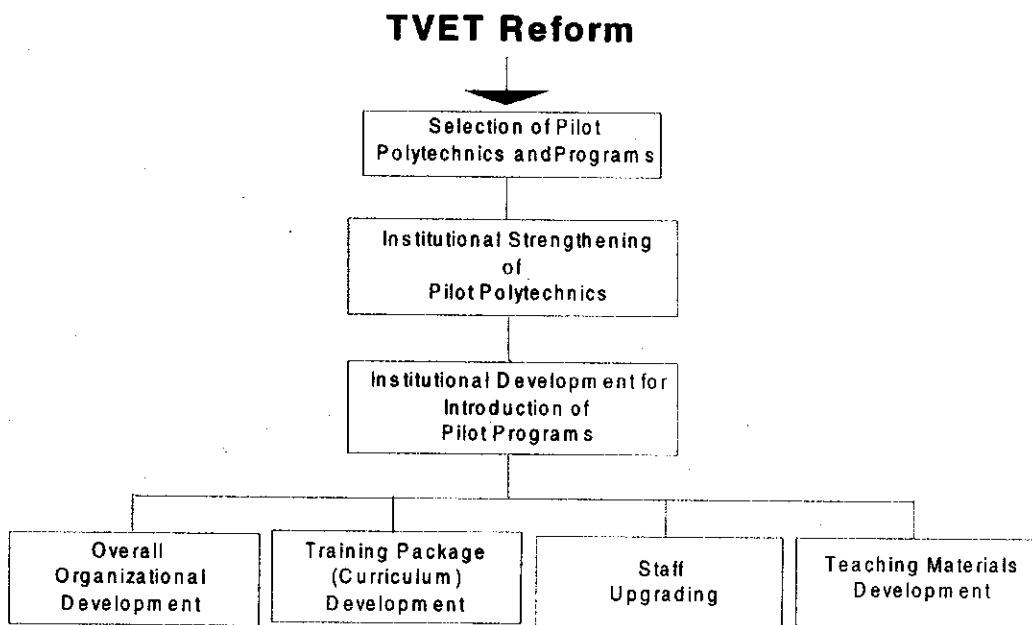


## CHAPTER 8 IMPLEMENTATION MEASURES FOR PILOT POLYTECHNICS AND PILOT PROGRAMS

The Study Team recommends a phased approach to TVET reform in Ghana. Some immediate actions will be necessary and, at the same time, a CBT approach will be gradually introduced into Polytechnics. The Team recommends pilot Polytechnics as case studies to examine institutional strengthening measures and also pilot programs to introduce a CBT approach within the Ghanaian context.

Figure 8.0.1 is a conceptual diagram of implementation measures for pilot Polytechnics and pilot programs.



**Figure 8.0.1 Conceptual diagram of institutional strengthening measures for Pilot Polytechnics and Pilot Programs**

### 8.1 Selection of Pilot Polytechnics and Pilot Programs

#### 8.1.1 Identification of Economic Structure by Region

The TVET sector should be closely related to industries and economic activities. Courses and programs on the CBT approach should contribute to the development of human resource needed in the industrial sector at national and local levels. In order to develop pilot programs in Polytechnics, we need to identify existing economic structure and regional development potential. There is, however, very little reliable data and information available to enable the analysis of economic structure and regional development potential. Based on existing information (see Appendix 8.1) and field studies conducted by the Study Team, the major characteristics of the economy by region are summarized as follows:

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#### (1) Greater Accra Region

The Greater Accra region, including the national capital of Accra, is the nation's major concentration of manufacturing, commercial, business and services activities. About 19 percent of the manufacturing employment and nearly 60 percent of the manufacturing enterprises in the formal sector are concentrated in this region. In addition, almost all the enterprises, which deal in computing equipment, electrical machinery and communications equipment, are located in the region. The region has great potential for the development of manufacturing industry, especially paper products, metal fabrication and machinery.

The region will constantly play a significant role as the center of commercial and business activities in the nation. The wholesale and retail trade will be the dominant sector in the region's economic activities, followed by the service sector. As an international gateway, Accra will attract foreign investors as a financial center and as the focus for telecommunications and information technology. These developments can be facilitated by greater availability of infrastructure and relevant human resources.

#### (2) Volta Region

The region's economy is basically agriculture. Ho is the major town in the region. Major crops cultivated in the region are cocoa, oil palm, citrus, coconut, pineapple, sugarcane, coffee and fresh vegetable, but quantities are rather limited. Important industrial activities in the region are food processing and the manufacture of textile and wood products. Based on existing resources, the food processing industry has a potential for future development, which includes cassava processing, sugar production, and palm oil processing. Another potential area is the textile industry, which is the second largest manufacturing employer in the region. In addition, Volta Lake has great potential for the fishing and tourism industries.

#### (3) Eastern Region

The Eastern region is located in the north of the Great Accra region, and their major economic activity is agriculture. Koforidua is the major town in the region, and it can be reached for less than 2 hours by drive from Accra. The region's manufacturing industries are very limited. They are food processing, textiles and wood products. Most of the manufacturing enterprises obtain their basic raw materials from the region. Food processing is the most important potential industry in the region. In addition, large deposits of kaolin can be developed for use in the paper industry and for pharmaceutical products.

#### (4) Central Region

The Central region is located in the west of the Great Accra Region, and the major economic activities there are agriculture, forestry, mining and quarrying. Some manufacturing industries are based on the use of the local agricultural raw materials. Food processing is the principal manufacturing activity, including palm oil processing, kernels and lime processing, providing about 50 percent of the region's manufacturing employment. The region is the leading ceramics producer in the country. Production of

ceramic products is a potential export industry. In addition, there is a large soap-manufacturing factory using raw materials produced in the region.

There are several tourism resources in the region. Elmina and Cape Coast Castles are major tourism attractions. Seafood processing, including lobster and shrimp, is another potential industry, but it will be necessary to improve the quality of the products to meet the requirements of the export markets.

#### (5) Western Region

The Western region has rich natural resources, but they have not been fully exploited, due to poor infrastructure, particularly transportation. The main manufacturing industries in the region include food processing, beverages and tobacco, textile production, wood processing, and cement production. Metal fabrication and wood processing are relatively well developed compared to other regions. The largest iron and steel foundry in the country is located in Takoradi.

The mining industry has potential in the region, namely gold, manganese, iron ore and limestone. In the manufacturing sector, food processing and wood products are potential industries.

#### (6) Ashanti Region

The Ashanti region is the second most industrialized region in the country following Greater Accra, and it has vast natural resources, including arable land and mineral deposits. It has the largest gold mine (at Obuasi) and several manufacturing and extractive activities have been growing, including food processing, textiles, beverages and tobacco, wood products, and metal fabrication. Kumasi, the regional capital, has the largest concentration of wood processing industries in the country.

The region has great potential for the development of manufacturing industries, which include food processing, beverages, wood products and metal fabrication. Kumasi will continue to be developed as the second largest concentration of manufacturing industry in the country.

#### (7) Brong Ahafo Region

The region's economy depends primarily on agriculture, which provides about 80 percent of the total employment in the region. Food processing and wood product manufacturing are important activities in the region's industrial sector. Food processing includes palm oil, corn flour, tomato puree and processed cassava. The enterprises are predominantly small-scale.

The region's industrial potential seems quite limited, due to lack of sufficient infrastructure. Although the industry manufacturing wood products and furniture has not been significant, it has potential for development because there is a large forest in the region.

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(8) Northern Region

The region's economy is principally agriculture. Food processing is the most important activity in the manufacturing sector and accounts for more than 60 percent of the region's manufacturing employment. The industry is dominated by small-scale enterprises. The region's industrial potential is very limited, due to lack of infrastructure.

Food processing is the most important industry due to the abundance of natural resources and the one with the highest manufacturing potential. In addition, the region's mineral resources, such as limestone and iron-ore, may represent a future commercial venture.

(9) Upper West Region

There is a very low level of industrial activity in the Upper West region. Agricultural work accounts for 76 percent of employment in the region. Manufacturing is mostly carried out by small-scale enterprises in the informal sector. Beverages and tobacco are the principal products, which are manufactured in the region.

Agriculture, including food processing, will be the major economic activity in the region. There is potential for textiles, made from processed cotton produced in the region, while various types of traditional textiles can be considered for development for domestic and export markets.

(10) Upper East Region

The region's economy is predominantly in the agricultural sector. There are few small-scale manufacturing industries, most of which use agricultural raw materials produced within the region. There is few mining production in the region. The region's industrial potential is very limited, because of lack of infrastructure and natural resources. Food processing is only a potential industry, based on agricultural raw materials produced in the region.

### 8.1.2 Selection of Pilot Polytechnics

The pilot Polytechnics are case studies to examine institutional measures to strengthen the managerial capacity of Polytechnics. For this purpose, the Study Team selected three pilot Polytechnics based on the geographical and economic structure of the regions where Polytechnics are located.

Greater Accra, Ashanti and Western Regions are major concentrations of the country's manufacturing, trading and service activities. The regions have relatively large urban populations compared to the other regions. Accra, Kumasi, and Takoradi Polytechnics are located at major urban centers in each region. These Polytechnics have relatively large enrolments with over 2,000 students in 1998/99 (see Table 4.2.2). Accra Polytechnic was selected as a pilot Polytechnic to represent a large and integrated Polytechnic located in the urban area.

Volta, Central, Eastern and Brong Ahafo Regions are rural regions, where the agriculture and raw material industries are the main economic activities. Ho, Kofordia, Cape Coast

and Sunyani Polytechnics are located in the regional centers, respectively. These Polytechnics have medium-size enrolment, from 1,000 to 1,600 students in 1998/99 (see Table 4.2.2). Ho Polytechnic was selected as a pilot Polytechnic to represent a medium-size Polytechnic focusing on education and training of technologies related to the local resources.

Northern, Upper West and Upper East Regions are rural regions in northern remote areas, where agriculture and raw material industries are still limited. The small-scale industries in the informal sector are the major economic activities in the regions. Tamale, Wa and Bolgatanga Polytechnics are located in the regional centers, respectively. Wa and Bolgatanga Polytechnics are not operated yet as of July 2001, although MOE announced that they would be opened in 2000. Tamale Polytechnic was selected as a pilot Polytechnic to represent relatively small Polytechnics located in rural regions. It also functions as a regional human resource center to offer general information on the technologies and advanced skills needed for the local industries in the region.

### 8.1.3 Selection of Pilot Programs

The purpose of pilot programs is to examine implementation measures of the CBT approach in the Polytechnics. The essence of the CBT approach is demand-driven and market-oriented, and pilot programs in Polytechnics should meet industry needs in the global market. It is expected that the people trained in pilot programs will play a significant role in the development of each industry sub-sector. In other words, pilot programs offered in Polytechnics are expected to contribute to the nation's economic development, specifically the export industry.

Several criteria have been used to select pilot programs. The first criterion is that pilot programs should be directly related to the demand of the labor market. Secondly, pilot programs should contribute to the development of Ghana's export industry. Thirdly, pilot programs should promote competitive human resources related to global standards. Finally, pilot programs should provide a positive impact on existing courses in Polytechnics. Based on the above criteria, the following six new areas were selected as pilot programs to introduce a CBT approach in the Polytechnics:

#### (1) Hospitality and Tourism

Ghana possesses rich natural and human resources to attract foreign tourists. These resources include tropical weather, beautiful white sand beaches, wild life in national reserve, historical sites such as Elmina Castle, as well as social stability, public safety and friendship of the people. In fact, the tourism industry has grown rapidly in recent years in Ghana. The income from the tourism industry has grown with an annual growth rate of 17 percent from 1990 to 1999, and the total income reached at US\$279 million in 1999. Tourist arrivals have also grown with an annual growth rate of 11 percent during the same period. It was the third largest amount of foreign earning in Ghana, following the income from gold (US\$608 million) and cocoa (US\$465 million). In addition, the tourism industry encourages development of various supporting industries, which certainly help to reduce the serious unemployment problem. It can be said, then, that the tourism industry has a big potential to lead the nation's economic development in the near future.

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The tourism industry, however, is not well-organized or developed in Ghana. For instance, it is not competitive in an international market due to inadequate resource management, insufficient marketing activities, and lack of communication technology needed in a global market. It is, therefore, important to develop a new program in Polytechnics to develop skilled human resources in the fields of tourism and hospitality.

## (2) Information Technology and Communications

Recently, Information Technology (IT) has become more and more important in business and almost all types of industrial activities. This trend will be accelerated in the near future. All Polytechnics in Ghana currently have computer labs or related facilities, but most of the computers in Polytechnics have no Internet connection. The students, therefore, can learn only a basic level of Information Technology and Communication. Our interview survey also showed that many enterprises in Ghana need more professionals with advanced skills and knowledge of information technology and communication. Many teachers, students and graduates of Polytechnics also mentioned that computer skills are one of the most important and useful academic areas.<sup>59</sup>

Presently there are still very limited numbers of TVET institutions teaching the subject of Information Technology and Communication in Ghana. The pilot programs will offer courses in Information Technology and Communication, including networking, data communications, operating systems, web page development, computer graphics and software programming.

## (3) Business Information Technology (Business IT)

Business Information Technology (Business IT) is a relatively new field that intends to connect the fields of Business Administration with Information Technology. Business IT would be introduced in Polytechnics to develop middle management and advanced human resources with knowledge of both business and information technology. The primary objective of the pilot program in Business IT is to provide effective training courses focusing on applications of information technology for the business fields, such as accounting, banking, marketing, logistics and office administration.

## (4) Post Harvest and Food Processing

Agriculture is a dominant economic activity in Ghana. In 1999 nearly 50 percent of the total of Ghana's export earning (US\$1,874 million) was comprised of agriculture commodities, such as cocoa (US\$464 million), wood product (US\$204 million), fruits (US \$90 million), marine product (US\$72 million), etc. In order to increase export of agriculture commodities, advanced technology in post harvest and food processing is significantly important. This is clearly identified when a distinction is made between "processed" and "non-processed" export items (Table 8.1.1). The following are major findings:

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<sup>59</sup> According to our survey, many technical institutions said that IT and Computers are the most important courses that need to be introduced. Polytechnic students also view Computer Science and Computer Programming as the most useful subjects. In addition, Computer science was selected as the most useful subjects to learn by polytechnic graduates. Our survey showed that Computer skills and information technology were one of the most important in the TVET sector.

- The export value of non-processed vegetables and fruit had grown from US\$4.7 million in 1995 to US\$85 million in 1999. It is one of the most rapidly growing export commodities in Ghana.
- Although the total volume was not significant, the export value of processed oil from vegetables and animals has increased from US\$0.2 million in 1995 to US\$ 6.6 million in 1999.
- The export of processed fish product has doubled from US\$23 million in 1995 to US\$54 million in 1999. The export of non-processed fish products, on the other hand, decreased from US\$81 million in 1995 to US\$17 million in 1999.

**Table 8.1.1 Export trend by commodities and by levels of process**

	1995	1999	Growth
	(Mil. US\$)	(Mil. US\$)	(times)
1 Wood products			
Non-processed	17.73	3.42	0.2
Semi-processed	96.70	164.70	1.7
Processed	2.11	36.46	17.3
2 Fish			
Non-processed	81.89	16.94	0.2
Semi-processed	0.07	0.97	14.3
Processed	22.55	54.33	2.4
3 Grain			
Non-processed	3.53	13.28	3.8
Processed	0.30	1.66	5.6
4 Oil from vegetable and animal			
Semi-processed	1.79	3.34	1.9
Processed	0.18	6.57	36.5
5 Vegetable and fruit			
Non-processed	4.73	85.14	18.0
Processed	5.34	0.83	0.2

Source: Trade statistics, Min. of Finance

It can be said that advanced skills and knowledge in relation to Post Harvest and Food Processing Technology are important to promote export of agricultural commodities in Ghana. Food Processing Technology is linked to a wide range of supporting industries, such as agricultural machinery, production of fertilizer and animal feed, logistics, distribution and packaging of products.

#### (5) Wood Processing Technology

Wood products were the fourth largest export commodities (US\$205 million in 1999) in Ghana, following gold, cocoa and tourism. As shown in Table 8.1.1, the export of processed and semi-processed wood products doubled from US\$99 million in 1995 to US\$201 million in 1999, whilst the export of non-processed wood products decreased from US\$18 million in 1995 to US\$3 million in 1999. The trend of the export in wood products implies that the demand of labor in the wood processing industry has increased significantly, and at the same time, the demand has shifted from less skilled labor to advanced skills and knowledge of Wood Processing Technology.

In fact, the export of value added products such as veneer, wood articles and wooden furniture has increased, according to the trade statistics. In terms of global competition, Ghana still needs human resources with Wood Processing Technology skills, especially kiln drying and designing of wood production. Kiln drying technology is critically important, because all wooden materials used for furniture have to be dried up by kiln. Accordingly, it is recommended that Polytechnics should offer new courses on Wood Processing Technology, as part of a pilot program based on the CBT approach.

#### (6) Manufacturing Technology

Manufacturing Technology is the most fundamental and important technical area needed for the development of any industry (including small-scale industry), even in the informal sector. The Study Team identified the following technical areas as particularly important in Ghana: Agricultural Engineering, Metal Processing, Well Drilling, Design and Drawing Skills, Industrial Engineering and Engineering Management. Polytechnics should provide programs based on the CBT approach to develop future workers with fundamental knowledge of Manufacturing Technology and advanced skills in the above technical areas. These human resources would contribute to the industrial development of the country.

A tentative schedule to introduce the pilot programs in Polytechnics is shown in Table 8.1.2.

**Table 8.1.2 Development plan of pilot programs**

	Polytechnic	Pilot programs					
		(1)	(2)	(3)	(4)	(5)	(6)
		Hospitality and tourism	Information technology and communications	Business information technology	Post harvest and food processing	Wood processing technology	Manufacturing technology
1	Accra	xx	xxx	xx		x	xx
2	Kumasi		x	xx	xx	xx	xxx
3	Takoradi	x	xx	xx		xxx	xx
4	Ho	xx	xx	x	xxx		x
5	Cape Coast	xxx	xx	xx			x
6	Tamale	xx		x	xxx		xx
7	Sunyani	xxx	x	x	xx		
8	Koforidua	x	xx	xxx	x		
9	Wa	x		x	xx		xx
10	Bolgatanga	x		x	xx		xx

xxx: Major center with a function to develop teaching materials in form of textbook and workbook, which is developed in a short term

xx: Center, developed in a mid term

x: Center, developed in a long term

#### 8.1.4 Courses provided in Polytechnics

Polytechnics should provide three types of courses - packaged courses, short courses, and distance-learning courses - to provide people with the opportunities offered by the TVET. The characteristics of these courses are described as follows:



- “Packaged courses” are a conventional learning method where students attend classes in Polytechnics on a full-time basis. The target students in packaged courses are graduates from secondary schools.
- “Short courses” involve a learning method where students attend classes on a part-time basis. Short courses are often conducted in the evenings, and they can also be intensive summer courses, tailor made courses and so on. The target students in short courses would be workers and adult learners.
- “Distance-learning courses” can be taken at home or at people’s current workplaces, and they are supplemented by short-term schoolings and practical training in industries. The target student in distance-learning courses would be workers and adult learners especially those living in remote areas where no conventional learning facilities are available.

#### 8.1.5 Estimation of Enrolment in Polytechnics

In the transition to the CBT approach in Polytechnics, there will be two types of enrolments: enrolments in existing department and enrolments in the pilot programs. The enrolments were estimated with the following assumptions:

- Enrolment in existing departments, which offer HND, has increased at an average annual growth rate of 32 percent from 1993 to 2000. This figure is extremely high in terms of existing infrastructure and capability of the Polytechnics. It is therefore recommended that existing departments will not increase their enrolments until 2007 then gradually decrease their enrolments from 2007.
- During the period from 2001 to 2007, Polytechnics should focus on preparation of the CBT approach in the pilot programs.
- Although Polytechnics have offered non-tertiary courses, these courses should transfer to Technical Institutes. Polytechnics will provide tertiary level of technical and vocational education and training.
- Packaged courses and short courses in the pilot programs will commence their enrolments starting in 2007.
- Distance-learning in existing courses and the pilot programs will commence their enrolments from 2010.

Future enrolments in Polytechnics were estimated based on the predictions described above. Table 8.1.3 and Figure 8.1.1 show the overall enrolment growth in Polytechnics. The following is a summary of the results:

- The total enrolments in Polytechnics will increase from 22,000 persons in 2000 to 38,600 persons in 2010 and 97,500 persons in 2020. The percentage shares of the total enrolments in existing departments and the pilot programs will be nearly even in 2020.

- As for existing departments, the enrolments in packaged courses will gradually decrease due to expansion of short courses and distance-learning courses. It is estimated that the percentage shares of enrolment in packaged courses and short courses will be the same in 2020.
- As for the pilot programs, enrolments in all three courses - packaged, short and distance-learning courses - will increase significantly after 2010. It is estimated that the percentage share of enrolment in each course will be even in 2020.
- The total enrolment in packaged courses in Polytechnics will increase from 22,000 persons in 2000 to 27,200 (=23,990 + 3,160) persons in 2010, and 35,800 (=19,602 + 16,151) persons in 2020. The percentage share of packaged courses will be about 37 percent of the total enrolments in 2020.
- The total enrolment in short courses in Polytechnics will increase from 1,200 persons in 2005 to 35,800 (=19,602 + 16,151) persons in 2020. The percentage share of short courses will be about 37 percent of the total enrolments in 2020.
- The total enrolment in distance-learning courses in Polytechnics will increase from 600 persons in 2010 to 26,000 (=9,801 + 16,151) persons in 2020. The percentage share of distance-learning will be 27 percent of the total enrolments in 2020.

The detailed estimation of enrolment in Polytechnics is shown in Appendix 8.5.

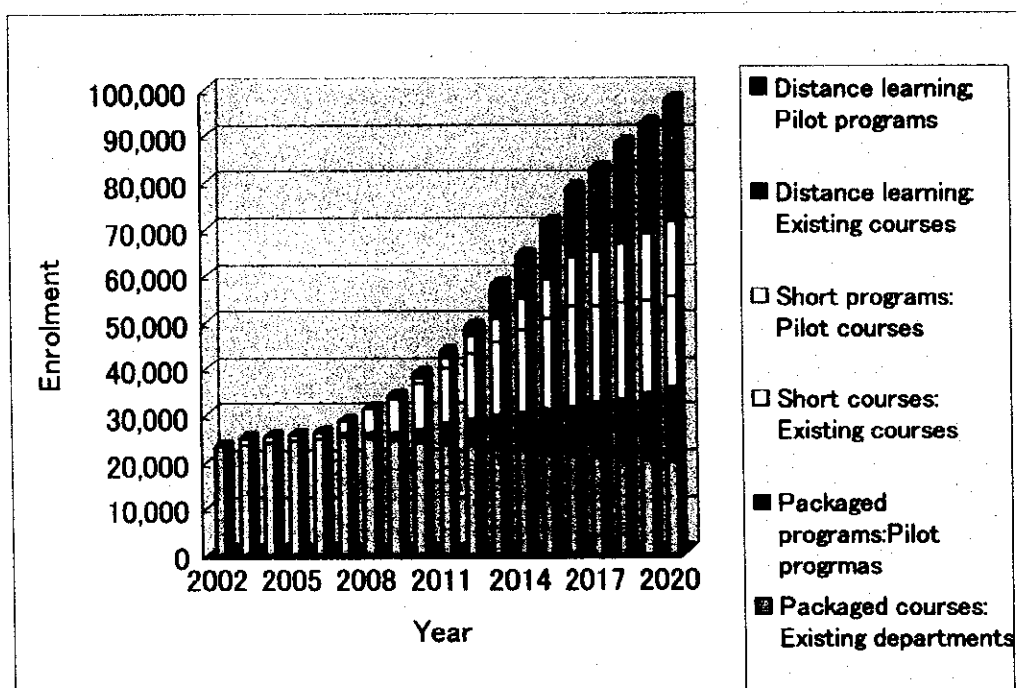


Figure 8.1.1 Enrolment growth plan for Polytechnics

**Table 8.1.3 Summary of enrolment growth plan for Polytechnics**

	(Man-year)					
	2000	2005	2010	2015	2020	Share in 2020
<b>Existing departments</b>						
Packaged courses	21,951	24,404	23,990	21,685	19,602	20.1%
Short courses	0	1,220	9,596	19,517	19,602	20.1%
Distance-learning	0	0	0	5,421	9,801	10.1%
Sub-total	<b>21,951</b>	<b>25,624</b>	<b>33,586</b>	<b>46,623</b>	<b>49,005</b>	<b>50.3%</b>
<b>Pilot programs</b>						
Packaged courses	0	0	3,160	9,480	16,151	16.6%
Short courses	0	0	1,264	8,532	16,151	16.6%
Distance-learning	0	0	632	6,636	16,151	16.6%
Sub-total	<b>0</b>	<b>0</b>	<b>5,056</b>	<b>24,648</b>	<b>48,454</b>	<b>49.7%</b>
<b>Total</b>	<b>21,951</b>	<b>25,624</b>	<b>38,642</b>	<b>71,271</b>	<b>97,458</b>	<b>100.0%</b>

## 8.2 Institutional Strengthening of Pilot Polytechnics

### 8.2.1 Current Situation of Pilot Polytechnics: Accra, Ho and Tamale Polytechnics

#### (1) Accra Polytechnic

Accra Polytechnic is located in the capital of Ghana, and it has a large enrolment of approximately 4,000 students in three departments - Engineering, Applied Math./Science, and Management/Business Study. The courses provided at Accra Polytechnic are shown below.

Department	Courses
Engineering	Automobile Eng., Electrical Eng, Mechanical Eng., Building/Construction Civil Eng., Furniture Design Production
Applied Math / Science	Hotel Catering/Management, Statistics, Fashion, Science Lab. Technology
Management/Business Study	Accountancy, Secretaryship, Marketing, Purchase & Supply, Bilingual Secretaryship

Many manufacturing and service industries in both the formal and informal sector have been concentrated in Accra and its surrounding areas. Accra Polytechnic, therefore, has great potentials to establish strong relations with the surrounding industries. As a pilot Polytechnic, Accra Polytechnic should play a leading role to improve the management of Polytechnics.

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## (2) Ho Polytechnic

Ho Polytechnic is located at Ho, an administrative center of the Volta Region, about two-hour drive from Accra. Ho Polytechnic has three departments with a total enrolment of 2,700 students. The courses provided at Ho Polytechnic are shown below.

Department	Courses
Engineering	Electrical Eng, Automobile, Agriculture, Building
Applied Math / Science	Hotel Catering/Management, Statistics, Fashion Design
Management/Business Study	Accountancy, Secretaryship, Marketing

The main economic activity in the Volta Region is agriculture, such as the productions of rice, maize, yam, and other vegetables. There are very little manufacturing and service industries in the region. At present, there are no strong relations between Ho Polytechnic and surrounding industries. It is therefore important to establish these links with the other regions, including the neighboring Accra region. This way, qualified lecturers from Accra who have practical experience in the business, service, and manufacturing industries could come teach in the Ho Polytechnic as visiting lecturers.

## (3) Tamale Polytechnic

Tamale Polytechnic is located at Tamale, an administrative center of the Northern Region (it is a nine hour drive from Accra). It is a relatively small Polytechnic with a total enrolment of about 1,100 students in three departments. Each department offers a very limited number of courses as shown below:

Department	Courses
Engineering	Mechanical Eng., Agriculture
Applied Math / Science	Statistics
Management/Business Study	Accountancy, Secretaryship

There are a few small-scale industries in the Tamale or Northern Region; they are cotton processing, rice processing, and auto-repair shops. These activities are, however, very limited. Tamale Polytechnic has had difficulties establishing relations with the surrounding industries. It is recommended that Tamale Polytechnic play the role of a regional resource center in the development of technology and business. Also, special measures should be taken to strengthen technology and entrepreneurship in the informal sector.

### 8.2.2 Current Institutional Bodies in Management of Pilot Polytechnics

There are two kinds of supervisory bodies that oversee the management of Polytechnics. One is a Polytechnic Council and the other is an Academic Board. The members of the Polytechnic Council are representatives from MOE and from the Polytechnic, including

the principal, administrative staff, teachers, students, and also representatives from industries and professional bodies, such as the Association of Engineers, Chartered Accountants, etc. The Council has quarterly meetings where they discuss various issues, including funding, budgeting, expansion of facilities, rules and regulations, and management of the Polytechnic.

The Academic Board supervises the academic aspects of each Polytechnic. It is composed of the principal and heads of departments in the Polytechnic. The major role of the Academic Board is to decide on the educational guidelines of each Polytechnic, including the curriculum, admission policy, examinations, and development of facilities.

Together with two supervisory bodies in each Polytechnic, there is an overall administrative body called the Conference of Polytechnic Principals, whose members are principals in the Polytechnics. The meetings are held regularly, monthly or bi-monthly, to exchange information and discuss issues in Polytechnics, such as management and recruitment of teaching staff, funding sources, expansion of academic programs, etc.

### 8.2.3 Strengthening Measures in Management of Pilot Polytechnics

#### (1) Linkages with the Industrial Sector

One of the most critical issues in the management of Polytechnics is the creation of links between Polytechnics and industries. Without these links, the CBT approach cannot be successfully instituted. Some of the measures to establish these relations are:

- i) Extending and improving the system of industry attachments, for both students and teachers, by more specifically defining the knowledge and skills (competencies) that are intended to be acquired.
- ii) Monitoring activities for graduates through the establishment of alumni association so that the Polytechnics can get more opportunities for industrial attachments and funding sources to improve their education and training.
- iii) Establishing Industrial Training Advisory Boards (ITABs) to define competencies needed in the industrial sector.
- iv) Conducting analyses of resources at national and regional levels.
- v) Assisting emerging industries with the training needed for the workers.

#### (2) Income Generation Schemes

Some Polytechnics have made the effort to generate income from the services based on their resources. The areas of services provided by Polytechnics are wood processing, catering, automobile maintenance, etc. The revenue from these activities, however, has been less than 7 percent of the total revenue in Polytechnics. In a long-term perspective, Polytechnics need to make a great effort to increase their income on the basis of their resources. For instance, provision of short training courses for workers has a great potential in terms of income generation for Polytechnics.

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The concept of “Campus Companies” will be useful in promoting income generation in the Polytechnics. In Ireland, for example, many tertiary institutions have adopted the concept and operated their own businesses on campus, with support from the private sector. Polytechnics in Ghana can introduce a similar concept and operate businesses by their own initiatives. There are already some activities in the Polytechnics that resemble these “Campus Company” models, for example the Internet café at Takoradi Polytechnic and the regional radio station at Ho Polytechnic. These activities could be expanded to receive assistance from the private sector. Polytechnics would provide the facilities and human resources, and the private sector would provide financial support, equipment, technology, and marketing knowledge to develop and sell products.

### (3) Role of Industrial Liaison Officers

Industrial Liaison Officers should play a far more substantial role in strengthening the relations between Polytechnics and industries. In particular, they should coordinate the industrial attachment opportunities for teachers and students. In addition, Industrial Liaison Officers should be responsible for monitoring, collecting and compiling graduate data, in cooperation with alumni associations.

### (4) Industrial Training Advisory Board (ITAB)

Teachers in Polytechnics and representatives from specific industries should work together in establishing ITABs. The CBT approach in Polytechnics would not be successful without the establishment of ITABs. ITABs will establish the competencies needed for specific jobs, and these standards would then constitute the new curricula (Training Packages). In the delivery of new programs in Polytechnics, representatives from the industries should be invited periodically as lecturers or trainers in Polytechnics. By establishing closer links with the appropriate industries, some modules (or components of modules) can also be delivered in the workplace.

## **8.3 Institutional Development for Introduction of Pilot Programs**

### 8.3.1 Overall Organizational Development

The introduction of the CBT system will require the modification of many traditional systems and administrative procedures. These procedures should be performed at the national and local levels. The extent of the modification will depend on how Ghana approaches the CBT system. For these purposes, the following organizations will be required to administer the TVET reform process at the national level and support the introduction of a CBT approach in the pilot programs at Polytechnics. They are the Ministerial Council, Ghana National Training Authority (GHANTA), Industry Training Advisory Boards (ITABs) and the National Qualification Authority (NQA).

In the initial stage of the TVET reform, it will be necessary for existing supervisory bodies, such as NCTE, NABPTEX and NAB, to play a key role in developing ITABs with the help of the industrial sector. Figure 8.3.1 illustrates the administrative relationships of these stakeholders.

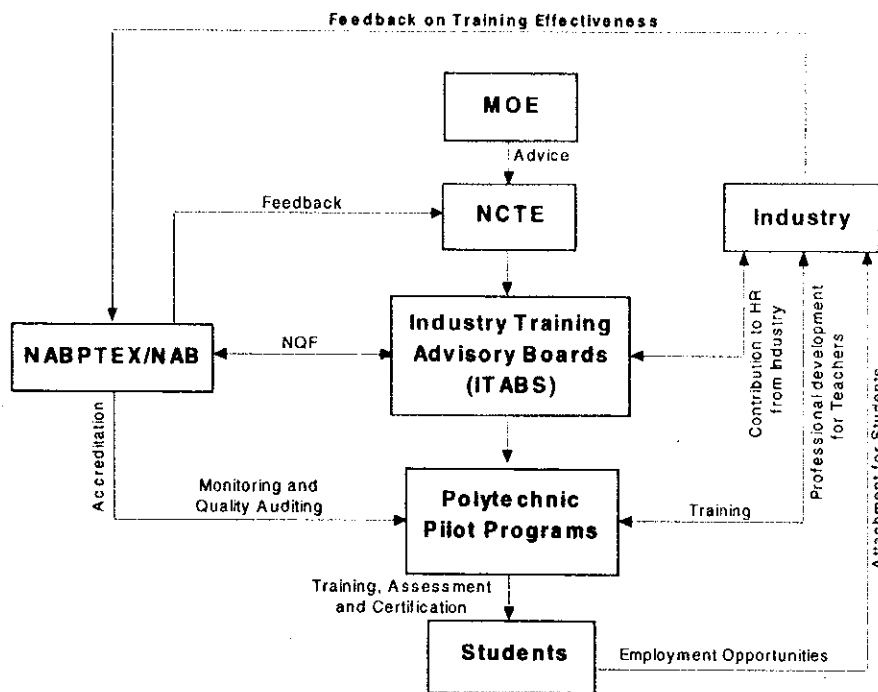


Figure 8.3.1 Overall administrative structure for implementation of Pilot Programs

### 8.3.2 Training Packages

Training packages (conventionally called curricula) form the basis of all nationally recognized TVET institutions throughout Ghana. Therefore, the development of training packages requires extensive consultation and validation by stakeholders from the industrial sector.

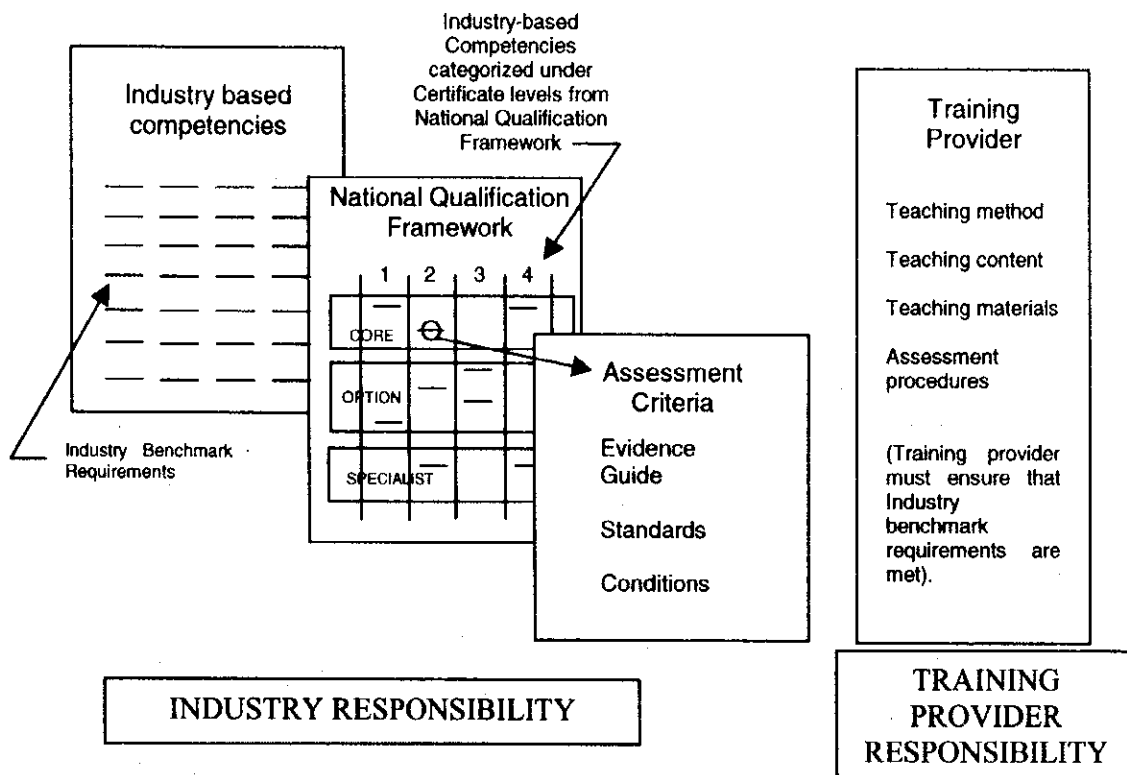
Training packages contain an integrated set of nationally endorsed competency standards, assessment guidelines and qualifications for a specific industry, industry sector, or enterprise. Training packages allow for qualifications to be awarded through the direct assessment of competencies rather than through grade results in a course. They encourage not only the development and delivery of education and training tailored to fit individual needs but it also encourages learning in a work environment.

All training packages will require the endorsement of a central administrative body such as “GHANTA,” as suggested in Chapter 7. The development processes of training packages are illustrated in Figure 8.3.2, and they are summarized as follows:

- 1) A group of representatives from a specific industrial sector develop a list of competencies that must be demonstrated by workers in their industry. They also decide on what evidence is required to ascertain that these have been met. The list of competencies and the assessment guidelines could be seen as the industry benchmark for training requirements. This benchmark should accurately reflect workplace requirements across a range of enterprises, incorporating small, medium and large businesses.

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- 2) In order for the training to meet the industries' requirements, the list of competencies needs to be classified according to a range of certificate levels previously developed through the National Qualifications Framework (NQF). An example of an NQF is shown in Appendix 8.3.
  - 3) Each of these broad categories or certificate levels are further refined into major teaching and learning modular groups. These groups of modules can be represented as:
    - Core modules or sets of competencies that must be demonstrated by all workers. These competencies are generally common across most related industries and incorporate key competencies such as language, literacy and math skills.
    - Optional or sector modules are units that are more specific to a particular work task, and individual learners may select from specific inventories that best suit their needs.
    - Specialist sector modules may also be selected from an inventory of specialized units. These are so specific that they usually can only be delivered in a workplace environment.
  - 4) Individual units of competency do not have formal levels, however, when they are packaged together, they form a qualification. This qualification reflects the level of job being done. Any person may undertake units or modules to meet their own personal or their industry's needs - of course there may be pre or co-requisite requirements, but in order to be awarded a qualification they must complete all of the required number and type of modules predetermined by the National Qualification Framework.
  - 5) Assessment of individuals' skills is conducted according to a set of guidelines developed by the ITAB. The assessment guidelines detail the processes and activities that must be undertaken for assessment of competencies in the particular industry sector's training package.





**Figure 8.3.2 Development of training packages**

For the pilot programs, six specific areas in industry were chosen. They are Information Technology and Communication, Business Information Technology, Wood Processing Technology, Manufacturing Technology, Hospitality and Tourism, and Post Harvest and Food Processing.

The study team, in collaboration with some Ghanaian industries, has produced six indicative training packages as a demonstration of the scope of exercise. These examples are based on the Australian experience, and copies of the indicative training programs are shown in Appendix 8.4.

### 8.3.3 Staff Upgrading

The key requisite in delivering industry-relevant, competency-based courses is providing teachers with appropriate technological knowledge and skills, as well as providing core industrial staff with the skills necessary for them to carry out comprehensive evaluations of the workers. In delivering the Training Packages, it is therefore necessary to not only upgrade teachers' specific skills, but also to train industry-based trainers and evaluation teams.

If teachers have a sufficient level of practical skills and knowledge to use and maintain machines, educational equipment could be well maintained with minimum repair cost. Since only teachers with industrial experience can satisfy these requirements, full utilization of the people from the industrial sector is recommended as part-time teachers. Although technical education institutions, especially those located in urban areas, are

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currently using part-time teachers from the industrial sector, this scheme should be expanded much more so that students can have hands-on knowledge of new technologies.

The following steps should be taken in implementing reform within the TVET system:

- Provide appropriate personnel within the current system with relevant industry skills upgrading, instructor upgrading and training in CBT, and training package design and delivery
- Attract personnel from industries with appropriate experience in the required areas and hire them with contracts that encourage bonus incentives. These “new teachers” will have to undertake a Train-the Trainer course such as the Certificate in Assessment and Workplace Training course;
- Offer this Train-the Trainer course to selected trainers and supervisors in the industries. These trainers/evaluators will be directly involved in the delivery of selected modules within Training Packages.
- Determine pay scales according to allocated roles in the new delivery process and enable these scales to be individually negotiated.

In this connection, the following strategies are proposed to improve the quality of teachers in technical education, particularly Polytechnics:

- The teachers’ wages should be competitive with those in the private sector, since teachers for technical education can easily find jobs in the private sector because of their practical skills.
- Teachers can be grouped into three categories by their career development process: 1) full-time teachers with mainly academic backgrounds, 2) full-time teachers with industrial experience and 3) part-time teachers sourced from companies. At present, the majority of the teachers are Group 1 and some teachers are from Group 3. Introduction of an attractive salary plan can make recruitment of Group 2 and 3 possible, and consequently technical education institutions will be able to strengthen their capacity through updated and practical skills and knowledge.
- Industrial connections have to be strengthened for: 1) use of their employees as part-time teachers, 2) improvement of training packages which have to be continuously updated by industrial needs, 3) joint use of their equipment and training facilities for certain course modules, 4) industrial attachment for students and teachers and 5) income generation by subcontracting jobs from industries.
- Besides the attractive salary scheme, teachers have to be motivated by participating in various activities generated within the technical education sub-sector such as instruction for short courses, tutorials for distance education, development of teaching materials in textbook form, production of manuscripts for broadcasting, audio tape, video tape and CD-ROM. These activities can also provide financial incentives.
- Technical education institutions have to provide teachers with training for upgrading their skills and knowledge in order to catch up with the continuously changing industrial environment by means of industrial attachments, in-service training by seminar/workshop, overseas training, etc.

- University College of Education of Winneba (UCEW) should develop short-term courses to instruct teaching skills and know-how for part-time teachers from the industrial sector. The courses should focus on instruction of practical teaching skills, including communication skills, presentation skills, syllabus development, teaching material development, computer skills, educational psychologies and so on. In addition, by strengthening a cooperative scheme with the industrial sector, UCEW should play a central role in re-training technical teachers by means of exchange programs, such as provision of industrial attachments for teachers and conduct of workshops inviting engineers from companies to lead them.

#### 8.3.4 Teaching Materials Development

One of the critical issues in the technical education in Ghana is the lack of teaching materials, including textbooks, workbooks and audiovisual tapes. There are very limited resources to develop appropriate teaching materials due to lack of labor and facilities. Imported textbooks are quite expensive<sup>60</sup>, and they are not affordable for most of the teachers and students in Polytechnics. Therefore, students have to spend time taking notes all the time in the classroom, which tends to be a more inefficient way of learning. Audiovisual tapes are not used in Polytechnics, although they are useful tools, especially in the TVET sector. Taking this condition into account, it is important to strengthen the capacity for developing teaching materials. For this reason, The Study Team proposed development of teaching materials as one of the priorities in improving the TVET sector and the Polytechnics.

There are several ways to develop teaching materials: 1) Ghanaian textbooks developed in Ghana, 2) import of foreign textbooks, and 3) revision of foreign textbooks with adjustment to meet Ghanaian needs. Teaching materials for CBT courses have already been developed in several countries such as Canada, Australia and Singapore, and it is therefore reasonable to use these materials in Ghana.<sup>61</sup> As for the development of audiovisual video, a huge stock of teaching materials is already available in developed countries. Therefore, it is recommended to purchase them and edit them to fit the Ghanaian context.

The development processes of textbooks/workbooks and audiovisual tapes are illustrated in Figure 8.3.3.

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<sup>60</sup> The average cost of foreign textbooks is a range from US\$30 to US\$50.

<sup>61</sup> Under agreement among member countries of Commonwealth of Learning, International organization for English speaking countries to promote distance-learning by sharing intellectual assets of teaching materials, a royalty payment can be minimized.

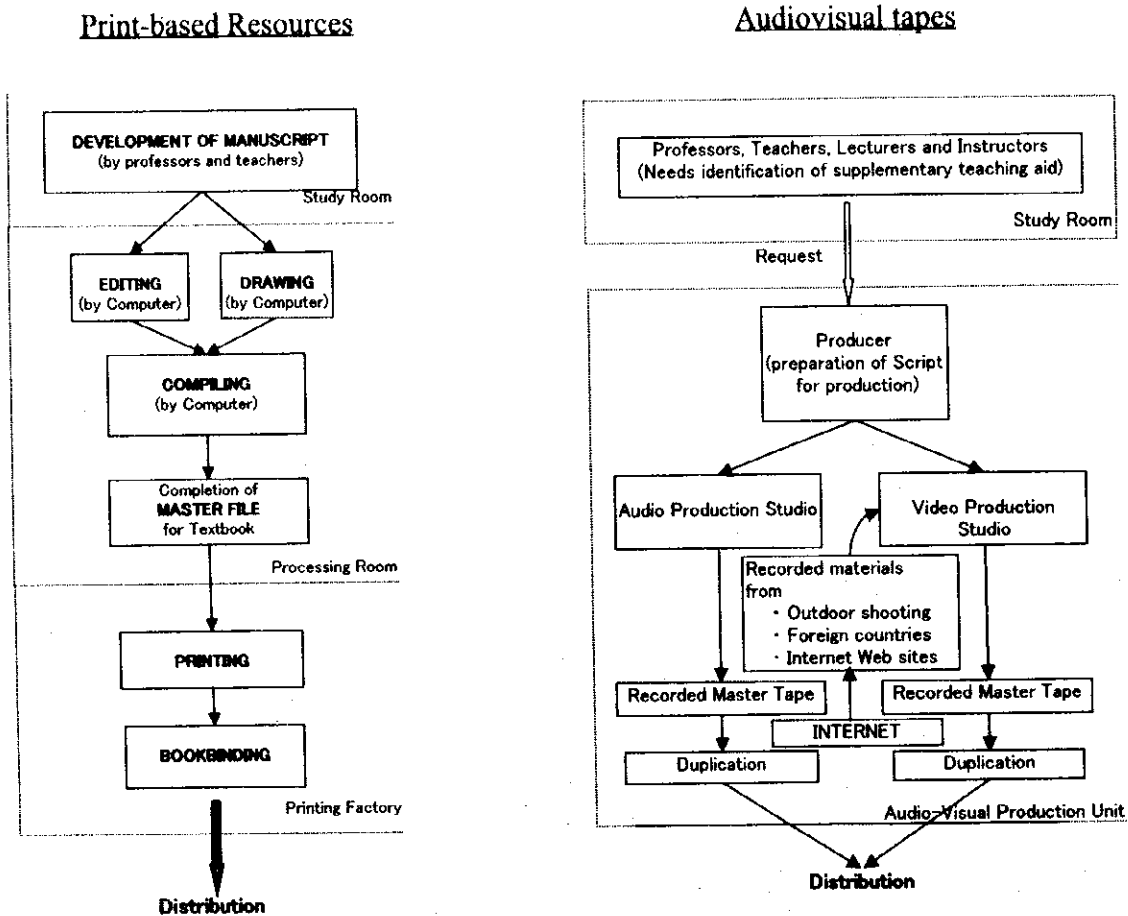


Figure 8.3.3 Development process of teaching materials

## 8.4 Institutional Development Strategies for Pilot Programs

The following section represents the Study Team's recommendation in respect to the measures that should be taken to prepare the Polytechnics to introduce the pilot programs.

### 8.4.1 Considerations of Alternatives in Polytechnics

Each Polytechnic has different characteristics and different institutional capacities. In locations where industry is very sparse, some modifications to the programs will be necessary. The following range of alternatives should be considered:

- 1) The Polytechnics only teach the core modules and other selected modules they have the capacity to deliver. Assessment criteria will determine this capacity. Students will receive certificates of achievement. Depending on the particular industry this may be sufficient for employment. For students to complete full qualifications it would be necessary for them to transfer to larger centers and complete the remaining modules at Polytechnics. In other words, Polytechnics with limited industry training places act as stepping stones for more central Polytechnics with better resources.
- 2) Clear articulation policies should be developed in order for modules delivered by the CBT approach to be accommodated within the existing HND programs. This will necessitate restructuring the current approaches to student evaluation so that these two systems can be merged.
- 3) There are many industrial attachment opportunities in the informal sector. For example, in Hospitality and Tourism, it is not necessary to be trained in a four star hotel. Local Chop Bars (small eating houses in Ghana), for example, can offer a wide range of work experiences. As in any industrial placement, Polytechnic staff would need to ensure the safety of the students. A change of attitude by both student and staff would be necessary to facilitate this change. An approach such as this would provide an opportunity for Polytechnics to instigate change and contribute to the upgrading of local industries in the informal sector.
- 4) Polytechnics will need to consider alternative approaches to timetabling of classes and industry attachments. Within the CBT approach, attachment to industry is a vital component. One way to achieve a more flexible approach would be to form small groups of students and stagger the industry attachment throughout the year. For example, groups of 40 students could form 4 groups of 10 students. Each group would spend approximately 4 weeks in an industry placement (in an internship with a different industry). This would overcome the present problem of large numbers of students seeking industrial placements at the same time. Course delivery approaches would need to change to accommodate this initiative. The modular system of CBT is designed for this approach.

#### 8.4.2 Considerations of Each Pilot Program

##### (1) Information Technology and Communication at Accra Polytechnic

Similar/existing department	Computer Science Department
Student enrolment	2400 note the Computer Science course services all students on campus
Major industries & potential employers	Ghana Telecom, Accra-north Akuaba (Gh) Ltd. Accra Electricity Company of Ghana Provita Clinic, Tema Banks, Computer firms, Telephone companies

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Products and services offered by businesses	Electronic banking, servicing and laying of networking, phone connections, electricity provision, vehicle electronic servicing, desktop publishing, printing, food industry
Current teaching staff	4
Availability of suitable teaching staff for CBT	Nil
Major equipment available	Personal computers and printers
Major equipment required	Networking tools, scanners, and software packages, programming language software, computers
Major constraints	Inadequate staff numbers and expertise, poor remuneration to attract appropriate staff, lack of funding for software and hardware purchase, inadequate laboratory and lecture space, lack of technical support.

Accra Polytechnic is best suited to begin the introduction of CBT. It has already established links with industry and an enthusiastic IT staff. It currently delivers introductory IT courses to all students. Some short courses for external students are currently being run.

- It is suggested that Certificate Level 1 and 2 courses be introduced initially and Certificate 3 in three or four years.
- It would be necessary to upgrade the facilities and make firm links with industries.
- An international consultant in the area of IT and CBT teaching and learning should be engaged for 12 months assisting in the introduction and skills upgrading of the staff.
- Two selected persons in the Information Technology (IT) staff should be offered international training in CBT and IT skills upgrading.
- All IT staff should be offered enrolment in a Train-the-Trainer course
- 3 part-time industry trainers should be recruited and offered the above course.
- 4 industry assessors should be trained.

(2) Manufacturing Technology at Kumasi

Similar/existing department	Manufacturing Technology
Student enrolment	50 per year
Major industries & potential employers	Ashanti Goldfields Co. (AGC) Obuasi VALCO Tema Suame Foundry Kumasi Logs and Timber Ltd. Kumasi Ghana Breweries Ltd. Toyota Ghana Company Ltd. Atu Engineering Works, Suame Kumasi Engineering Co. Ltd. Kumasi Breweries, Foundries, Sawmills Enterprise of Appropriate Technology Suame Magazine Kumasi
Products and services offered by businesses	Manufacturing of machine parts, servicing machines, product quality control, production planning and control
Current teaching staff	8
Availability of suitable teaching staff for CBT	Nil
Major equipment available	Lathe machines, drilling machines (radial), universal-milling machines (horizontal & vertical)
Major equipment required	Lathe machines and accessories, instrumentation for measurement
Major constraints	Lack of technical support, inadequate or obsolete machines, inadequate workshop space.

Kumasi Polytechnic is suited to be the second pilot program. It has already established links with industry both in the formal and non-formal areas. There is a core of enthusiastic industry leaders from the non-formal sector who want to be involved. Students and staff would need to rethink industry placement to accept work experience in the non-formal sector.

- It is suggested that Certificate Level 1, 2 and 3 courses be introduced initially and Certificate 4 introduced when the capacity of the Polytechnic is reached.
- It would be necessary to upgrade the facilities and make firm links with industry.
- An international consultant in the area of Manufacturing Technology and CBT teaching and learning should be engaged for 12 months assisting in the introduction and skills upgrading of the staff.
- A networking arrangement needs to be formed between Kumasi Polytechnic and the staff engaged in the introduction of CBT at Accra Polytechnic.
- Two selected members of the Manufacturing Technology staff should be offered international training in CBT and Manufacturing skills upgrading.
- All Manufacturing Technology staff should be offered enrolment in a Train-the-Trainer course
- 3 part-time industry trainers should be recruited and offered the above course.
- 4 industry assessors should be trained.

(3) Wood Processing Technology at Takoradi Polytechnic

Similar/existing department	Furniture Design and Carpentry
Student enrolment	110 per year approximately
Major industries & potential employers	Scanstyle Furniture, Mim Portal Ltd. Takoradi BMK Particle Board Ltd. Takoradi Akuba Ltd. Accra West African Co. Ltd. Takoradi Dupaul Wood Treatment Ghana Prime Wood Ltd. Intex, Samatex PAS Timbers Ltd. John Bitar Ltd.
Products and services offered by businesses	Furniture fully assembled, furniture knock down, structural members for building construction, export quality wood products – saw milling, particle board manufacturing, veneers.
Current teaching staff	7
Availability of suitable teaching staff for CBT	Inadequate expertise in most areas except science & properties of wood



Major equipment available	Thicknesser, surface planer, circular, dimension, band and radial-arm saws, universal machine saw sharpener, airless spraying machine, sewing machine, jig saw.
Major equipment required	Computers, kiln dryers, dust extractors, air spraying machines, band saw welding, industrial sewing machines for leather, laboratory equipment for wood strength testing and moisture content.
Major constraints	Inadequate number of trained staff, poor remuneration of staff, absence of local training institutions for staff upgrading, difficulty in placing students in industry for practical attachment, inadequate equipment and lack of funds for acquisition of training materials.

Takaradi Polytechnic should be the third Polytechnic to introduce CBT. It has already established some links with industry and an enthusiastic Wood Technology staff.

- It is suggested that Certificate Level 1 and 2 courses be introduced initially and Certificate 3 courses in three or four years.
- It would be necessary to upgrade the facilities and strengthen links with industry.
- An international consultant in the area of Wood Technology and Processing and CBT teaching and learning should be engaged for 12 months assisting in the introduction and skills upgrading of the staff.
- Two selected Wood Technology staff should be offered international training in CBT and Wood Processing skills upgrading.
- All Wood Technology staff should be offered a Train-the-Trainer course
- 3 part-time industry trainers should be recruited and offered the above course.
- 4 industry assessors should be trained.

**(4) Post Harvest and Food Processing at Tamale Polytechnic**

Similar/existing department	Agricultural Engineering Department
Student enrolment	60 students per year
Major industries & potential employers	Ghana Cotton Co. Ltd. BOSBEL Vegetable Oil Mills Ejura Farms, Ejura Tamale Polytechnic NULUX Plantation Savannah Agric Research Institute, ITTU UNILEVER Ghana Ministry of Food and Agriculture

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	Hydrological Services Dept. Nestle Ghana Ltd. NASIA Rice Co. Ltd. Agriculture & Rural Dev. Mechanical Lloyd Co. Ltd. Kpong farms Non Governmental Organizations
Products and services offered by businesses	Extensions services to rural farmers, crop processing & storage, packaging, grading cotton, processed vegetable oil, milled rice, processed maize, fabrication & manufacturing of equipment parts, research services, crop production & storage, soil science, animal production, teaching.
Current teaching staff	18
Availability of suitable teaching staff for CBT	10 teachers available but all need skills upgrading
Major equipment available	-
Major equipment required	Computers, tractors, spraying machines, seeder/seed drills, manure & fertilizer distributors, engine valve calibrators, welding plant, lathe & milling machines, pressure gauges, air compressors, metro, infiltro & moisture meters, photocopier & duplicating machines, one pass milling machines, juice extraction, paddy cleaner, rice grading machines, boiler, current meter, evaporation pans, metrological station, duster & blowers, chemicals, electronic balance, thermometers, dryers, freezers, grinding machines, micrometers, volumetric apparatus, audio visual equipment, air conditioners workshop tools, taps & dies, sieves, harvesting & processing equipment.
Major constraints	Lack of teaching aids, poor remuneration for staff, lack of professional development, tools, laboratories, workshop, computers, transport for field trips, photocopiers, drawing equipment, cameras, OHP projectors.

Tamale Polytechnic is quite isolated and the introduction of CBT should be delayed. It has established limited links with industries in the region. It would be necessary for students to find alternative industry attachments outside Tamale in order to complete a qualification.

- It is suggested that Certificate Level 1 and 2 courses be introduced initially. Certificate 3 can be introduced when the capacity of the Polytechnic to deliver is reached.
- It would be necessary to upgrade the facilities and strengthen links with both the formal and non-formal industrial sectors.
- An international consultant in the areas of Post Harvest and Food Processing and CBT teaching and learning should be engaged for 12 months assisting in the introduction and skills upgrading of the staff.
- Two selected staff, one from each area of Post Harvest and Food Processing, should be offered international training in CBT and skills upgrading.
- All Post Harvest and Food Processing staff should be offered enrolment in a Train-the-Trainer course
- 3 part-time industry trainers should be recruited and offered the above-mentioned course.
- 4 industry assessors should be trained.

(5) Post Harvest and Food Processing at Ho Polytechnic

Similar/existing department	Agricultural Engineering Department and Hotel, Catering & Institutional Management
Student enrolment	35 students per year in both areas
Major industries & potential employers	Ministry of Food & Agriculture Aveyime Rice Project Afiye Irrigation Project Ghana Education Service DANIDA – Community Water & Sanitation Division GHAFCO Nkalenu Ind. ASTEK Nestle Major farms, food processing companies Major hotels, restaurants, resorts
Products and services offered by businesses	Potable water, drilling bore holes, irrigation services, food processing & packaging, food production
Current teaching staff	19

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Availability of suitable teaching staff for CBT	9 however all a need Professional Development
Major equipment currently available	Tractor, lathe / shaping / grinding/ drilling machines, hydraulic press, forage harvester, boom spraying machine, deep freezers & refrigerators, cookers, ovens.
Major equipment required	Computers, tractors, spraying machines, seeder/seed drills, manure & fertilizer distributors, moisture meters, one pass milling machines, juice extraction, paddy cleaner, rice grading machines, ovens (normal & micro wave), duster & blowers, electronic balance, dryers, harvesting & processing equipment.
Major constraints	Inadequate equipment & funds for training materials, lack of industries to take students for industrial attachment, poor staff conditions, lack of relevant reference books and journals.

Ho Polytechnic, like Tamale, has limited industry placement opportunities, and the introduction of CBT should be delayed. It would be necessary for students to find alternative industry attachments outside Ho in order to complete a qualification.

- It is suggested that Certificate Level 1 and 2 courses be introduced initially and then Certificate 3 when the capacity of the Polytechnic to deliver is reached.
- It would be necessary to upgrade the facilities and strengthen links with both the formal and non-formal sectors of industry.
- An international consultant in the area of Post Harvest and Food Processing and CBT teaching and learning should be engaged for 12 months assisting in the introduction and skills upgrading of the staff.
- Two selected staff members, one from each area of Post Harvest and Food Processing, should be offered international training in CBT and skills upgrading.
- All Post Harvest and Food Processing staff should be offered enrolment in a Train-the-Trainer course.
- 3 part-time industry trainers should be recruited and offered the above course.
- 4 industry assessors should be trained.

(6) Hospitality and Tourism at Cape Coast Polytechnic

Similar/existing department	Catering and Tourism Departments
Student enrolment	50 students per year in Catering and 100 students in Tourism
Major industries & potential employers	Hotels CEDECOM Airlines Ghana Tourist Board Resorts Transportation Tour Agencies Teaching
Products and services offered by businesses	Room & catering service, front office operations, event & recreation management, tour operation, hotel auditing, ticketing, tour development & planning, sales presentation, accommodation counseling.
Teaching staff	10
Availability of suitable teaching staff for CBT	Nil Inadequate number and level of expertise
Major equipment currently available	Deep freezers, refrigerators, vacuum cleaners, cookers.
Major equipment required	Training establishment, cookers, deep freezers, refrigerators, dishwashers, vacuum cleaners, carpet cleaners, OHP, video camera/recorder, computers textbooks and journals.
Major constraints	Lack of teaching space & office space, lack of teaching equipment, lack of staff expertise.

Cape Coast Polytechnic is situated in a region with tourist attractions and should be capable of introducing the CBT courses. However, the Polytechnic has established links with limited industries in the region. It would be necessary for students to find alternative industry attachments in both the formal and non-formal sectors, both locally and outside Cape Coast, in order to complete a qualification.

- It is suggested that Certificate Level 1, 2 and 3 courses be introduced initially and Certificate 3 be introduced when the capacity of the Polytechnic to deliver is reached.
- It would be necessary to upgrade the facilities and make firm links with both the formal and non-formal sectors of industry.
- An international consultant in the area of Hospitality & Tourism and CBT teaching and learning should be engaged for 12 months assisting in the introduction and skills upgrading of the staff.
- Two selected staff, one from each area of Hospitality & Tourism, should be offered international training in CBT and skills upgrading
- All Hospitality & Tourism staff should be offered a Train-the-Trainer course.
- 3 part-time industry trainers should be recruited and offered the above-mentioned course.
- 4 industry assessors should be trained.

(7) Hospitality and Tourism at Sunyani Polytechnic

Similar/existing department	Hotel Catering & Institutional Management
Student enrolment	27 students per year
Major industries & potential employers	Ghana Education Service Ghana Tourist Board (Regional Office) District assemblies Social Welfare –Women’s Training Institute Eusbett Hotel Tropical Hotel Tata Restaurant Vision Hotel Dymns Hotel Tourist Centers Kintampo Water Falls Fura Water Falls Monkey Sactury Grotto
Products and services offered by businesses	Hotel accommodation services, food preparation, tourism

Current Teaching staff	11
Availability of suitable teaching staff for CBT	8 but there is a need for Professional Development
Major equipment currently available	Deep freezer, refrigerator, gas & electric cookers, ovens.
Major equipment required	Microwave ovens, food mixers, brat pans, food processors, dishwashers, blenders, sinks, pastry rollers, salamander, waste disposal units, trolleys, weighing machines, infra-red grills, vacuum cleaners, cold storage room, deep-fryers, combined scrubber/dryer, sinks
Major constraints	Lack of equipment & training facilities, inadequately trained staff

Sunyani Polytechnic is situated in a region that has a good potential for tourism but limited established industries. This will prove to be a difficulty for the introduction of CBT and for this reason it should be delayed. It has established links with a limited number of industries in the region. It would be necessary for students to find alternative industry attachments outside Sunyani in order to complete a qualification. A strong partnership should be made with Cape Coast Polytechnics that is introducing Hospitality and Tourism pilot programs.

- It is suggested that Certificate Level 1 and 2 courses be introduced initially and Certificate 3 be introduced when the capacity of the Polytechnic to deliver is reached.
- It would be necessary to upgrade the facilities and strengthen links with both the formal and non-formal sectors of industry.
- An international consultant in the area of Hospitality and Tourism and CBT teaching and learning should be engaged for 12 months assisting in the introduction and skills upgrading of the staff.
- Two selected staff members, one from each area of Hospitality and Tourism, should be offered international training in CBT and skills upgrading.
- All Hospitality and Tourism staff should be offered a Train-the-Trainer course.
- 3 part-time industry trainers should be recruited and offered the above-mentioned course.
- 4 industry assessors should be trained.

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(8) Business Information Technology at Korforidu Polytechnic

Similar/existing department	Business Information Technology
Student enrolment	Approx. 140 students per year
Major industries & potential employers	Banks Ghana Water Co. Ltd. Electricity Co. of Ghana District Assemblies New Juaben Municipal Assembly State Insurance Co. Public and Civil Service Ghana Education system
Products and services offered by businesses	Banking services, insurance services, provision of utility services, administrative and financial support services.
Current teaching staff	12
Availability of suitable teaching staff for CBT	Nil
Major equipment available	Limited computers, overhead projector, slide projector, photocopier, public address system.
Major equipment required	Accommodation, training materials, reference books.
Major constraints	Teaching accommodation, staff offices, lack of funds for training materials, inadequate expertise in staff, lack of journals and reference materials, poor conditions of service for staff, inability of local industry to provide practical experience.

Koforidua Polytechnic has a very limited number of local industries. For this reason, it has been suggested that this pilot program not be introduced until 2010.

- It is suggested that Certificate Level 1 and 2 courses be introduced and only the modules within the Polytechnics capacity be undertaken e.g. Core and some sector options.
- It would be necessary to upgrade the facilities and strengthen links with industries outside Koforidua and other Polytechnics.
- An international consultant in the area of Business IT and CBT teaching and learning should be engaged for 12 months assisting in the introduction and skills upgrading of the staff.



- Two selected Business staff should be offered international training in CBT Business and IT skills upgrading.
- All Business and IT staff should be offered enrolment in a Train-the-Trainer course.
- 3 part-time industry trainers should be recruited and offered the above course.
- 4 industry assessors should be trained.

## **8.5 Implementation Schedule**

As discussed in the previous chapters, one of the key recommendations is to introduce a demand-driven or a CBT approach into the TVET sector. The CBT approach would be introduced into Polytechnics first, and then it would be extended to other TVET institutions. The CBT approach is, however, new for Ghana, and there are several constraints to start the CBT approach, which include:

- 1) Lack of proper mechanisms in the public and private sectors to cooperate in strengthening the technical education sector.
- 2) Lack of financial schemes to support the technical education sector from outside Ministry of Education.
- 3) No human resources available to teach any subject in the technical education sector through the CBT approach.
- 4) Limited capabilities to develop textbooks and other teaching materials.

Taking into account these constraints, it is recommended that the CBT approach be introduced in Polytechnics by means of a phased approach. An overall implementation schedule is shown in Figure 8.5.1.

### **(1) Phase I (2001 to 2004): Initial Stage to introduce the CBT Approach**

In the initial stage, it is important for both the TVET and industrial sector to learn the concept and implementation process of the CBT approach. For this purpose, foreign experts who have experience with the CBT approach need to work with Ghanaian counterparts to prepare basic conditions as well as the institutional framework needed to start the CBT approach in Ghana. They should be institutional development, financial development, CBT resource development and textbook/workbook production experts, and they would work on the following items (see Chapter 9 for the details):

- Establishment of the Ghana National Training Authority (GHANTA) within the National Council of Tertiary Education (NCTE),
- Establishment of Industrial Training Advisory Boards (ITABs) with members from selected industrial areas,
- Establishment of a specific unit to produce teaching materials under NCTE, and
- Capacity building for all relevant organizations and activities above mentioned.

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With the preparation of these items, preliminary implementation of the CBT approach will become possible in the Phase II period.

(2) Phase II (2004 to 2007): Preparation Stage to start the Pilot Programs

The Phase II is a preparation stage to implement the CBT approach in selected courses in Polytechnics (a full implementation of the CBT approach in the pilot programs will begin in Phase III. The following items would be developed in the Phase II period:

- Use of textbooks and other teaching materials for common modules, that would teach better communication in workplace, better math skills, application of quality procedures, and so on,
- Establishment of a CBT Development Center that would function as a core facility to develop, demonstrate and disseminate the CBT approach, including training of managerial and teaching staff, and development of printing and audiovisual teaching materials for distance-learning programs,
- Establishment of a Council of Ministries, a provisional organization of GHANTA, to introduce a national qualification framework, and
- Recruiting foreign experts and overseas and domestic trainings for the staff who would teach in and manage pilot programs. (See Appendix 8.12 for the details.)

(3) Phase III (2007 to 2010): Operation of the Pilot Programs

In this Phase, the CBT approach will be operated in the pilot programs in Polytechnics. Activities needed in this phase are:

- Delivery of the CBT approach in the pilot programs in Polytechnics,
- Development of teaching materials on a full scale,
- Establishment of GHANTA and ITABs of all industrial sectors, and
- Overseas and domestic training for the staff who would teach in and manage pilot programs. (See Appendix 8.12 for the details.)

(4) Phase IV (2010 to 2013): Operation of Distance-learning in the Pilot Programs

Distance-learning programs, which will be introduced in this phase, will use the implementation of the CBT approach in pilot programs as their model.

(5) Phase V (2013 to 2020): Implementation of the CBT Approach in all TVET Sectors

A full range of distance-learning programs will be instituted in this Phase, based on the outcomes of Phase IV. All TVET providers, including public and private education and training institutions under all Ministries, will participate in the CBT approach, establishing a National Qualification Framework.

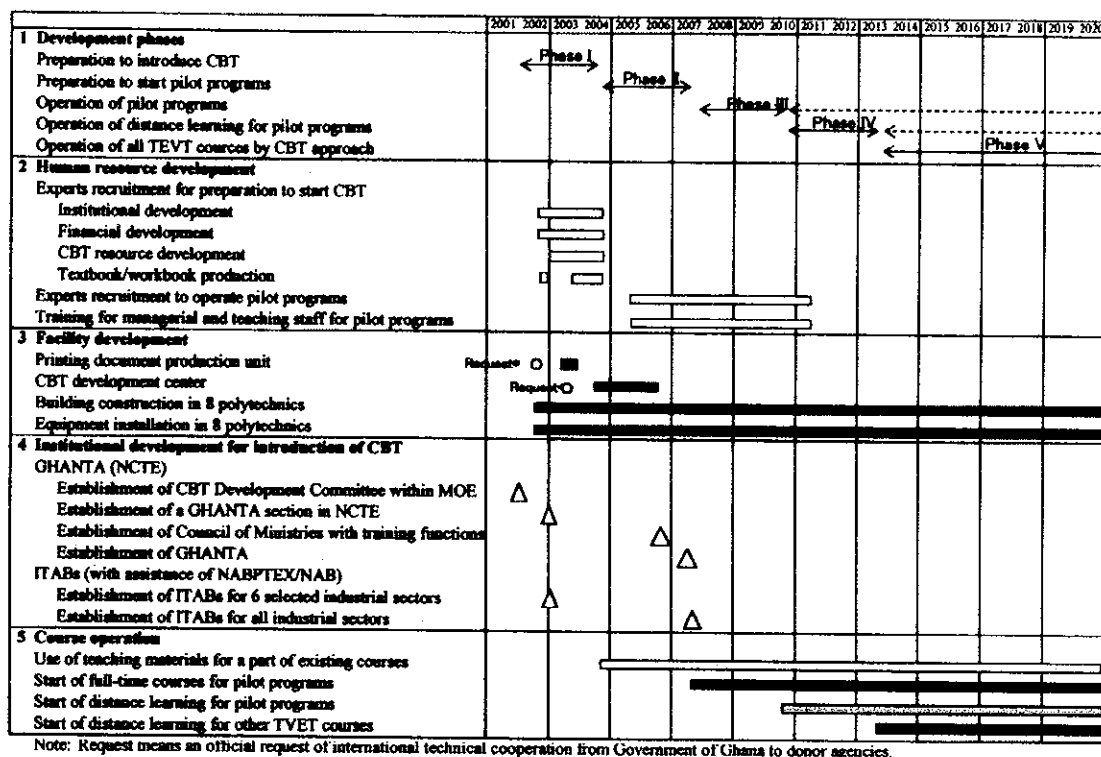


Figure 8.5.1 Overall implementation schedule

## 8.6 Budgetary Simulation

### 8.6.1 Methodology

The objective of the budgetary simulation is to examine the financial viability of implementing the TVET reform, with a focus on Polytechnics, in terms of government budget, tuition fee and education cost per student, and various other costs.

#### (1) Three Case Studies

The budgetary simulation was conducted in the following three cases:

- 1) Overall Polytechnic sub-sector: All ten Polytechnics would provide packaged, short and distance-learning courses in the existing departments and pilot programs.
- 2) Three pilot Polytechnics: Accra, Ho and Tamale Polytechnics were selected as pilot Polytechnics, and budgetary simulation was conducted assuming that the three Polytechnics would provide packaged, short and distance-learning courses in the existing departments and pilot programs.
- 3) Eight pilot programs in Polytechnics: The budgetary simulation was conducted for the pilot programs only, assuming that pilot programs in each Polytechnic would provide packaged, short and distance-learning courses.

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(2) Items of Financial Outflow and Inflow

Items of outflow

Outflow consists of 1) investment related costs and 2) operation and maintenance costs.

1) Investment related costs

- Facilities: Unit construction cost per student was estimated based on the data of construction costs of existing facilities in Polytechnics. The annual construction costs of facilities, including classroom, workshop and infrastructure, were estimated by multiplying future enrolment (see Appendix 8.9 for the details)
- Equipment: Unit equipment cost per student was calculated based on the existing cost of equipment in Polytechnics. For the pilot programs, equipment costs were estimated based on the analysis of similar programs in Japan (see Appendix 8.10 and Appendix 8.11 for the details)
- Training: The costs of human resource development include the cost of institutional development for the introduction of CBT, the cost of capacity building of managerial and teaching staff, and the cost of development of teaching materials (see Appendix 8.12 for the details).

2) Operation and maintenance costs

- Cost of building maintenance was estimated based on investment data in Polytechnics (see Appendix 8.9 for the details).
- Cost of equipment maintenance was estimated based on data of investments made on equipment (see Appendix 8.10 for the details).
- Cost of teaching personnel's salaries was estimated based on the current salary plan. It was recommended that the salary of teachers be competitive enough to attract people from the private sector (see Appendix 8.8 for the details).
- Cost of administrative personnel's salaries was estimated based on the current salary plan (see Appendix 8.8 for the details)
- Other non-personnel administrative costs, such as costs of transportation, utility, entertainment, etc. were estimated based on the Polytechnics' budget plans (see Appendix 8.8 for the details).

Items of inflow

- Equity: Equity includes costs of building, equipment, training and hiring of core personnel (see Appendix 8.8 for the details).
- Student fees: After holding discussions with the MOE, the Study Team estimated that the cost of the annual student fee for "packaged courses" would be US\$1,000 in 2007, and it would increase to US\$1,400 in 2020. This is based on a survey of tuitions for other training courses in Ghana (see Appendix 8.8 for the details).

(3) The Share of Enrolments in Packaged, Short, and Distance-learning Courses

The Study Team proposed that Polytechnics provide three types of courses, i.e., packaged courses, short courses and distance-learning courses. The following three options (Table 8.6.1) were taken into consideration for the purpose of budgetary simulation.

**Table 8.6.1 Three options of course provision in Polytechnics**

Case-1	Packaged courses only
Case-2	Packaged courses and Short courses
Case-3	Packaged courses, Short courses and Distance-learning

Table 8.6.2 shows the number of enrolments, unit education costs, and government support in each case. The following are major findings.

- The education cost per student is US\$1,063 in the case that Polytechnics provide all three courses. Other cases show higher education costs per student (US\$2,259 in the case providing packaged courses and US\$1,255 in the case providing packaged courses and short courses). The introduction of distance-learning courses is particularly useful in terms of financial consideration.
- The accumulated government budget needed for Polytechnics amounts to US\$377 million in the event that Polytechnics provide all three courses.

Accordingly, the budgetary simulation was conducted based on the assumption that the percentage shares of enrolments would be 55 percent in packaged courses, 31 percent in short courses, and 13 percent in distance-learning courses in 2020.

**Table 8.6.2 Comparative analysis among three options**

	Option 1 (Package only)		Option 2 (Package/Short)		Option 3 (Full set)	
Student numbers (1,000)						
Package						
Existing	659	67%	474	48%	434	44%
Pilot	324	33%	141	14%	108	11%
Short						
Existing	0	0%	245	25%	210	21%
Pilot	0	0%	123	13%	94	10%
DL						
Existing	0	0%	0	0%	54	5%
Pilot	0	0%	0	0%	82	8%
Total	983	100%	982	100%	983	100%
Unit education cost (US\$/student/year)	2,259		1,255		1,063	
Government support (Mil. US\$)	741		410		377	

8.6.2 Overall Polytechnic Sub-sector

(1) Analysis of Accumulated Cost and Revenue

The results of the accumulated cost and revenue from 2002 through 2020 are shown in Table 8.6.3 (see Appendix 8.13 for the details). The major findings are:

- In the accumulated enrolment of 983,000 students-year, existing courses have 644,000 students-year (66 percent), followed by 203,000 students-year in pilot programs (21 percent) and 136,000 students-year in distance-learning courses (14 percent).
- The accumulated cash outflow amounts to US\$1,044 million, which consists of personnel cost (32 percent), equipment (24 percent), building (21 percent) and others.
- The accumulated cash inflow of US\$1,044 million consists of student tuition fees (47 percent), government subsidy (36 percent), and other costs (17 percent). This means that the Polytechnics can derive 64 percent of the cash inflow from their own sources.
- The unit education costs per student are estimated to be US\$747 in existing courses, US\$2,500 in pilot program and US\$417 in distance-learning courses. The government subsidy in the unit education costs are US\$264 in existing courses, US\$929 in pilot programs and US\$139 in distance-learning courses. The average government subsidy per student will be US\$384 in 2020, compared to US\$421 in 1998.
- The unit education cost per student in pilot programs is relatively high, because of initial investment in building and equipment, as well as human resource development to train teachers and administrative staff.

**Table 8.6.3 Summary of the accumulated cost and revenue for 2002-2020**

	Existing		Pilot		DL		Total	
Students (1,000)	644	66%	203	21%	136	14%	983	100%
<b>Finance (Mil. US\$)</b>								
<b>Cash outflow</b>	<b>481</b>	<b>100%</b>	<b>507</b>	<b>100%</b>	<b>57</b>	<b>100%</b>	<b>1,044</b>	<b>100%</b>
Building	87	18%	134	26%	2	3%	223	21%
Equipment	88	18%	134	27%	31	54%	253	24%
Staff training	0	0%	24	5%	2	4%	26	3%
Personnel Cost	207	43%	119	23%	12	21%	338	32%
Others (*)	98	20%	96	19%	10	18%	205	20%
<b>Cash inflow</b>	<b>481</b>	<b>100%</b>	<b>507</b>	<b>100%</b>	<b>57</b>	<b>100%</b>	<b>1,044</b>	<b>100%</b>
Revenue	311	65%	319	63%	38	67%	667	64%
Student fee	248	52%	207	41%	37	65%	491	47%
Others (**)	62	13%	112	22%	1	2%	176	17%
Government support	170	35%	188	37%	19	33%	377	36%
<b>Unit education cost (US\$/student/year)</b>	<b>747</b>		<b>2,500</b>		<b>417</b>		<b>1,063</b>	
<b>Government support (US\$/student/year)</b>	<b>264</b>		<b>929</b>		<b>139</b>		<b>384</b>	

Note: (\*) Others in cash outflow include transportation, utilities and so on. For DL, only, learning materials and schooling are included.

(\*\*) Others in cash inflow is residual value of building.

## (2) Comparative Analysis of Financial Structure in 1998 and 2020

Table 8.6.4 shows a comparative analysis between 1998 and 2020 in terms of the percentage share of the government's total budget that went specifically to Polytechnics.

- In order to provide higher quality of technical education in Polytechnics, the unit education cost will increase by 2.9 times from US\$421 per student in 1998 to US\$1,202 per student in 2020.

- The enrolment in Polytechnics will increase by 7.5 times from 13,000 persons in 1998 to 97,300 persons in 2020. The total education cost needed for Polytechnics will increase significantly by 21.4 times from US\$5 million in 1998 to US\$117 million in 2020.
- By implementing a cost recovery policy, the actual government support for Polytechnics will be US\$34 million in 2020, which is 30 percent of the total cost.
- The percentage share of the budget allocated to Polytechnics in the total budget will increase from 0.34 percent in 1998 to 0.51 percent in 2020.

**Table 8.6.4 Summary of budgetary simulation for Polytechnics (Comparison between 1998 and 2020)**

		1998	2020	Annual growth rate (1998-2020)	Comparison between 1998 and 2020 (times)
<b>GDP</b>		(Mil. US\$) 7,501	30,985	6.7%	4.1
<b>Per capita GDP</b>		(US\$) 417	1,000	4.1%	2.4
<b>Population</b>		18,000,000	30,988,285	2.5%	1.7
<b>Enrolment</b>	University	32,000	86,306	4.6%	2.7
	Polytechnic	13,000	97,337	9.6%	7.5
	<b>Total</b>	<b>45,000</b>	<b>183,643</b>	<b>6.6%</b>	<b>4.1</b>
<b>Tertiary students per 100,000 inhabitants*</b>		250	593	4.0%	2.4
<b>Unit education cost of Polytechnic</b>		(US\$/student/year) 421	1,202	4.9%	2.9
<b>Total education cost for Polytechnic</b>		(Mil. US\$/year) 5	117	14.9%	21.4
<b>Total government budget for polytechnic</b>		(Mil. US\$/year) 5	34	8.6%	6.2
<b>Total government budget</b>		(Mil. US\$/year) 1,600	6,609	6.7%	4.1
<b>Budget share of Polytechnic</b>		(%) 0.34%	0.51%	1.8%	1.5

Note: Number of tertiary student per 100,000 inhabitants in 2020 in Ghana is planned based on Scenario 2.

### (3) Sensitivity Analysis for Tuition Fee

The tuition fee is the most critical factor for effective operation of Polytechnics. For this reason, a sensitivity analysis was conducted by using coefficients ranging from 0.25 points to 2.00 points of the original tuition fees. Table 8.6.5 shows the results of the sensitivity analysis and it has been interpreted as follows:

- When the tuition fee is assumed to be one-fourth (0.25 times) of the original fees, the accumulated government support needed from 2002 through 2020 would reach US\$746 million.
- When the tuition fee is assumed to be about 1.5 times more than the original fees, all the costs needed through 2020 would be covered by those of tuition fees.
- The sensitivity analysis indicates that if the government does not collect appropriate tuition fees from students, a significant amount of government subsidy would be needed for improvement of Polytechnics.

**Table 8.6.5 Sensitivity analysis in terms of tuition fee level**

Indicators		Ratio of basic tuition fee to the proposed tuition fee scale*							
		0.25	0.50	0.75	1.00	1.25	1.50	1.75	2.00
<b>Accumulated financial figures from 2002 to 2020</b>									
Accumulated government support **	(Mil. US\$)	746	623	500	377	254	132	9	(114)
Government support **	(US\$/student/year)	759	634	509	384	259	134	9	(116)
Self-financing ratio	(%)	29%	40%	52%	64%	76%	87%	99%	111%
<b>Financial figures in 2020</b>									
Total government budget for polytechnic **	(Mil. US\$/year)	96	75	55	34	13	(8)	(29)	(49)
Budget share of polytechnics to the government budget	(%)	1.46%	1.14%	0.83%	0.51%	0.20%	-0.12%	-0.43%	-0.75%

Note: \* Ratio in case of 0.5 means tuition fee level for all training become half.

Note: \*\* Negative figures mean surplus or profit.

### 8.6.3 Three Pilot Polytechnics

#### (1) Assumptions

The budgetary simulation of pilot Polytechnics was conducted by using the following assumptions:

- Considering characteristics of Polytechnics, percentage shares of part-time teachers are assumed to be 25 percent at Accra Polytechnic, 50 percent at Ho Polytechnic, and 75 percent at Tamale Polytechnic. This is assuming that Tamale Polytechnic has more difficulty recruiting full-time teachers than Accra and Ho Polytechnics, and so it has to recruit more part-time teachers.
- Other cost items, such as salaries for full-time staff, building, equipment, utilities, maintenance, are the same among pilot Polytechnics.
- Tuition fees are identical in all three pilot Polytechnics.

#### (2) Analysis

A comparison of budgetary simulation among three pilot Polytechnics is shown in Table 8.6.6 (see Appendix 8.14 for the details). The major findings are as follows:

- The accumulated enrolments from 2002 through 2020 would be 171,000 students-year at Accra Polytechnic, 117,000 students-year at Ho Polytechnic, and 62,000 students-year at Tamale Polytechnic.
- Tamale Polytechnic shows the highest unit education cost. This is because Tamale Polytechnic has a relatively smaller enrolment, which means higher education costs, when compared to Accra and Ho Polytechnics.
- Furthermore, Tamale Polytechnic needs to recruit more part-time teachers, which causes an increase in unit education costs.
- The ratio of the government support in the cost of the entire operation in Tamale Polytechnic is the highest among the three pilot Polytechnics.



**Table 8.6.6 Comparison of budgetary simulation among three pilot Polytechnics**

		Accra	Ho	Tamale
<b>Accumulated enrolment from 2002 to 2020</b>				
Existing courses	(1,000 student-year)	126	78	33
Pilot Programs	(1,000 student-year)	24	23	18
Distance learning	(1,000 student-year)	20	16	10
<b>Total</b>	<b>(1,000 student-year)</b>	<b>171</b>	<b>117</b>	<b>62</b>
<b>Unit education cost</b>				
Existing courses	(US\$/student/year)	737	794	960
Pilot Programs	(US\$/student/year)	2,458	2,502	2,879
Distance learning	(US\$/student/year)	421	426	471
<b>Total</b>	<b>(US\$/student/year)</b>	<b>943</b>	<b>1,078</b>	<b>1,454</b>
<b>Government support</b>	<b>(%)</b>	<b>36%</b>	<b>37%</b>	<b>46%</b>

#### 8.6.4 Pilot Programs at Polytechnics

Table 8.6.7 shows the results of budgetary simulation of the pilot programs. The major findings are summarized as follows:

- The accumulated enrolments in the pilot programs amount to 285,000 students-year during the period from 2007 to 2020. The enrolments in packaged courses and short courses are 203,000 students-year (71 percent) and the enrolments in distance-learning courses are 82,000 students-year (29 percent).
- The accumulated cash outflow throughout the period is estimated at US\$541 million, in which equipment cost occupies the highest share of US\$153 million (28 percent), followed by building cost of US\$135 million (25 percent), personnel cost of US\$126 million (23 percent), and staff training cost of US\$25 million (5 percent).
- The accumulated cash inflow of US\$541 million consists of student fees of US\$229 million (42 percent), government support of US\$199 million (37 percent) and others
- The unit education costs in the pilot program are US\$2,500 per student in packaged and short courses and US\$413 per student in distance-learning courses, in which government subsidy comprises US\$929 per student in packaged and short courses and US\$135 per student in distance-learning courses.
- The average government support in the pilot programs is estimated at US\$ 699 per student, which is more than 50 percent higher than the support of US\$ 421 per student in 1998.

When we look at the results of the budgetary simulation in terms of the implementation schedule (see section 8.5), major findings are summarized as follows:

- The accumulated enrolments in the pilot programs are 4,000 students-year in Phase III (2007-2010), 26,000 students-year in Phase IV (2010-2013), and 255,000 students-year in Phase V (2013-2020). Nearly 90 percent of the total enrolments in the pilot programs will take place after 2013.

- The accumulated cash outflow is US\$40 million in Phase III, US\$86 million in Phase IV, and US\$414 million in Phase V.
- The percentage share of student fees in the total cash inflow is estimated to increase from 11 percent in Phase III to 25 percent in Phase IV and to 49 percent in Phase V. The percentage share of government subsidy in total cash inflow, on the other hand, is estimated to decrease from 89 percent in Phase III to 75 percent in Phase IV and to 24 percent in Phase V.
- The unit education costs per student are different in each phase. It is estimated at US\$9,644 per student in Phase III, US\$3,372 per student in Phase IV, and US\$1,623 per student in Phase V. The unit education cost per student is the highest during Phase III period because of initial investments on building, equipment and training.

**Table 8.6.7 Summary of accumulated financial simulation for pilot programs by phases**

	Phase 1 (Upto 2010)			Phase 2 (2010 to 2013)			Phase 3 (2013 to 2020)			Total		
	Pilot (Pkg+Sht)	DL (Pilot)	Pilot Total	Pilot (Pkg+Sht)	DL (Pilot)	Pilot Total	Pilot (Pkg+Sht)	DL (Pilot)	Pilot Total	Pilot (Pkg+Sht)	DL (Pilot)	Pilot Total
Students (1,000)	4	0	4	21	4	26	177	78	255	203	82	285
Finance (Mil. US\$)												
Cash outflow	32	8	40	85	1	86	389	25	414	507	34	541
Building	8	1	8	26	0	26	100	0	101	134	1	135
Equipment	11	5	16	35	1	35	89	13	101	134	18	153
Staff training	9	1	11	4	0	4	10	0	10	24	1	25
Personnel Cost	2	0	3	11	1	12	105	6	111	119	7	126
Others (*)	2	0	2	9	0	10	85	6	91	96	6	102
Cash inflow	32	8	40	85	1	86	389	25	414	507	34	541
Revenue	4	0	4	21	1	22	293	22	315	319	23	341
Student fee	4	0	4	21	1	22	181	21	203	207	22	229
Others (**)	0	0	0	0	0	0	112	1	113	112	1	113
Government support	28	8	36	64	1	65	96	3	99	188	11	199
Unit education cost (US\$/student/year)	7,821		9,644	4,019	308	3,372	2,195	322	1,623	2,500	413	1,897
Government support (US\$/student/year)	6,794		8,617	3,023	125	2,518	542	39	388	929	135	699

(Share Percentage)

	Phase 1 (Upto 2010)			Phase 2 (2010 to 2013)			Phase 3 (2013 to 2020)			Total		
	Pilot (Pkg+Sht)	DL (Pilot)	Pilot Total	Pilot (Pkg+Sht)	DL (Pilot)	Pilot Total	Pilot (Pkg+Sht)	DL (Pilot)	Pilot Total	Pilot (Pkg+Sht)	DL (Pilot)	Pilot Total
Students (1,000)	100%	0%	100%	83%	17%	100%	69%	31%	100%	71%	29%	100%
Finance (Mil. US\$)												
Cash outflow	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Building	23%	8%	20%	30%	4%	30%	26%	2%	24%	26%	3%	25%
Equipment	35%	68%	41%	41%	42%	41%	23%	50%	24%	27%	54%	28%
Staff training	29%	20%	27%	5%	0%	5%	3%	0%	3%	5%	4%	5%
Personnel Cost	7%	4%	7%	13%	39%	14%	27%	25%	27%	23%	21%	23%
Others (*)	6%	0%	5%	11%	14%	11%	22%	23%	22%	19%	18%	19%
Cash inflow	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Revenue	13%	0%	11%	25%	60%	25%	75%	88%	76%	63%	67%	63%
Student fee	13%	0%	11%	25%	60%	25%	47%	85%	49%	41%	65%	42%
Others (**)	0%	0%	0%	0%	0%	0%	29%	3%	27%	22%	2%	21%
Government support	87%	100%	89%	75%	40%	75%	25%	12%	24%	37%	33%	37%

Note: (\*) Others in cash outflow include transportation, utilities and so on. For DL, only, learning materials and schooling are included.  
 (\*\*) Others in cash inflow is residual value of building

## 8.7 Economic Analysis

The main purpose of the economic analysis is to examine the effects of the TVET reform focusing on Polytechnics, considering how these will contribute to a national economy. The Economic Internal Rate of Return (EIRR) is used in order to estimate an economic return on investment and to assess the economic viability of the reform projects. (See Appendix 8.15 for the details)

EIRRs are calculated for the following four cases:

- 1) Accra Polytechnic
- 2) Ho Polytechnic
- 3) Tamale Polytechnic
- 4) Pilot Programs at eight Polytechnics

#### 8.7.1 Constraints of Analysis

The followings are constraints in conducting the economic analysis for the projects in the education sector:

- Demand of the labor market changes all the time, depending on the economic situation, which makes it difficult to forecast student enrolment in terms of capacities and majors.
- Changes of industrial demand affect course contents and educational equipment, which make complicates cost estimation of equipment.
- Students' preferences in terms of packaged courses, short courses and distance-learning courses also fluctuate by social and economic conditions in the country.
- Economic benefit is measured on the basis of an accumulated productivity gap between Polytechnic graduates and those who leave schools after the second cycle. In other words, added value by learning in Polytechnics is considered an economic benefit, which is measured in terms of an income gap. However, since the income level depends on individual work performance, this can also be a constraint in measuring economic benefit.
- In addition, there are other economic benefits to be derived from producing good Polytechnic graduates, such as business expansion, job creation, and productivity improvement by technology transfer to other workers. These by-products, however, cannot be estimated in monetary terms and thus these possible economic benefits are not included in this economic analysis.

Recognizing these constraints and uncertainties in conducting the economic analysis, various approaches were taken to estimate costs and benefits from various statistical analyses and interview surveys, as explained in Appendix 8.15.

#### 8.7.2 Cost Benefit Analysis

##### (1) Scope of Economic Analysis

The scope of the economic analysis for the three pilot Polytechnics, namely Accra, Ho and Tamale, includes the aggregation of existing departments (packaged and short courses), pilot program (packaged and short courses) and distance-learning (existing departments and pilot programs).

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The scope of the economic analysis for pilot programs in eight Polytechnics includes all pilot programs (packaged, short and distance-learning).

## (2) Major Assumptions

The major assumptions are summarized as follows:

- The cost estimation is calculated based on 18 years, from 2002 to 2020, assuming that graduates contribute to the national economy for 20 years based on their training in Polytechnics (the benefit is calculated by 2039).
- All graduates start working in Ghana shortly after graduation.
- Once students complete any courses in Polytechnics, no students come back to Polytechnics to study.
- Economic costs for all items are estimated by multiplying financial costs by an estimated conversion factor of 0.85.
- Economic benefit is estimated by calculating a gap between the estimated average income of Polytechnic graduates and that of the second cycle graduates, then by deducting their opportunity cost during their schooling period in Polytechnics.
- No price escalation is considered.
- All investments are done by the government.
- Other assumptions are identical to the budgetary simulation in section 8.5.

Definition of economic cost and benefit and estimation of economic benefit are described in greater detail in Appendix 8.15.

## (3) Results of Economic Analysis

The EIRRs of each model are summarized in Table 8.7.1, which can be interpreted in the following way:

- Economic analyses in all cases result in high EIRRs, ranging from 22.2 percent to 26.0 percent, which indicates that this project is feasible from an economic viewpoint. This is because graduates from Polytechnics earn higher incomes than graduates from the second cycle.
- The EIRR of pilot programs in eight Polytechnics is the lowest among others due to the highest initial investment cost in building, equipment and human resource development, as well as their operation and maintenance cost.
- The EIRR of Tamale Polytechnic is the lowest among three pilot Polytechnics. This is caused by higher cost for teaching personnel because of an assumption that Tamale Polytechnic has to recruit more part-time teachers from other regions.

**Table 8.7.1 Summary of the estimated EIRRs**

(%)

	Pilot Polytechnic: Accra	Pilot Polytechnic: Ho	Pilot Polytechnic: Tamale	Pilot programs in eight Polytechnics
EIRR	26.0%	25.3%	23.5%	22.2%

Source: Estimated by JICA Study Team

### 8.7.3 Qualitative Effect

Several qualitative effects are expected to arise from the implementation of these priority projects in the Polytechnics. Development of pilot programs is expected to improve productivity in related industrial areas by supplying workers with the latest in practical skills and knowledge. This contributes to strengthening competitiveness in local industries, as well as related and supporting industries in the global market. This upward movement creates jobs, expands business and earns foreign currency. Then, all sectors in agriculture, industries and services in the country are activated.

For example, development of pilot program in Hospitality and Tourism will contribute to an increase of foreign visitors and their expenditures, which contributes to an expansion of not only tourism industries, such as hotels, restaurants and shops, but also related industries, such as transportation, financing, agriculture/fishing, utility and so on. This can also signify positive social impact by creating opportunities for people in the rural area to earn foreign currency.

Development of the pilot program for post harvest and food processing will add value to agricultural products, which will significantly improve working conditions for workers in the agricultural sector. This implies that this project creates a social impact in the area of poverty reduction in the long run. In addition, many relevant industries such as transportation, utility, mechanical, commercial industries can also enjoy benefits.

Introduction of distance-learning provides people in the rural area with equal learning opportunity, allowing them to learn the latest technical skills and knowledge, which would then significantly improve productivity for the entire nation by means of a spillover effect.

All of these examples can be considered as a qualitative effect from the projects, although this is not calculated in the economic analysis because of the difficulty in estimating it in monetary terms.



## **CHAPTER 9 URGENT ACTION PROGRAMS**

Urgent action programs in the TVET reform are discussed in this chapter, with particular emphasis on the introduction of a CBT approach into Polytechnics. The urgent action programs are divided into two types of initiatives: one is Ghanaian initiative and the other is technical and financial assistance by donor agencies. It is recommended that these action programs be implemented during the initial stage of the TVET reform.

### **9.1 Urgent Action Programs by Ghanaian Initiatives**

#### **9.1.1 Government Efforts**

##### **(1) Cooperation between the TVET Sector and Industry**

The most critical issue in the implementation of the TVET reform is establishing a linkage between the TVET sector and industry. Strong cooperation between the TVET sector and industry is essential in introducing a CBT approach. In the initial stage of the reform process, the Ministry of Education (MOE), in cooperation with the Association of Ghana Industries (AGI) and Ghana's Employers Association (GEA), should play a leading role in the development of new organizations, such as Ghana National Training Authority (GHANTA) and Industrial Training Advisory Boards (ITABs). The meetings between MOE, AGI and GEA should be held regularly to discuss establishing new organizations.

##### **(2) Establishment of CBT Development Committee**

A CBT Development Committee should be established within the MOE. The Committee would play a significant role in the introduction of the CBT approach. The Committee consists of representatives from the MOE, the Ministry of Finance, the National Council for Tertiary Education (NCTE), the National Board for Professional and Technical Examinations (NABPTEX), the National Accreditation Board (NAB), the National Coordinating Committee for Technical and Vocational Education and Training (NACVET), Polytechnics, Universities, and industries. NCTE will function as a secretariat of the Committee.

##### **(3) Development of GHANTA**

The Government should play a significant role in establishing new organizations, especially GHANTA, to implement the TVET reform. As discussed in Section 8.3.1, GHANTA will be a key organization in establishing a linkage between the TVET sector and industry. In the initial stage, preliminary GHANTA should be established in NCTE, and then, it would become an independent organization by 2007. The Government will appoint the members of GHANTA, including representatives from various Ministries and industries.

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#### (4) Introduction of Cost Recovery Policy

The Government should introduce a cost recovery policy to achieve financial sustainability in the TVET sector. Some of the cost recovery schemes proposed in this Study are increasing tuition fees in the TVET institutions, a Skill Development Fund (SDF), Ghana Emigrant Fund (GEF) and a new Student Loan Plan. In the initial stage of the reform processes, the Government should make a strong effort to establish a national consensus in the introduction of cost recovery policies in the TVET sector.

#### 9.1.2 Polytechnics' Efforts

##### (1) Establishment of Preliminary ITABs

In the initial stage of the development of pilot programs, preliminary ITABs in the relevant industrial areas should be established by the Polytechnics' efforts. The preliminary ITABs include Hospitality and Tourism, Information Technology and Communications, Business/Information Technology, Wood Processing Technology, Post Harvest and Food Processing, and Manufacturing Technology. Polytechnics should identify competencies based on the industrial needs and develop indicative training packages. Members of preliminary ITABs will be a CBT coordinators and teachers in Polytechnics, as well as representatives from the relevant industries.

##### (2) Development of Short Courses

Polytechnics should provide efficient delivery of TVET courses not only for full-time students but also for workers in the formal and informal sectors. The provision of short courses is particularly important in terms of flexible delivery of TVET courses and income generation. Effective operation of short courses would provide Polytechnics with an exercise in practical business.

##### (3) Development of Database

The TVET institutions such as Polytechnics cannot implement efficient management and operation of TVET programs without proper information. In the initial stage of the TVET reform, Polytechnics should make a strong effort to develop a computer database that would store information on students, alumni, enterprises, teachers, as well as financial management, equipment and inventory. The database would support efficient management and operation of TVET programs.

##### (4) Strengthening Industrial Liaison Officer

Industrial liaison officers should be encouraged to establish a linkage between Polytechnics and industries. Industrial liaisons officers should play an important role in organizing regular meetings between the Polytechnics and the industrial sector as well as in the establishment of preliminary ITABs. The function and role of industrial liaison officers should be discussed in a/the Polytechnic Council.

##### (5) Strengthening Alumni Association

Although some Polytechnics have already established Alumni associations, they are not active. In order to promote a strong linkage between the Polytechnic and the industry, Alumni associations should be encouraged in their activities. Regular meetings and



seminars organized by Alumni associations would support the Polytechnics in identifying industrial needs. Strengthening alumni associations is one of the immediate actions to be taken by a/the Polytechnic initiative.

#### (6) Strengthening Industrial Attachment

Special task forces should be established in Polytechnics to strengthen connections to the industrial sector. These task forces would consist of a group of teachers and industrial liaison officers. The major objectives of the task forces are to develop opportunities of industrial attachment for students and teachers, to develop training objectives, to monitor individual achievement, and to develop the roles of trainers and assessors in industrial attachment.

## 9.2 Urgent Action Programs with Support from Donor Agencies

### 9.2.1 Recruitment of International Experts

A CBT approach is new for Ghana and, therefore, international experts who have knowledge and experience relating to the implementation process of the CBT approach need to work in Ghana. It is recommended that donor agencies provide financial and technical support to the introduction of the CBT approach and for the development of teaching materials for CBT courses. For these purposes, international experts would work with Ghanaian counter parts. They are: 1) Institutional development experts, 2) Financial development experts, 3) CBT development experts, and 4) Textbook/workbook production experts. The scope of work of each expert is described as follows.

#### (1) Institutional Development Expert

##### 1) Total input

Foreign expert: 12 person/months<sup>62</sup> (The institutional development expert should be invited from countries, which have experiences relating to the implementation of TVET reform, such as Singapore, South Africa, and others.)

##### 2) Objectives

An institutional development expert will assist the National Council for Tertiary Education (NCTE) to develop new organizations to introduce the Competency Based Training (CBT) in the Technical and Vocational Education and Training (TVET) sector. These organizations include Ghana National Training Authority (GHANTA), Industrial Training Advisory Boards (ITABs) and National Qualification Authority (NQA).

##### 3) Expected outcomes

The following are intended outcomes:

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<sup>62</sup> The number of input is an estimation for the Phase I period.

- 
- Cooperation agreement between NCTE and the industrial sector in terms of establishing CBT related organizations
  - Draft of Act to introduce the CBT in the TVET sector
  - Draft of articles of association for provisional organizations of GHANTA, ITABs and NQA
  - Preparation for establishment of provisional organizations of GHANTA, ITABs and NQA

#### 4) Activities

The expert would assist NCTE to:

- work with all relevant stakeholder groups including industries, MOE, NCTE and Polytechnics to inform people about the key requirements for introduction of a CBT approach through meetings, workshops and written reports;
- strengthen linkage with industries by clarifying roles, responsibilities and benefits in both the industrial and TVET sector;
- identify member companies to establish ITABs in six industrial areas of pilot programs, i.e., Hospitality and Tourism, Information Technology and communications, Business/Information Technology, Post Harvest and Food Processing, Wood Processing Technology and Manufacturing Technology; and
- define roles, functions and responsibilities of all relevant organizations related to the implementation of CBT.

#### (2) Financial Development Expert

##### 1) Total input

Foreign expert: 6 person/months<sup>63</sup>

##### 2) Objectives

A financial expert will assist NCTE to develop financial schemes of relevant funds/organizations to support implementation of the CBT approach. The financial schemes are to include a skill development fund and student loan fund. The expert will also assist with the preparation of documentation to develop the CBT development center.

##### 3) Expected outcomes

The following are intended outcomes:

- Cooperation agreement between NCTE and the industrial sector in terms of establishing the skill development fund.

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<sup>63</sup> The number of input is an estimation for the Phase I period.

- Draft of Act to establish the skill development fund.
- Appropriate financial scheme related to the skill development fund.
- Operation scheme of the student loan fund.
- Identification of other financial sources such as private money transfer from overseas Ghanaians.
- Draft document to request a grant for the construction of the CBT development center.

#### 4) Activities

A financial expert will assist NCTE to:

- identify member companies to participate in the skill development fund;
- develop a financial data-base to implement the skill development fund and student loan fund;
- identify other financial sources such as private money transfers from overseas Ghanaians;
- develop a scheme for a public-private cooperation for the CBT development center; and
- design functions and activities of the CBT development center.

#### (3) CBT Development Expert

##### 1) Total input

Foreign expert: 10 person/month<sup>64</sup> (A CBT Development Expert would be invited from countries, which have experience with the CBT approach, such as Singapore, South Africa, and others.)

##### 2) Objectives

A CBT development expert would assist NCTE to develop competency standards, assessment guidelines, qualifications, textbooks and workbooks (teaching/learning resources).

##### 3) Expected outcomes

The following are intended outcomes:

- Selection of ten modules which could be used for existing packaged courses in Polytechnics.
- CBT related documents for selected ten modules such as competency standards, assessment guidelines, qualifications, textbook and workbook.

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<sup>64</sup> The number of input is an estimation for the Phase I period.

- 
- Capacity building of both the public and private sectors to plan, design and develop competency standards, assessment guidelines, qualifications.
  - Capacity building of Ghanaian managerial and teaching staff to plan, design and develop resources.

#### 4) Activities

A CBT development expert would assist the NCTE to:

- transfer knowledge and skills to develop CBT related documents;
- strengthen the system to plan, design and develop CBT related documents;
- organize a joint team of industries and teachers to develop CBT related documents; and
- develop CBT related documents for selected ten modules to start the CBT approach for existing packaged courses in Polytechnics.

#### (4) Teaching/Learning Resources Development Expert

##### 1) Input

Foreign expert: 9 person/months<sup>65</sup>

##### 2) Objectives

A resources development expert would assist NCTE to develop capabilities to produce textbooks and workbooks by editing, printing and binding.

##### 3) Expected outcomes

The following are intended outcomes:

- Capacity building of Ghanaian staff to produce resources including textbooks and student workbooks.
- Draft a document to request a small-scale grant for the establishment of a printed document production unit in NCTE.
- Textbooks and workbooks for ten selected modules mentioned above.

##### 4) Activities

The expert would assist NCTE to:

- transfer knowledge and skills to produce documents;
- select equipment for the printed document production unit and make a cost estimation;

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<sup>65</sup> The number of input is an estimation for the Phase I period.

- install equipment for the printed document production unit; and
- produce textbooks and workbooks for 10 selected modules in cooperation with the CBT development expert.

## 9.2.2 A Special Unit to Develop Teaching/Learning Materials

### (1) Background

The development of textbooks and other teaching/learning materials is essential to implement the CBT courses in the TVET sector in Ghana. In order to start the CBT courses at the selected pilot programs in the Polytechnics, it is recommended that a special Unit will be developed, which will be responsible for the developments of print-based resources and other teaching/learning materials. The Unit will operate on a small scale in NCTE during the initial stage, and will be limited to the development of textbooks and printed materials in a few technical fields. The function of the Unit will be extended and transferred to the CBT Development Center (discussed in subsequent section) during the Phase II period (2004-2007).

### (2) Objectives

The main objective of the Unit is to develop the capability to produce printed resources for some modules by applying the CBT approach. Commonly and widely used modules for existing packaged courses in Polytechnics will be selected so that these new teaching materials can also be used in courses for workers and life-long learners.

### (3) Activities

The Unit has the following functions and activities: 1) human resource development by providing on-the-job training for planning, manuscript development, editing, printing, distribution, inventory control and financial management; and 2) production and sales of textbooks and workbooks for some selected modules.

### (4) Organization

The Unit will be operated under the administration of the NCTE and comprise the following Ghanaian personnel:

- Producer (course materials developer): one person;
- Technical staff for textbooks/workbooks: two people;
- Teachers to develop manuscript: two people; and
- Administrative staff: two people.

The expert will assist them to develop the production process of the printed documents and to operate the Unit.

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(5) Subjects for the production of textbooks and workbooks

The following basic modules are recommended as a first priority for the development of printed teaching-learning resources by the Unit:

- Communication in the workplace
- Operating and managing a small business
- Participation in a team
- Receiving and processing oral and written communication
- Applying occupational health and safety procedures
- Performing computations (basic)
- Operating word processing packages
- Operating spreadsheet packages
- Managing files and folders
- Maintaining equipment & consumables
- Delivering a service to customers
- Applying quality procedures
- Planning to undertake a routine task

(6) Preliminary financial estimation

A preliminary financial estimation was conducted to examine the financial viability of the Unit. The total investment cost of the Unit would be US\$93,000 (see Table 9.2.1). The preliminary financial analysis indicates that the development of the Unit is feasible with the Financial Internal Rate of Return (FIRR) of 49 percent (see Table 9.2.2).<sup>66</sup> The details of the estimation are shown in Appendix 9.2.

**Table 9.2.1 Cost estimation for printed document production Unit**

No.	Items	Unit Price( ¥ )	Unit Price (US\$)	Q'ty	Total Cost(US\$)
1	D.T.P. system Special Personal computer system with software	1,375,000	12,500	4	50,000
2	High speed copy machine	2,200,000	20,000	2	40,000
3	Bookbinding equipment	110,000	1,000	2	2,000
4	Other supplementary equipment	110,000	1,000	1	1,000
	<b>Total</b>				<b>93,000</b>

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<sup>66</sup> The initial investment is excluded in this calculation, assuming it is covered by a/several donor agency(ies)

**Table 9.2.2 Preliminary financial estimation of printed document production Unit**

		2002	2003	2004	2005	2006	Total	Share(%)
<b>Revenue</b>								
<b>Sales of textbooks and workbooks</b>								
Student enrollment in Packaged courses	(student)	23,033	23,545	23,925	24,404	24,892		
Development schedule of textbooks and workbooks	(module)	0	0	5	10	15		
Sales amount of textbooks and workbooks	(book)	0	0	39,875	81,345	124,458		
Sales revenue of textbooks and workbooks	(US\$ 1,000)	0	0	120	244	373	737	248%
<b>Cost</b>								
<b>Personnel cost</b>								
<b>No. of staff</b>								
Producer(course material's developer)		1	1	1	1	1		
Technical staff for textbooks		2	2	2	2	2		
Teacher to develop manuscripts		0	2	2	2	2		
Administration		1	1	2	2	2		
Total		4	6	7	7	7		
<b>Personnel cost (including activity cost)</b>								
Producer(course material's developer)	100%							
Producer(course material's developer)	(US\$1000)	4	4	4	5	5	22	7%
Technical staff for textbooks	(US\$1000)	8	8	9	9	10	45	15%
Tutors	(US\$1000)	0	8	9	9	10	37	12%
Administration	(US\$1000)	1	2	3	4	2	12	4%
Total	(US\$1000)	13	22	26	27	27	116	39%
<b>Production cost of teaching materials</b>								
Textbooks/workbooks	(US\$1000)	0	0	60	122	187	369	124%
Others (Packaging and distribution)	(US\$1000)	0	0	12	24	37	74	25%
Total	(US\$1000)	0	0	72	146	224	442	149%
<b>Maintenance and utility cost</b>								
Maintenance and utility cost	(US\$1000)	0	0	0	19	19	19	6%
<b>Contingency (10%)</b>								
Contingency (10%)	(US\$1000)	1	2	10	19	27	27	9%
Total cost	(US\$1000)	14	24	107	212	297	297	100%
Balance	(US\$1000)	-14	-24	13	32	76	76	26%
Accumulated balance	(US\$1000)	-14	-24	13	32	76		
FIRR		49%						

### 9.2.3 CBT Development Center

#### (1) Background

In the operation of a CBT system, industry defines competency standards, assessment guidelines and qualifications. Education and training organizations design and deliver courses. Since the courses will be modularized, any training organization, industry and individual can provide the module-based training, if they register as accredited education and training organizations. Therefore, the CBT system can make maximum use of scarce resources such as teachers, facilities and infrastructure.

The CBT approach is new in Ghana, and the CBT development center (the Center) is extremely important to support the challenge of the TVET reform. The primary functions are institutional development, teacher development, teaching material and distance-learning development.

#### (2) Objectives

The overall goal of the Center is to develop and disseminate a CBT approach in the TVET sector and to provide equal learning opportunities to a wide variety of clients across the country with reasonable training costs.

The following are major objectives in terms of the time frame:

- a. Short term objective: Introduction of the CBT approach for the proposed eight pilot programs at 8 Polytechnics (Target year to start: 2007)

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- b. Mid term objectives: Introduction of distance-learning in the areas of the 6 proposed pilot industrial areas (Target year to start: 2010)
  - c. Long term objective: Introduction of the CBT approach by all public and private technical training providers under various Ministries with training functions by means of packaged courses, short courses and distance-learning courses (Target year to start: 2013)

### (3) Proposed CBT Training Courses

The Study identified the following six potential areas to introduce CBT training courses as pilot programs in Polytechnics:

- a. Hospitality and Tourism
- b. Information Technology and Communications
- c. Business/Information Technology
- d. Wood Processing Technology
- e. Post Harvest and Food Processing
- f. Manufacturing Technology

In the initial stage, the Center would support the development of these six areas to introduce the CBT approach. The areas would then be extended to other fields.

### (4) Functions, Activities and Facilities

There are four major functions in the Center. They are: 1) human resource development, 2) institutional development, 3) teaching material development, and 4) administration and management.

Human resource development will involve training for managerial staff and teaching staff in TVET institutions as well as the related industrial sector. The training for managerial staff includes provision of knowledge of the CBT approach, financial management of training organizations, personnel management, operational skills and knowledge of training organization and training course management. The training for teaching staff includes understanding of the CBT approach, development of teaching materials, teaching skills of CBT courses, course operation and management of CBT courses.

The activities relating to institutional development are the development and operation of CBT related organizations such as GHANTA, ITABs and the NQA. These organizations should be developed in close collaboration with the industrial sector.

The teaching materials include audio-visual materials and textbooks/workbooks. These materials would be developed by the Center to address local needs, conditions and circumstances.



Administration and management of the Center will involve provision of administrative and managerial services. Functions will also include sales and promotion of printed resources and operation of distance-learning. This function in particular will include the strengthening of cooperative relations with the industrial sector. It is particularly important for the Center to be efficiently managed and to achieve self-funding.

Figure 9.2.1 illustrates the conceptual scheme of the CBT Development Center.

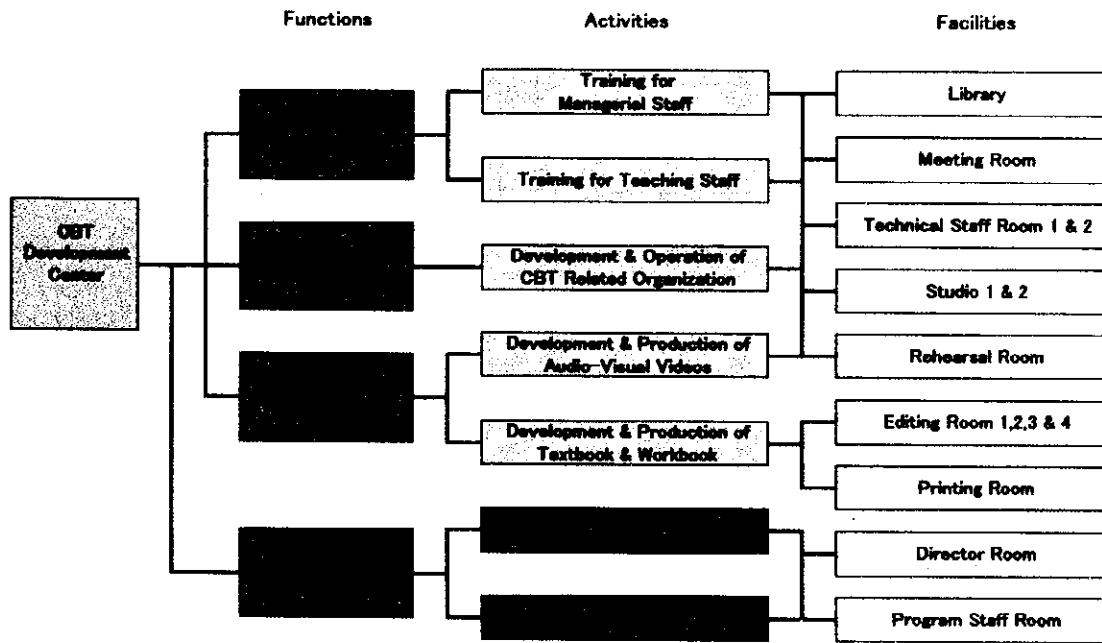


Figure 9.2.1 Conceptual diagram for the CBT development center

(5) Preliminary Financial Estimation

A preliminary financial estimation of the Center was conducted to examine its financial viability. Figure 9.2.2 shows the accumulated cost and revenue of the Center from 2002 to 2020. The total investment cost of the Center amounts to US\$6.3 million and the preliminary financial analysis indicates that the development of the Center is feasible with the financial internal rate of return (FIRR) of 68 percent<sup>67</sup>. However, the project would make losses until 2010 and, therefore, the Government need to provide the Center with financial support to ensure proper operation during the early stage. The details of the financial estimation are shown in Appendix 9.3.

<sup>67</sup> The initial investment is excluded in this calculation, assuming it is covered by a / several donor agency(ies).

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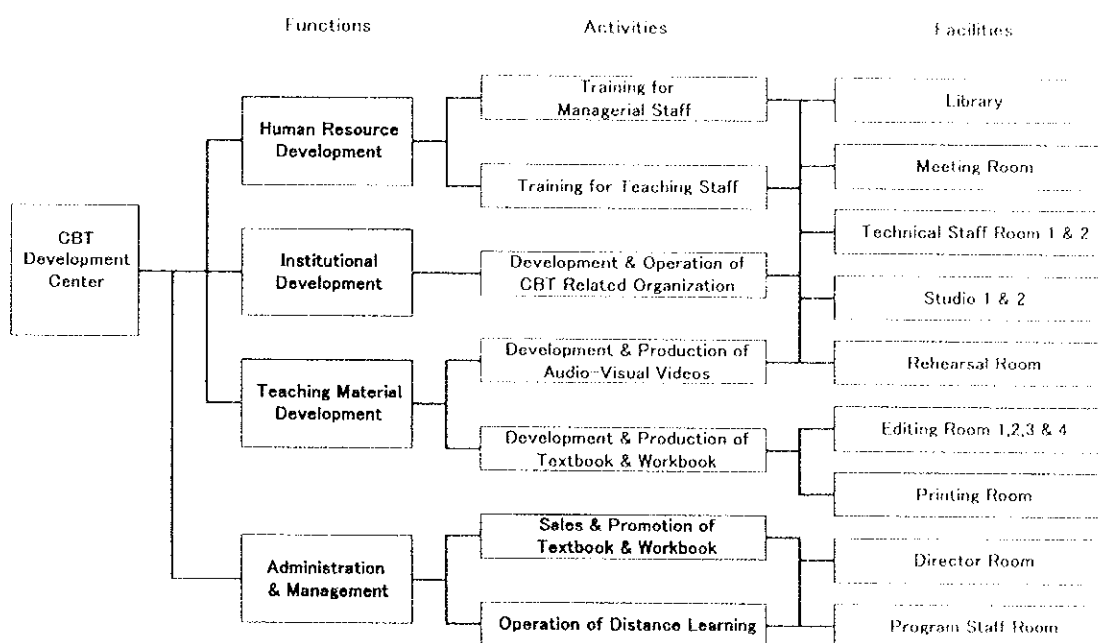


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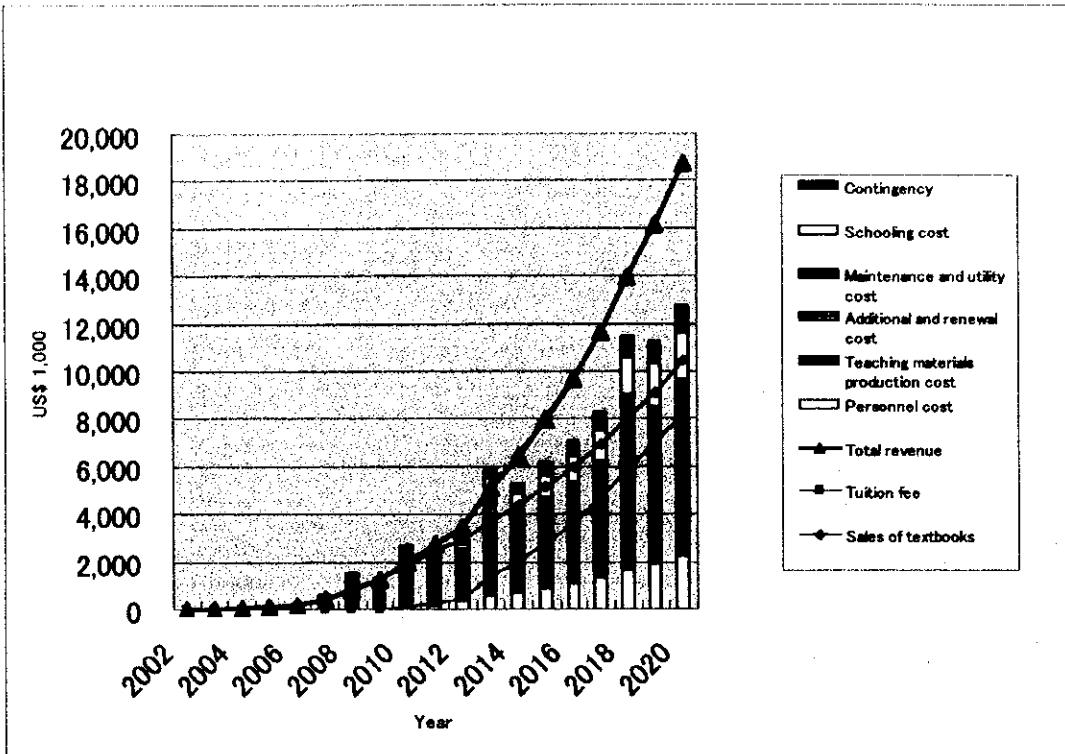
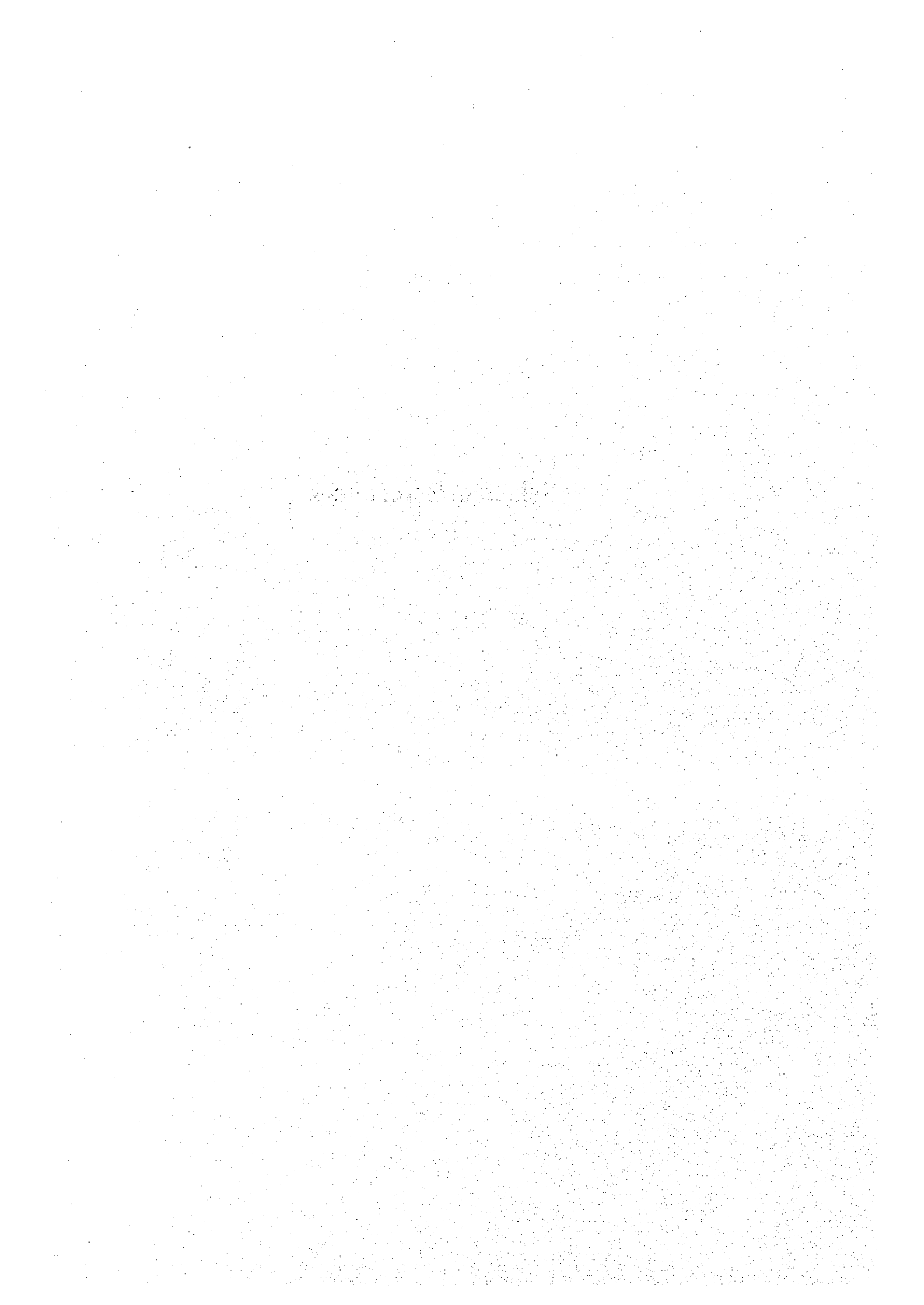


Figure 9.2.2 Financial estimation for the CBT development center

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