organisation goals Participate in a team and individually to achieve organisation goals Determine client computing problems and action Administer network peripherals	***Complete any 4 Optional Modules from:*** Maintain equipment and software in working order Connect internal hardware components Operate system software Relate to clients on a business level Install software to networked computers Provide network systems administration Provide one to one instruction Administer network peripherals Create web pages with multimedia Apply skills in project integration Connect internal hardware components Maintain equipment and software in working order	NO OPTIONAL UNITS REFER TO SPECIALIST STREAM	

Table A-8.4.1 (3) Indicative training packages for Information Technology / Communications (Specialist Stream Modules)

CERTIFICATE I	CERTIFICATE II	CERTIFICATE III SPECIALIST STREAM MODULES	CERTIFICATE IV SPECIALIST STREAM MODULES	CERTIFICATE V
	NO SPECIALIST STREAM MODULES	*SOFTWARE APPLICATION* NETWORK ADMINISTRATION **EXAMPLE OF NETWORK ADMINISTRATION MODULES –** ***Complete 7 Specialist Modules from:*** Provide network systems administration ***Administer and Configure a Network Operating System*** Determine and Action Network Problems Maintain Custom Software Install network hardware to a network Create code for applications Customise Packaged software Applications for Clients	TECHNICAL SUPPORT NETWORK MANAGEMENT PROGRAMMING *MULTIMEDIA* CLIENT SUPPORT NETWORK MANAGEMENT **SOFTWARE DEVELOPMENT** **EXAMPLE OF SOFTWARE DEVELOPMENT MODULES –** ***Complete 18 Specialist Modules from:*** Develop system infrastructure design plan Model preferred system solutions Prepare the build phase Develop logical abstraction from requirements (OOA) Develop client user interface Develop integration blueprint Pilot the developed system Build using RAD Monitor the system pilot Conduct pre-installation audit for software installation Conduct post implementation review Perform unit test Modify IT strategy to meet business solutions requirements Contribute to the development of a strategy plan Identify physical database requirements Monitor physical database implementation Design IT security framework Validate quality and completeness of design Review developed software Coordinate the build phase Prepare for software development using RAD Perform data conversion Monitor data conversion Design system security and controls	

Table A-8.4.2 (1) Indicative training packages for Business / Information Technology (Core Modules)

CERTIFICATE I	CERTIFICATE II CORE MODULES	CERTIFICATE III CORE MODULES	CERTIFICATE IV CORE MODULES	CERTIFICATE V
NOT INCLUDED IN THIS EXAMPLE	***Complete all 11Core Modules*** Work within a financial services context Communicate in the workplace Participate in a team Receive and process oral and written communication Apply Occupational Health and Safety procedures Operate word processing packages Operate spreadsheet packages Insert and retrieve information from a database Manage files and folders Maintain equipment & consumables Deliver a service to customers	***Complete all 11 Core Modules*** Work within a financial services context Communicate in the workplace Participate in a team Resolve customer complaints Apply Occupational Health and Safety procedures Operate word processing packages Operate spreadsheet packages Insert and retrieve information from a database Use advanced features of computer applications Develop macros and templates for clients using standard products Maintain equipment and software in working order	***Complete all 14 Core Modules*** Work within a financial services context Communicate in the workplace Participate in a team Resolve customer complaints Apply Occupational Health and Safety procedures Operate word processing packages Operate spreadsheet packages Insert and retrieve information from a database Use advanced features of computer applications Develop macros and templates for clients using standard products Maintain equipment and software in working order Co-ordinate sales / service performance Resolve disputes Promote customer / client service	NOT INCLUDED IN THIS EXAMPLE

Table A-8.4.2 (2) Indicative training packages for Business / Information Technology (Optional Modules)

CERTIFICATE I	CERTIFICATE II OPTIONAL MODULES	CERTIFICATE III OPTIONAL MODULES	CERTIFICATE IV OPTIONAL MODULES	CERTIFICATE V
	Complete any 4 Optional Modules from:	***Complete any 9 Modules from Optional and Specialist Skills Streams with a minimum of ONE from each stream:***	***Complete any 6 Modules from Optional and Specialist Skills Streams with a minimum of ONE from each stream:***	
	Process credit applications	Customer Services	Promote Customer / Client Service	
	Administer accounts	Deliver a service to customers	Co-ordinate sales/service performance	
	Process loan applications	Sell / cross sell products and services	Resolve disputes	
	Process customer accounts	Respond to customer enquiries		
	Balance cash holdings	Convert a single line product enquiry to maximise sales	**Administer Financial/Business Operations**	
	Prepare and process financial documentation	Provide ongoing sales and services	Evaluate credit applications	
			Manage accounts	
		Process Financial Transactions	Manage bad/doubtful debts	
		Process financial documentation for cash flow and accounting records	Administer card services	
			Reconcile and monitor account receivable	
		Maintain financial records for reporting purposes		
		Process credit applications	Analyse Information and Reporting	
		Process loan applications	Prepare government returns	
		Monitor and control accounts	Provide financial information	
		Etc etc	Prepare budgets and forecasts	
			Produce financial reports	
		Process Information and Reporting		
		Maintain daily financial records for accounting purposes	Information Technology	
		Produce reports for cash flow, forecasts and budgetary purposes	*Select appropriate IT modules from Optional or Specialist Streams of Certificate III or IV Information Technology / Communications Training Package*	
		Prepare statistical and financial reports		
		Information Technology		
		Maintain equipment and software in working order		
		Connect internal hardware components		
		Operate system software		

Table A-8.4.2 (3) Indicative training packages for Business / Information Technology (Specialist Stream Modules)

CERTIFICATE I	CERTIFICATE II	CERTIFICATE III SPECIALIST STREAM MODULES	CERTIFICATE IV SPECIALIST STREAM MODULES	CERTIFICATE V
	NO SPECIALIST STREAM MODULES	**EXAMPLE OF SPECIALIST MODULES MAY INCLUDE –** ***Complete 1 Specialist Module from:*** Monitor cash flow control for accounting purposes Monitor stock levels to maintain enterprise activities Process payroll Collect debts Maintain ATM services Process specialist services Administer fixed asset register	***Complete 4 Specialist Modules from one Stream:*** Frontline Management Manage personal work priorities and professional development Provide leadership in the workplace Establish and manage effective workplace relationships Participate in, and facilitate work teams Manage workplace information Manage quality customer service Administration standards Negotiate with team members to allocate and complete tasks to achieve team goals Supervise the team to ensure team goals are achieved Maintain Computer Files Produce complex documents Assessment and Workplace training Train small groups Plan assessment Conduct assessment Review assessment Financial Transactions Initiate debt recovery Assist clients in estate planning Identify assets and liabilities Conduct research to support recommendations Produce management reports to enable effective decision making Analyse and comment on management reports Undertake risk assessment Settle policy payments and determinations Maintain integrity of financial systems	

Table A-8.4.3 (1) Indicative training packages for Wood Processing (Core Modules)

CERTIFICATE I CORE MODULES	CERTIFICATE II CORE MODULES	CERTIFICATE III CORE MODULES	CERTIFICATE IV CORE MODULES	CERTIFICATE V CORE MODULES
Complete all 5 Core Modules	***Complete all 6 Core Modules***	***Complete all 6. Core Modules***	***Complete all 6 Core Modules***	***Complete all 5 Core Modules***
Maintain interactive communication in the workplace -Intermediate	Maintain interactive communication in the workplace - Intermediate	Communicate in the workplace - Advanced	Plan assessment	Communicate in the workplace - Advanced
Plan to undertake a routine task	Plan to undertake a routine task	Plan a complete activity	Communicate in the workplace - Advanced	Interpret and solve numerical problems - Advanced
Work effectively with others	Work effectively with others	Work effectively in groups	Plan a complex activity	Analyse competency requirements
Interpret and solve numerical problems - Basic	Interpret and solve numerical problems	Solve problems in the workplace - Basic	Solve problems in the workplace - Advanced	Design and conduct training courses
Follow defined occupational health and safety policies and procedures	Follow defined occupational health and safety policies and procedures	Interpret and solve numerical problems - Advanced	Interpret and solve numerical problems - Advanced	Implement and monitor the organisation's occupational health and safety policies, procedures and programs
	Implement quality control -Basic	Follow defined occupational health and safety policies and procedures	Implement and monitor the organisation's occupational health and safety policies, procedures and programs	

Table A-8.4.3 (2) Indicative training packages for Wood Processing (Optional Modules)

CERTIFICATE I OPTIONAL MODULES:	CERTIFICATE II OPTIONAL MODULES:	CERTIFICATE III OPTIONAL MODULES	CERTIFICATE IV OPTIONAL MODULES:	CERTIFICATE V OPTIONAL MODULES
Complete any 10 Optional Modules from:	***Complete any 16 Optional Modules from:***	***Complete any 9 Optional Modules from the prescribed specialist areas of :***	***Complete any 8 Optional Modules from the prescribed specialist areas:***	***Complete any .... Optional Modules from::***
Examples of modules:	***Examples of modules from forestry & panelling***	**Forest growing and management**	**Forest growing and management**	***Examples not provided***
Access and retrieve computer data	Access and retrieve computer data	**Wood panel products**	**Wood panel products**	
Act in an environmentally responsible manner	Act in an environmentally responsible manner	**Timber harvesting**	**Timber harvesting**	
Apply basic first aid techniques	Apply basic first aid techniques	**Saw milling and processing**	**Saw milling and processing**	
Pack assembled products	Grade sort and mark material in production process	**Timber manufactured products & merchandising**	**Timber manufactured products & merchandising**	
Assemble veneer in sequence	Repair veneer and ply			
Provide worksite support	Band edges of panels			
Shift materials safely	Match and join veneer			
Use manual handling equipment	Prepare veneer for ply			
Produce glue laminated beams	Scarf edges for veneer			
Finish fabricated products	Clip Veneer			
Coat products manually	Punch peg holes in veneer			
Assemble products	Cut peeled veneer			
Sort timber for appearance	Maintain stores			
Weigh loads	Repair panels			
Use hand-held tools safely	Grade finish product			
Measure and record log deliveries				

Table A-8.4.3 (3) Indicative training packages for Wood Processing (Specialist Stream Modules)

CERTIFICATE I SPECIALIST STREAM MODULES	CERTIFICATE II SPECIALIST STREAM MODULES	CERTIFICATE III SPECIALIST STREAM MODULES	CERTIFICATE IV SPECIALIST STREAM MODULES	CERTIFICATE V SPECIALIST STREAM MODULES
	Forest Growing and Management	**Forest Growing and Management**	**Forest Growing and Management**	**Forest Growing and Management**
	Wood Panel Products	**Wood Panel Products**	**Wood Panel Products**	**Wood panel Products**
	Harvesting	**Harvesting**	**Harvesting**	**Harvesting**
	Saw Milling and Processing	**Saw Milling and Processing**	**Saw Milling and Processing**	**Saw Milling and Processing**
	Timber Manufactured Products & Merchandising	**Timber Manufactured Products & Merchandising**	**Timber Merchandising Example of Specialist Stream**	**Timber Merchandising Example of Specialist Stream**
	Example of Specialist Stream Modules	**Example of Specialist Stream Modules**	Monitor work team	Command / control a major incident
	Operate a computer to gain access and retrieve data	Shift material using truck	Produce complex documents	Establish and manage effective workplace relationships
	Operate a computer to produce simple documents	Dress boards/timber - Advanced	Assist in the maintenance of a computer system	Participate in, lead and facilitate work teams
	Finish fabricated products	Cut material using computer program machinery	Customise and maintain software	Manage operations to achieve planned out comes
	Coat products manually	Cut material using high speed optimiser	Sell, quote/estimate specialised products & services	Manage workplace information
	Tail out or pull out timber	Set up and maintain finger jointing operations	Implement stock contr0l procedures	Analyse competency requirements
	Dress boards/timber - Basic	Test strength of joints	Provide leadership in the workplace	Design and establish the training system
	Re-saw boards/timber - Basic	Sharpen cutters and routers	Establish and manage effective workplace relationships	Design and establish the assessment system
	Assemble products	Maintain straight edges and tension gauges	Participate in, lead and facilitate work teams	Manage the training assessment system
	Produce timber jointed timber	Replace saws, blades and guides	Manage operations to achieve planned outcomes	Evaluate the training and assessment system
	Tally material	Manufacture cutters and router bits	Manage workplace information	Develop assessment procedures
	Produced pointed timber products	Swage saws	Manage quality customer service	Design training courses
	Sort timber for appearance	Identify and rectify saw performance	Develop and maintain a safe workplace and environment	Arrange contract
	Weigh loads	Identify and rectify cutter performance	Implement and monitor continuous improvement systems and processes	Establish, maintain and evaluate the organisation's occupational health and safety system
	Produce sawn green timber boards - Intermediate	Dry timber in conventional and high temperature kiln	Plan assessment	Undertake the tendering process
	Select and co-ordinate machine and saw shop supplies	Start steam boiler	Conduct assessment	Administer contracts
	Dry timber in low temperature kiln	Operate and monitor boiler	Review assessment	Manage a chemical spill / leakage
		Shutdown and store boiler	Train small groups	
		Conduct heat plant operations	Plan and promote a training program	
		Optimise timber treatment plant operations		

Table A-8.4.4 (1) Indicative training packages for Manufacturing Technology (Core Modules)

CERTIFICATE I CORE MODULES	CERTIFICATE II CORE MODULES	CERTIFICATE III CORE MODULES	CERTIFICATE IV CORE MODULES	CERTIFICATE V CORE MODULES
Complete all Core Modules	***Complete all Core Modules***	***Complete all Core Modules***	***Complete all Core Modules***	***Complete all .... Core Modules***
Undertake interactive workplace communication	Undertake interactive workplace communication	Undertake interactive workplace communication	Apply quality systems	Operate in an autonomous team environment
Apply principles of OH&S in the work environment	Apply principles of OH&S in the work environment	Undertake OH&S activities in the workplace	Organise and analyse information	Give formal presentations and take part in meetings
Apply quality procedures	Apply quality procedures	Apply quality procedures	Use graphical techniques and perform simple statistical computations	Participate in formal interviews and/or negotiations
Plan to undertake a routine task	Plan to undertake a routine task	Basic process planning	Operate in a work based team environment	Advanced customer service
	Perform computations (basic)	Perform computations	Schedule material deliveries	Monitor OH&S factors for enterprise or section of enterprise
	Perform computer operations	Perform computer operations	Write reports	
		Assist in the provision of on-the-job training	Assist in the development and delivery of training in the workplace	
		Write reports	Conduct workplace assessment	
			Perform internal/external customer service	