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TECHNOLOGY neist

Innovation Centre for Capital Goods

# Technology Innovation Centre for Capital Goods in Ghana

Opportunity and feasibility study

## Main Report*

**Prepared to the Government of Ghana by ECORYS Nederland BV, in association with GIBB Africa (Kenya), Bruks Associates (Ghana) & Laryea, Laryea & Company (Ghana)**

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# Acknowledgments

Following a competitive tender, UNIDO commissioned ECORYS Netherlands in association with GIBB Africa from Kenya, and Bruks Associates and Laryea, Laryea & Company, both from Ghana, to undertake an Opportunity and Feasibility Study. The study was undertaken in accordance with the UNIDO guidelines and with support of UNIDO financial software. The study was monitored by a Steering Committee chaired by the Honourable former Prime Minister Mr. P.V. Obeng and with representation of the Ministry of Trade & Industry, UNIDO, and industry stakeholders. The study was financed by UNIDO Programmable Funds through project and was supervised by Dr. Ricardo Seidl da Fonseca, Industrial Promotion and Technology Branch, UNIDO, with the support of the UNIDO Field Office in Ghana.

Table of contents

**List of abbreviations** 6

**Executive Summary** 7

**1 Introduction** 13
1.1 The Studies 13
1.2 The Opportunity Study 14
1.3 The Feasibility study 14

**2 The Project: Basic concept, features and justification** 17
2.1 Justification of the project 17
2.2 Basic concept and features 18
2.2.1 Place in the market 18
2.2.2 Services to be provided 19
2.2.3 Ownership of the centre 20

**3 Market evaluation and strategy** 21
3.1 Industry Structure 21
3.1.1 Producers 21
3.1.2 Capital Goods Users 23
3.1.3 Support Institutions 25
3.1.4 Suppliers 27
3.2 Size and capacity of the market for capital goods 27
3.2.1 Imports 27
3.2.2 Size of demand 27
3.3 Marketing concept 28
3.3.1 Markets and targets groups 28
3.3.2 Selected targets and strategies 29
3.3.3 Anticipated competition 31
3.3.4 Sales programme 33
3.4 Production programme required 36
3.4.1 *Product* 36

**4 Project engineering** 39
4.1 Technology and equipment 39
4.1.1 Technology description 39
4.1.2 Rough layout of proposed equipment 40
4.1.3 Rough estimate of investment costs of equipment (classified as above) 40
4.2 Determination of Centre's capacity 40
4.3 Pre-selection of location 40
4.4 Basic lay-out of the TICCG 41
4.5 Civil engineering works 41
4.5.1 Site preparation and development 41
4.5.2 Buildings and special civil works 41
4.5.3 Rough estimate of investment cost of civil engineering works 42

4.6 Fixed investment costs 42

**5 Draft specifications for the selected project alternative 45**
5.1 Organisational design 45
5.2 Estimated human resources requirements and costs 46
5.2.1 General management 46
5.2.2 Support staff 46
5.2.3 Production of capital goods or specialized components 46
5.2.4 Training 47
5.2.5 Facility Rental Services 47
5.2.6 Research and development 48
5.2.7 Finance services 48
5.2.8 Marketing and logistics 48
5.2.9 Total staff 49

**6 Financial plan and funds mobilization strategy 51**
6.1 Business results of TICCG 51
6.1.1 Net income statement 51
6.1.2 Balance sheet 51
6.1.3 Cash flow 52
6.1.4 Net present value 53
6.2 Fund mobilization 53
6.2.1 Criteria, terms and conditions 53
6.2.2 Participants 53
6.2.3 Funding strategy 57
6.3 Possibilities of private participation 57
6.3.1 Management and lease contracts 58
6.3.2 Concession 59
6.4 Finance Plan 60

**7 Sensitivity analysis for different alternatives 63**
7.1 Inflation 63
7.2 Business units 63
7.3 Price 64
7.4 Prices of raw materials 64
7.5 Prices of labour 65
7.6 Energy prices 65

**8 Institutional and legal framework 67**
8.1 Legal requirements 67
8.1.1 Operational approvals, consents and permits 67
8.1.2 Land or property acquisitions 68
8.1.3 Building or structure for the Technology Innovation Centre for Capital Goods 68
8.1.4 Contact forms 68
8.1.5 Employment and labour issues 71
8.1.6 Intellectual and industrial property rights 71
8.1.7 Insurance and security 71

8.1.8 Change in law 71

**9 Project implementation, including pre-investment phase 73**
9.1 Proposed approximate implementation time schedule 73
9.2 Estimated implementation costs 74
9.3 Tender process 74
9.3.1 Phase I Inception 75
9.3.2 Phase II Prequalification 76
9.3.3 Phase III Selection 76
9.3.4 Phase IV Negotiation 76
9.3.5 Phase V Completion 77

**Annexes**

1. Input Feasibility Model
2. Output Feasibility Model
3. Civil Engineering
4. Lay-out of the TICCG
5. List of machinery
6. Description of CNC machines
7. Breakdown of start-up costs
8. CEPS Database
9. Interest Rates
10. Opportunity study
11. Stakeholder workshop report
12. Market analysis

# List of abbreviations

| Abbreviation | Description |
|---|---|
| CEPS | Customs Excise and Preventative Services |
| CNC | Computer Numerically Controlled |
| COMFAR | Computer Model for Feasibility Analysis and Reporting |
| CSIR | Centre for Science and Industrial Research |
| Fte | Fulltime equivalent |
| GoG | Government of Ghana |
| IFI | International Finance Institution |
| IRI | Industrial Research Institute |
| KNUST | Kwame Nkrumah University of Science and Technology |
| MOTI | Ministry of Trade and Industry |
| NPV | Net Present Value |
| ROE | Return on Equity |
| ROI | Return on Investment |
| SPV | Special Purpose Vehicle |
| SWOT | Strengths, Weaknesses, Opportunities and Threats |
| TICCG | Technology Innovation Centre for Capital Goods |
| UNIDO | United Nations Development Organisation |
| USD | US Dollar |
| WACC | Weighted Average Cost of Capital |
| WTO | World Trade Organization |

# Executive Summary

As stated by the National Medium Term Strategy for Private Sector Development, The Government of Ghana has decided to enhance the level of industrialization in Ghana. One of the vital assets for Ghana's key industries are capital goods. To date most of the capital goods are imported as local industry is not able to match the quality of imported capital goods.

In order to reduce the dependency on imported capital goods and taken into account the inability of the local producers to match the quality of import, the Government of Ghana has initiated the concept of Technology Innovation Centre for Capital Goods (TICCG). The Technology Innovation Centre is to enhance the local capacity to produce high quality capital goods at a fair price to support the key industries in Ghana. The Centre could also lead in the long run to the creation of a new industrial district in Ghana.

To assess the opportunities and feasibility of such a centre, the Government of Ghana has asked UNIDO for support.
The study concludes that a TICCG in Ghana is feasible subject to the following key assumptions.

1. The TICCG is to provide the following services:
   a. Production of specialised capital goods and/or components
   b. Training and knowledge and technology transfer
   c. Research and Development
   d. Facility Rental services
   e. Financing Services
   f. Marketing and logistics advisory services

2. The TICCG is to focus initially on the following markets:
   a. Food Processing Industry
   b. Agricultural Production Industry
   c. Machine Tooling Industry

3. The total demand for capital goods by the industries indicated in point 2 above amounts up to approximately USD 84 million in 2004 based on the import statistics of related goods. It is expected that this demand will grow in the forthcoming years given the government industrialization policy, at least with an average annual growth rate of 5%.

4. In time the TICCG could expand its market focus to other industries, such as:
   a. Wood Processing Industry
   b. Automotive Industry

c. Chemical Industry
d. Textile Industry
e. Mining and Construction Industry
f. Water and Sanitation Industry

These market opportunities have not been quantitatively assessed in the study given the uncertainties concerning future demand.

5. In time the TICCG could also expand its market focus to other countries, in particular the ECOWAS region. It is to be noted that most countries in the ECOWAS region are importing capital goods, with Nigeria having the largest volume of import.

These market opportunities have not been quantitatively assessed in the study given the uncertainties concerning future demand.

6. The Study assume that the TICCG is to be located in the Kumasi region with in time satellites in Accra-Tema and Tamala. The envisaged satellites are not included in the study. The size of the required plot is approximately 15 acres including possibilities for future expansion. A final definition of the location will depend on the results of a location study to be conducted.

7. The required investments to enable the defined service offering amount up to USD 24 million over a period of 2 years, with the following breakdown (in USD million):

| Item | Year 1 | Year 2 | Total |
|---|---|---|---|
| Acquisition of land | 0.8 | | 0.8 |
| Development of site | 0.5 | | 0.5 |
| Buildings | 5.0 | | 5.0 |
| Machinery and Equipment | | 12.0 | 12.0 |
| IT Facilities | | 0.2 | 0.2 |
| Transport facilities | | 0.2 | 0.2 |
| Auxiliary and service plan equipment | 1.0 | 0.2 | 1.2 |
| Pre-production expenditures | 0.9 | 0.7 | 1.6 |
| Initial Working Capital | | 0.1 | 0.1 |
| Contingencies (10%) | 0.8 | 1.3 | 2.1 |
| **Total** | **8.8** | **14.7** | **23.6** |

8. The TICCG will make use of 12 computer numerically controlled (CNC) machines in order to meet the anticipated demand. These machines are currently hardly available in Ghana. They are able to produce a broad variety of tools and parts, are highly productive and enable high quality products.

9. The related production capacity is initially based on one labour shift and following the anticipated growth in demand will be expanded to two labour shifts as per 2012.

10. The related operational expenditures in the first year of operation being 2008, amount up to USD 3.7 million and will increase to USD 4.9 million in 2012 and further to USD 5.9 million in 2018 with the following breakdown (amounts in USD million).

| Item | 2008 | 2012 | 2018 |
|---|---|---|---|
| Raw materials | 0.1 | 0.1 | 0.3 |
| Energy | 0.6 | 1.2 | 2.1 |
| Maintenance | 0.3 | 0.7 | 1.2 |
| Labour | 0.4 | 0.7 | 0.8 |
| Overhead | 0.2 | 0.2 | 0.2 |
| Depreciation | 1.1 | 1.1 | 1.0 |
| Interest | 1.1 | 0.9 | 0.3 |
| **Total** | **3.7** | **4.9** | **5.9** |

11. The increase in operational expenditures is to a large extent caused by the energy consumption of the CNC machines. Energy is a major variable in the type of CNC machines. There are small CNC machines using little energy and there are CNC machines that even require the construction of a power plant to operate it. In consultation with CNC machines experts, the energy costs are set at USD 27 per hour, and consequently per unit of production at USD 15,60.

12. The cost of labour is based on an initial staffing of 79 fulltime equivalents (fte) and 82 persons, with the following breakdown.

| Labour | Fte | Persons |
|---|---|---|
| General management | 3 | 3 |
| Service staff | 16 | 16 |
| Production | 43 | 43 |
| Training | 2 | 4 |
| Facility rental services | 3 | 3 |
| R&D | 6 | 6 |
| Finance services | 4 | 4 |
| Marketing and Logistics | 2 | 2 |
| **Total** | **79** | **82** |

13. Four categories of staff have been defined with respective assumed gross wages (including social securities and fringe benefits).

| Specification | Monthly wages (Cedis) |
|---|---|
| General management | 27,450,000 |
| Professional staff and team managers | 10,000,000 |
| Operational workers | 2,000,000 |
| Other unskilled staff | 1,500,000 |

14. Possible revenues of the core business line of production of specialised capital goods or components amount up to USD 3.3 million in 2008, implying approximately 4% of the current total demand. If the market is to grow on average with 5% per year, the market share of the TICCG is to grow to 9% in 2012 and 10% in 2018, implying conservative sales growth projections (amounts in USD million).

| Year | Total Market Size | TICCG Gross Sales parts and components | Market share |
|---|---|---|---|
| 2008 | 83.7 | 3.4 | 4% |
| 2012 | 101.7 | 8.9 | 9% |
| 2018 | 136.3 | 13.1 | 10% |

15. The average sales price of a unit produced is set at USD 100 per unit. It is to be noted that this is an average price as the CNC machines enable a broad range of end products. The average sales price is based upon the costs of production and a margin to enable a financially viable implementation and operation of the TICCG. The average sales price as set is considered to be a competitive price.

16. Sales prices for other service lines are set to recover the costs of the respective service offering.

| Service Line | Unit | Sales Price per unit |
|---|---|---|
| Training | Per student per training course of 3 months | USD 760 |
| Research and Development | Per hour | USD 50 |
| Facility Rental Services | Per half a day | USD 125 |
| Finance Support | Not assessed | - |
| Marketing & Logistics | Per hour | USD 37.50 |

17. Taken into account initial overcapacity and gradual growth in sales, total revenues consequently amount up to USD 3.5 million in 2008 increasing to USD 7.9 million in 2012 and USD 13.8 million in 2018, with the following breakdown (amounts rounded in USD million).

| Service Line | 2008 | 2012 | 2018 |
|---|---|---|---|
| Production | 3.4 | 7.4 | 13.1 |
| Training | 0.1 | 0.1 | 0.1 |
| R&D | - | 0.3 | 0.4 |
| Rental | 0.0 | 0.1 | 0.1 |
| Advisory | - | 0.1 | 0.1 |
| **Total** | **3.5** | **7.9** | **13.8** |

18. The TICCG is to be owned initially by the Government of Ghana with the possibility in time to offload shares to the private sector. The initial share capital required amounts up to USD 12 million. The return on equity based on a planning horizon of 20 years is 21%.

19. Next to equity the TICCG is to be funded by loans either from international finance institutions (IFI's) like Worldbank or African Development Bank, bilateral loans or commercial loans. The required initial loan amounts up to USD 13 million and assumed is the loan to be provided for by 50% by IFI's at an interest rate of 5% and for 50% by commercial banks at an interest rate of 12%.

20. The return on investment based on the planning horizon of 20 years is 17% and exceeds the weighted average cost of capital of 12%. The net present value of future cash flows amounts up to USD 7.9 million, making it a financially viable investment.

Based on the conclusion of the TICCG being a feasible concept it is recommended to continue with the preparations of the implementation. The proposed steps for the short and medium term are:

1. Agree on the findings of the study.

2. Mobilise the necessary funds both within the Government of Ghana as well as the funding from other sources. Initially the necessary funds amount up to USD 2.4 million for the pre-production expenditures and the acquisition of land.

3. Setup a Project Implementation Unit to be responsible for the implementation of the TICCG.

4. Define a location for the TICCG through a detailed location study and acquire the land or agree on a lease contract.

5. Agree with the involved municipality (or municipalities) on allocation of responsibilities and risks.

6. Define the tender and contracting strategy for the implementation and operation of the TICCG.

7. Pending on the tender and contracting strategy, the following activities need to undertaken or allocated to the management of the TICCG:
    a. Define the specifications for the construction of the civil works
    b. Define the specification of the utilities
    c. Define the specifications of the transport facilities
    d. Define the specification for the machinery equipment
    e. Recruitment of staff

8. Incorporate the TICCG.

# 1 Introduction

## 1.1 The Studies

In light of the National Medium Term Strategy for Private Sector Development of the Government of Ghana (GoG), the level of industrialization in Ghana has to be increased by improving the competence and capacity at the firm level.

Capital Goods are a vital asset for the firms active in industry. However the majority (approximately 65%) of the demand for Capital Goods in Ghana is imported. In view of the Government's industrialization policy it is expected that the demand for Capital Goods will grow significantly for the medium term and for the long term.

In order to substitute part of the imports, the Government of Ghana wants to support the local production of Capital Goods. However, the locally produced Capital Goods in most cases do not meet the quality requirements of the firms demanding the Capital Goods in contrast to the imported Capital Goods.

A recent Market Study (prepared by UNIDO) indicated that the main reason for this imbalance in the market for capital goods is the use of inefficient and obsolete machinery which is not capable of producing the kind of finish associated with imported products.

Consequently the Government of Ghana as represented by the honorable Minister of Trade and Industry Alan Kyerematen and UNIDO decided to initiate the concept of a Technology Innovation Centre for Capital Goods (TICCG), to provide the machinery needed and the parts and components that cannot currently be produced in Ghana.

UNIDO commissioned ECORYS Nederland b.v. in association with Gibb Africa from Kenia and Bruks Associates and Laryea, Laryea & Company, both from Ghana to undertake an opportunity and feasibility study for a Technology Innovation Centre in Ghana. The study was monitored by a Steering Committee chaired by the Honorable former Primer Minister Mr. P.V. Obeng and with representation of Ministry of Trade and Industry, UNIDO and the industry stakeholders.

## 1.2 The Opportunity Study

In accordance with the contract agreed upon between UNIDO and ECORYS Nederland b.v. with the Government of Ghana as beneficiary, the Consultant has completed an opportunity study[1] to define the underlying business concept for the TICCG.

The Opportunity Study assessed the opportunities for a TICCG based on a detailed analysis of the demand for capital goods in Ghana. The opportunities in terms of service offering, market focus and institutional setting have been presented to the stakeholders in a stakeholder workshop held on 2 August 2005 in Accra and the following was jointly agreed upon:

1. The TICCG is to offer the following services:
    - Production of specialized capital goods and/or components
    - Training and knowledge and technology transfer
    - Research and Development
    - Facility rental services
    - Financing services
    - Marketing and logistics

2. The TICCG is to focus initially on the following markets:
    - Food processing industry
    - Agricultural production industry
    - Machines tooling

In time the TICCG is to expand its market focus to (not limited to)
- Wood processing
- Automotive industry
- Textile industry
- Chemical industry
- Mining and construction
- Water and sanitation

3. The TICCG is to be institutionalized as a new organization.

Further details are described in the next chapters.

## 1.3 The Feasibility study

The feasibility of the preferred business model has been subsequently assessed. In accordance with the Terms of Reference and UNIDO guidelines this report includes the following chapters:
- Executive summary and recommendations
- Basic concept and features, and justification of the Technology Innovation Centre

[1] See annex 10 for the results of the opportunity study and annex 11 for the report of the stakeholder workshop as held in Accra at 2 August 2005

- Market evaluation and strategy
- Definition of size and building features of the in-site and off-site facilities and services, including ancillary facilities
- Location and basic layout
- Indication of basic equipment and civil engineering works
- Project implementation, including pre-investment phase
- Financial plan and funds mobilization strategy
- Sensitivity analysis for different alternatives, including competing projects
- Draft specifications for the selected project alternative

For the financial analysis of the feasibility study, UNIDO's Computer Model for Feasibility Analysis and Reporting (COMFAR) software has been applied. This model produces financial statements and calculates measures of performance. Financial calculations in COMFAR III Expert are performed in accordance with the methods described in the Industrial Feasibility Studies Manual published by UNIDO. The detailed assumptions and the output of the computer model are included as annex 1 and 2.

In addition to the guidelines, a chapter on legal requirements is included as well as recommendation for further implementation of the TICCG.

# 2 The Project: Basic concept, features and justification

This chapter presents the basic concept of the Technology Innovation Centre for Capital Goods (TICCG) as identified as the most preferred business model during the opportunity study. Paragraph 2.1 justifies the project based on the analysis of the strengths, weaknesses, opportunities and threats (SWOT) of the capital goods industry as a whole as assessed in the opportunity study. Paragraph 2.2 describes the consequently derived basic concept and features of the preferred business model as agreed upon with the stakeholders.

## 2.1 Justification of the project

The SWOT analysis done in the opportunity study indicates that the capital goods sector requires a strategic breakthrough in order to seize the opportunities in the market and match the competition. This strategic breakthrough has to be aimed at:

**1. Enabling economies of scale through specialization**

In order to enhance cost effectiveness economies of scale is required. In general the Capital Goods Industry throughout the world is characterized by medium sized enterprises. The products offered by these firms are highly specialized and customized because of the high investments in requisite equipment and specific knowledge on the products and production process. The high level of specialization is required to enable economies of scale on the equipment and work force.

It is recommended for the Capital Goods Industry in Ghana to choose explicitly for one or more specializations and focus all resources on these products.

**2. Enhancing knowledge dispersion**

In order to enhance the efficiency and quality of production to match the competition a skilled work force is an absolute requisite. Although the industry as a whole has a strong engineering knowledge base and technical skills as well as good educational and training facilities, it has not led yet to well trained work force on the ground.

Consequently, it is recommended to develop an infrastructure that enables a more efficient and effective knowledge dispersion.

**3. Enabling investments in requisite equipment**

In order to enhance the efficiency and quality of production to match the competition more investments in equipment is an absolute requisite. Investments, which are currently not possible because of limited availability of funds, associated high costs of funding and long period of release of funds. Cost of funding is related by the creditworthiness of the fund applicant and the risks of his investment proposal. Enhancement of the creditworthiness and risk mitigation on the investments are to reduce the cost of funding.

Consequently it is recommended to enhance the creditworthiness of the fund applicants and mitigate the investment risks in order to enable more cost efficient funding of investment. The Technology Innovation Centre can support the sector by offering finance and by bundling finance requirements of the sector.

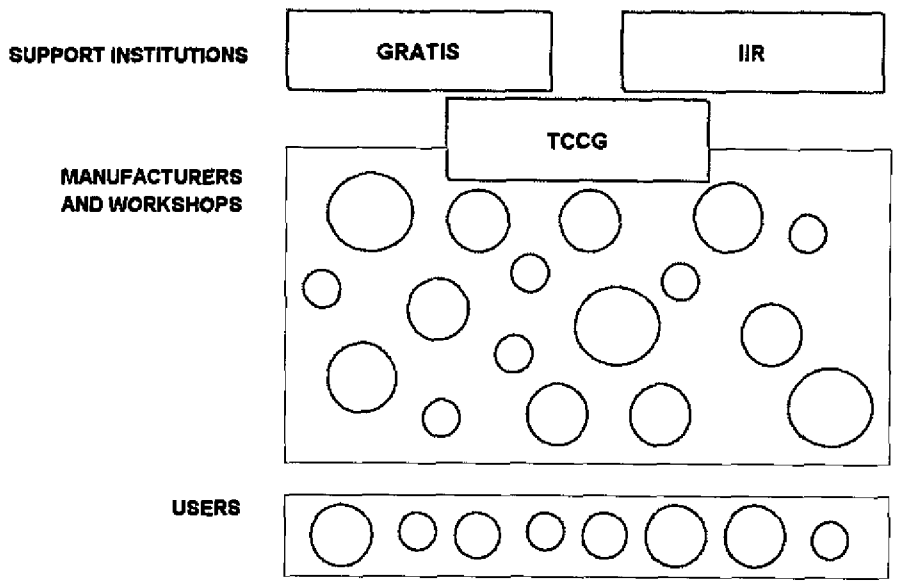
These challenges justify the establishment of a Technology Innovation Centre for Capital Goods (TICCG).

## 2.2 Basic concept and features

### 2.2.1 Place in the market

The basic idea for the option selected is to position the TICCG in addition to the existing support institutions. The resulting industry structure is shown in the figure below.

Figure 2.1 Industry structure of the TICCG



### 2.2.2 Services to be provided

Through a multi criteria analysis the stakeholders concluded on the following scope of services to be provided by the TICCG:

**1. Production of specialized capital goods and/or components**

The TICCG is to produce capital goods or components of capital goods that are inefficient for current manufacturers to produce. This would concern capital goods or components of which the production would either require specific equipment that is too costly for current manufacturers to purchase on their own, or of which the production would require specific knowledge of the work force too costly for current manufacturers to acquire in terms of training costs. The TICCG could produce as a sub-contractor for local producers and it could also subcontract local producers for production. The center could also produce items under license.

**2. Training and knowledge and technology transfer**

The TICCG is to provide training and knowledge transfer services to the workforce on the ground. It would facilitate knowledge dispersion though training courses, workshops, and so on. The own staff of TICCG and any new staff will also be trained in the Centre in order to maximize the quality of the staff. For use of machinery however, the supplier is responsible for training of the staff and this is included in the investment for machinery.

**3. Research and Development**

The TICCG is to be active in the area of research and development. Research on and development of new products and business process reengineering, computer software development, prototyping, and design services. Research and development will be mainly demand driven and on a commercial basis. If applicable the TICCG will also be responsible for licensing new technologies or support local producers in obtaining licenses.

**4. Facility Rental Services**

The TICCG is to provide facilities for various purposes; e.g. manufacturing facilities, design facilities, testing facilities and measuring facilities. This will include facilities that would be inefficient for manufacturers to invest in on their own. It would imply that TICCG would provide only facilities but that the operators are responsible for their own work force. Besides, this department will provide equipment installation services and maintenance and repair services.

**5. Financing Services**

The TICCG is to support and facilitate in fund raising for investments in requisite equipment. Besides, TICCG can attract funds to provide commercial loans to the sector. This will be provided at a commercial basis; TICCG will pay a certain amount

of interest and charge another amount. As these interest amounts are fluctuating and no research has been done about the finance demand in the sector, it is hard to predict the income TICCG will make from this service. However, stakeholders have indicated in the stakeholder workshop that a financing facility would be needed. More research is required to establish a solid finance department. It is recommendable to attract finance specialists who can start setting up a Technology Innovation Fund which will be managed in the Financing Services Department

**6. Marketing and logistics**

The TICCG is to provide marketing or logistics services to respectively stimulate demand by promoting the industry and reduce costs of logistics by means of central warehousing and coordinated transport.

### 2.2.3 Ownership of the centre

Public Private Partnership is possible by either tendering the right to establish a TICCG through an innovative concession (refer to chapter 8.1.4 for description of different concession contract forms), or through establishment of a legal entity with public and private shareholders.

The Consultant advises the TICCG has to be operated as an independent entity owned by the Government of Ghana as initiator which may off load shares to the private sector later, and financially supported by:

- Industry Financing – Banks like NIB
- International Financial Services – IFC
- Private Sector – Producers & Traders

These different options will be elaborated in chapter 6.

# 3 Market evaluation and strategy

This chapter presents an overview of the market evaluation as prepared in the Opportunity Study. It will also summarize the strategy to be implemented with the Technology Innovation Centre for Capital Goods[2].

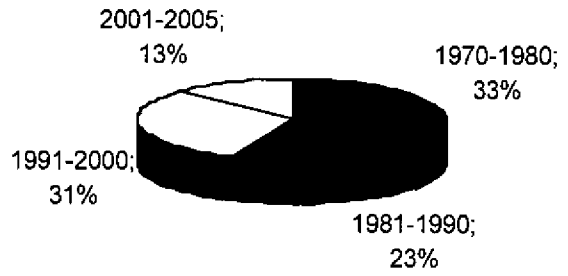
## 3.1 Industry Structure

The capital goods industry is made up of producers of capital goods, users of capital goods and support institutions that render support services to both producers and users. There are 25,931 companies active in manufacturing, these are either users of capital goods or producers of capital goods.

### 3.1.1 Producers

The producers of capital goods in Ghana can be both private and Government agencies. For this study, 40 capital goods producers have been interviewed. 33% of these producing firms were established between 1970 and 1980 whilst 31% of them started operation after 1991. Many of these companies are limited liability firms. The market research indicates that most (87%) of the producers of all capital goods exist already for more than 5 years and 56% even more than 15 years. This shows that the market is fairly matured with vested and experienced organizations.

Figure 3.1 Year of Commencement of the producers




*Activities*

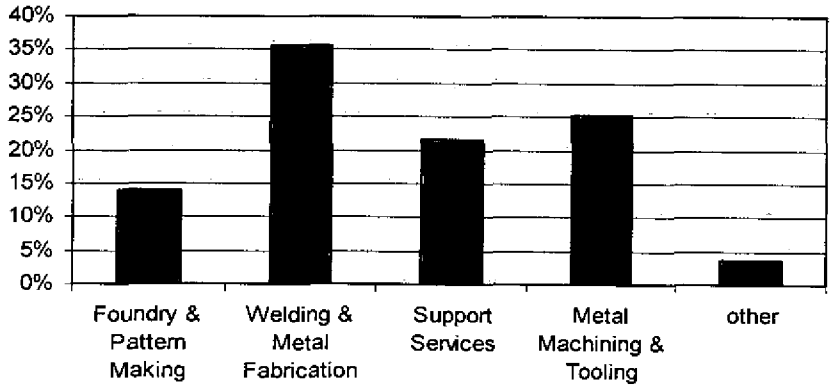
The key functionality of these companies is:

- Foundry and pattern making operations
- Welding and metal fabrication
- Machine tooling

[2] See appendix 12 for detailed analysis of the market as included in the opportunity study

Figure 3.2 shows how the functionality of the companies is divided among the activities.

Figure 3.2 Key functionalities of companies




*Size and location*

Table 1 below reveals that 22,025 (85%) of manufacturing establishments in the survey have up to 9 employees which categorizes them as a Small Scale Enterprise as per the Statistical Service definition. Note that only 41 manufacturing firms employ 500+ persons in their operations. Industrial Statistics is therefore very limited. Accra and Kumasi have the highest number of larger manufacturing concerns. It can be concluded that the manufacturing industry is dominated by small and medium enterprises and is located mainly in Accra and Kumasi.

Table 3.1 Establishment in manufacturing by size and region

| Establishment size** | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Region | 1 – 4 | 5 - 9 | 10 - 19 | 20 - 29 | 30 – 49 | 50 – 99 | 100 – 199 | 200 - 499 | 500+ | Total |
| Western | 973 | 678 | 180 | 30 | 16 | 18 | 9 | 8 | 8 | 1,920 |
| Central | 1,503 | 682 | 199 | 43 | 27 | 16 | 7 | 6 | 2 | 2,485 |
| Greater Accra | 4,029 | 1,635 | 531 | 140 | 100 | 75 | 49 | 37 | 14 | 6,610 |
| Volta | 599 | 435 | 161 | 38 | 33 | 26 | 10 | 3 | 3 | 1,308 |
| Eastern | 1,909 | 719 | 219 | 34 | 41 | 28 | 5 | 6 | 4 | 2,965 |
| Ashanti | 3,011 | 2,355 | 721 | 152 | 71 | 45 | 25 | 25 | 7 | 6,412 |
| Brong Ahafo | 1,078 | 429 | 161 | 27 | 29 | 14 | 10 | 1 | 3 | 1,752 |
| Northern | 487 | 433 | 132 | 50 | 71 | 53 | 5 | 1 | - | 1,232 |
| Upper East | 379 | 335 | 89 | 21 | 8 | 6 | 1 | - | - | 839 |
| Upper West | 229 | 127 | 33 | 6 | 5 | 5 | 3 | - | - | 408 |
| **Total** | 14,197 | 7,828 | 2,426 | 541 | 401 | 286 | 124 | 87 | 41 | 25,931 |
| **Percentage** | 55 | 30 | 9 | 2 | 2 | 1 | 0 | 0 | 0 | 100 |

**Note** : '0' in percentages means **less than 0.5%**, and ' - ' means **no** establishment

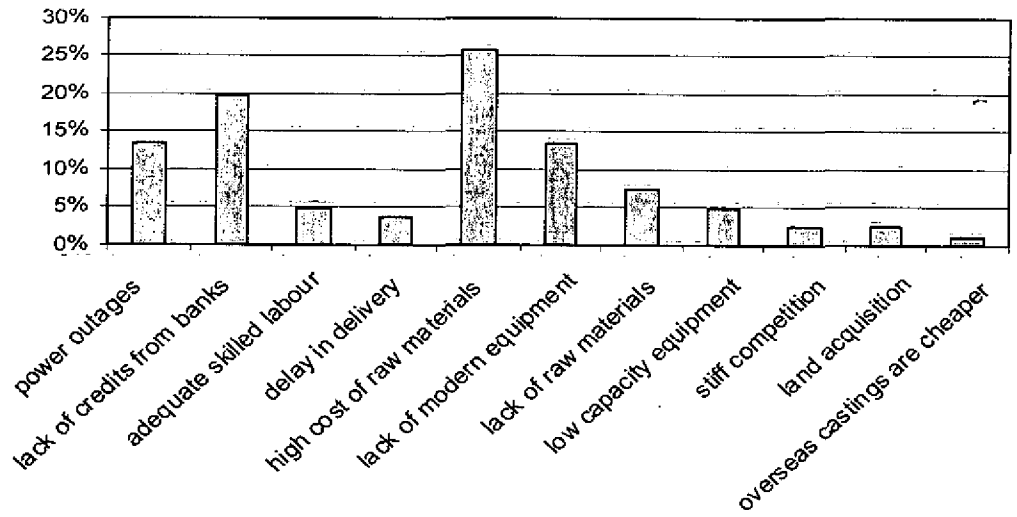
** Establishment size is defined on the basis of the number of persons engaged

*Challenges*

High cost of raw materials accounts for 26% of the major challenges facing producers in their operations. Lack of credits, followed with power outages and lack of modern equipment were also cited as major challenges. With regards to how producers were

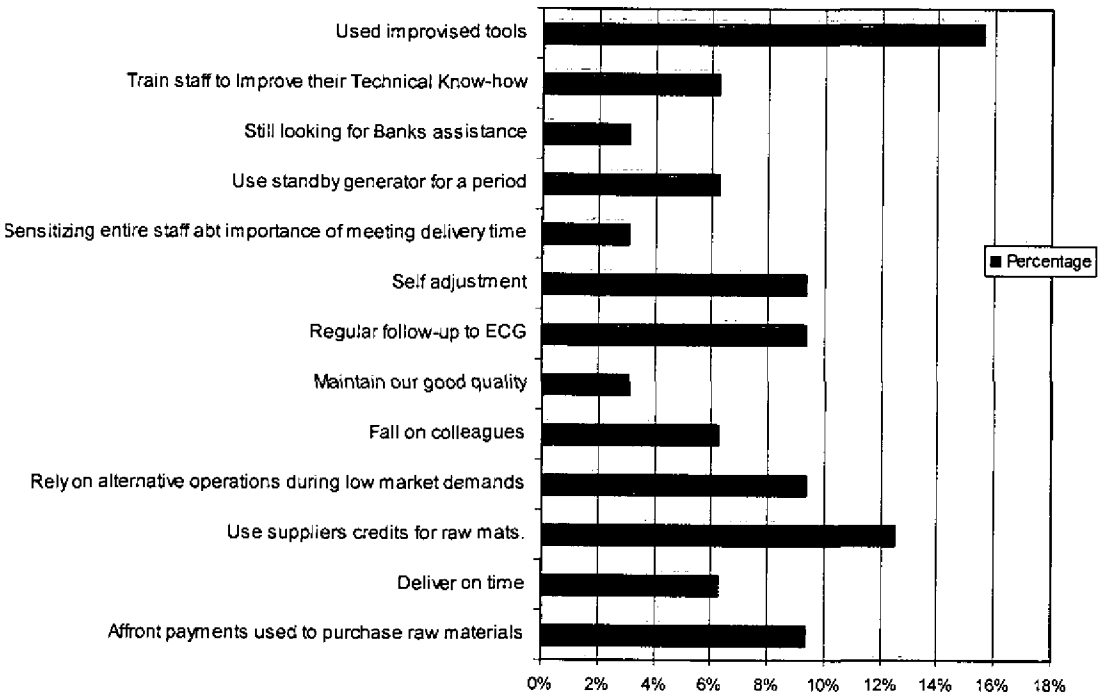
addressing these challenges, the use of improvised tools and materials accounts for about 16% of the listed ways.

Figure 3.3 Key challenges for producers




Among the key equipment currently used by producers, the Drilling machine, Guillotine machine, Grinding machine, Shaping machine, electric welding set and milling machine were found to be the most frequently used.

Figure 3.4 Ways by which challenges are addressed




### 3.1.2 Capital Goods Users

For this study, 51 capital goods users have been interviewed.

*Activities*

Major sectors of the domestic market using capital goods can be grouped into five (5) categories. 1) Manufacturing; 2) Vehicle repair and maintenance, 3) Metal working, 4) Sale of engineering materials and accessories; 5) Sale of automobile spare-parts

Table 3.2 Major sectors and products

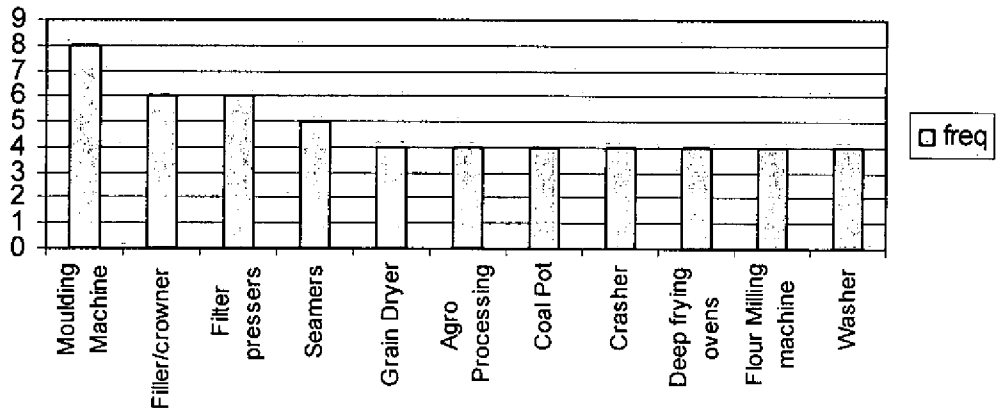
| Major Sectors | Product Group and Services |
|---|---|
| Manufacturing | Food processing machinery & equipment and farm implements, Improved cook stoves, commercial and domestic utensils, foundry products |
| Vehicle repair and Maintenance | Engine overhauling, auto electrical works, vehicle interior upholstery, auto body straightening & spraying |
| Metal working | Metal fabrication and plant construction using sheet metals, angle irons, channel irons, bars etc. |
| Sale of engineering materials & accessories | Sheet metals, bars, iron rods, steel sections. Hand tools, fasteners, electric motors, pumps etc. |
| Sale of automobile spare-parts | Used engines and parts, car decorating materials etc |
| | |

The users of capital goods constitute firms engaged in food processing, agro-processing, construction, manufacturing, wood, and health. About 80% of these user firms are limited liability firms out of which 40% got incorporated less than five years ago.

*Capital goods used*

Ninety five (95) different types of equipment were listed by users of capital goods. The most frequently listed equipment used by users is the moulding machine, filter pressers and filler/crowners. The table below lists the most frequently mentioned equipment used.

Figure 3.5 Types of equipment used by users of capital goods




The market research shows that about 84% of the users interviewed are planning new investments in machinery to increase production.

### 3.1.3 Support Institutions

The support institutions are GRATIS foundation, the Centre for Scientific and Industrial Research (CSIR) which constitute Food Research Institute and Industrial Research Institute (IRI); the College of Engineering (Kwame Nkrumah University of Science and Technology - KNUST), Polytechnics, Accra Technical Training Centre, Ghana Standard Boards, Ghana Pumps Services Ltd, all government owned; and the private institutions (Agbemskod Engineering Ltd, Dunkwa Continental Goldfields Ltd, etc).

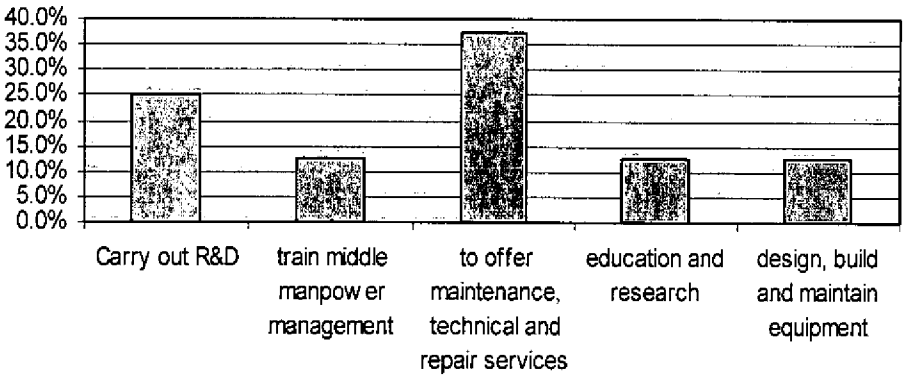
Apart from the private institutions, all the other support institutions were set up by Government. Most of these Government Institutions have been in existence as far back as 1970 and 1987.

*Activities*

These institutions provide:

- Training and support services for industries.
- Research, education and development services
- Technical supports
- Maintenance and repair services
- Design and build engineering equipment

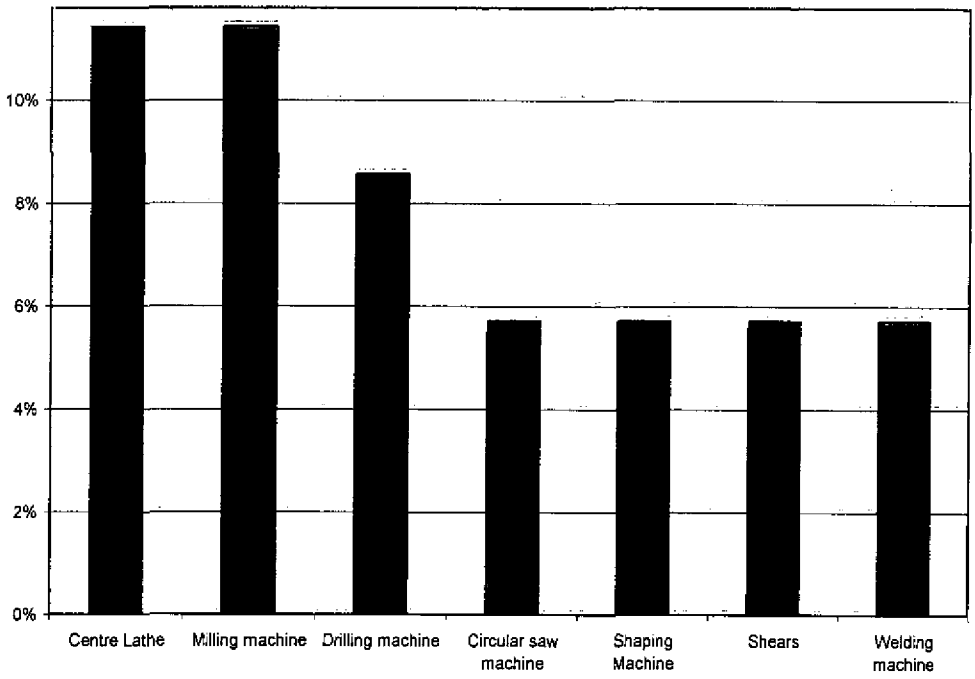
Figure 3.6 Purpose of being in business




*Capital goods used*

Support institutions currently mainly use the Central Lathe machine and the Milling machine. The table below shows the machinery mainly used by the support institutions.

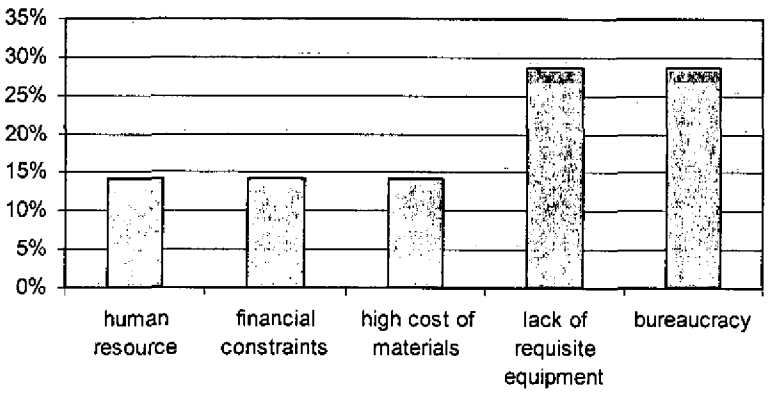
Figure 3.7 Type of machinery and equipment currently used by institutions




*Challenges*

The major bottlenecks preventing the institutions from achieving optimal services and delivery are the lack of requisite equipment and existence of bureaucracies. The figure below shows an overview of challenges to the support institutions.

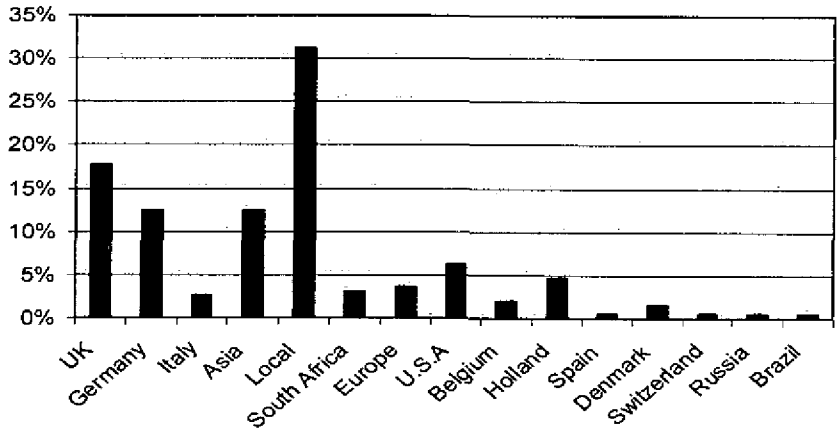
Figure 3.8 Factors limiting support institutions' ability to deliver optimal quality services



### 3.1.4 Suppliers

Apart from the local market, the major sources of raw materials, equipment and machinery used by users are UK, Germany, Asia, USA, Holland, rest of Europe, and South Africa. UK and Germany are the leading countries.

Figure 3.9 Main suppliers of capital goods




## 3.2 Size and capacity of the market for capital goods

### 3.2.1 Imports

The market study as included in the opportunity study (annex 12) reveals a significant growth in imports of capital goods. The total value of capital goods imported into Ghana was USD 4.6 billion[3]. The table below shows the division of these imports among the different types of product.

Table 3.3 Imports of capital goods

| Type of product | % of total imports | Amount in USD |
|---|---|---|
| Base metals and products of base metals | 7% | 0.32 billion |
| Machinery and transport equipment excluding automobiles | 51% | 2.35 billion |
| Automotive products | 42% | 1.93 billion |
| Total | | 4.6 billion |

### 3.2.2 Size of demand

According to the Market Research, 70% of the respondents mentioned that currently the biggest problem in their production cycle is the delay in delivery of (import) orders. If TICCG produces the parts and components that are currently imported in a more efficient way, it can be expected that a lot of customers will switch to products from the TICCG.

[3] Based on Ghana Customs Excise and Preventative Services (CEPS). The Statistical Services of Ghana and the WTO International Trade Statistics.

Imports of capital goods in Ghana amount up to USD 4.6 billion, of which USD 224.5 million is spent on products which could also be produced by the TICCG (also see annex 8 CEPS database).

## 3.3 Marketing concept

The marketing concept is the concept that businesses should analyse the needs of the customers and satisfy those needs better than the competition does. In this paragraph, the markets and target groups are identified and their needs analysed. Following to that, the four P's (product, price, place, promotion) can be defined as well as the anticipated competition. Finally, the sales program is explained.

### 3.3.1 Markets and targets groups

The main opportunity for the sector is the expected growing demand for capital goods in Ghana itself. Drivers for this demand growth are the political stability of the country, the expected economic growth and the government policy to enhance the industrialization of the country's industries. As can be derived from the market research the main sub sectors expected to grow further are:

- Agricultural Production
- Wood Processing
- Automotive Industry
- Food Processing
- Chemical Industry
- Textile Industry
- Mining and Construction
- Machine Tooling
- Water and Sanitation

It has been stated by the stakeholders that the TICCG is preferably to have a diversified market focus. However taken into account that some prioritization is necessary the TICCG is to focus initially on[4]:

- Food Processing Industry
- Agricultural Production Industry
- Machine Tooling

Of the total imports of capital goods, USD 83.7 million consists of relevant products for the TICCG, (also see the CEPS database of annex 8) given this market focus. The total market size in terms of products that could be produced by TICCG is therefore estimated 83.7 million. This includes a very wide range of products, and therefore the TICCG should initially focus on the most relevant products for the market segment targeted and of those products the ones most demanded:

[4] As concluded in the Stakeholder Workshop

Table 3.4 The market for TICCG

| HS Code | Product Description | Year 2004 CIF Import Value (USD) |
|---|---|---|
| 8455 | Metal rolling mills and rolls thereof; parts | 3,059,656 |
| 8456 | Machine tools for material removal by laser etc | 962,903 |
| 8457 | Machining centers, unit const mach etc work metal | 540,979 |
| 8458 | Lathes for removing metal | 812,532 |
| 8459 | Machine tools for drilling, boring, milling etc | 5,046,350 |
| 8460 | Machine tools for honing or finishing metal etc | 936,902 |
| 8461 | Machine tools for shaping, slotting, gear cut etc | 1,184,830 |
| 8462 | Machine tools for forging, bending, stamping etc | 4,285,224 |
| 8463 | Machine tools for working metal, nesoi | 2,065,351 |
| 8464 | Machine tools for working stone, etc & glass | 819,961 |
| 8465 | Machine tools for working wood, cork, bone etc | 12,276,534 |
| 8466 | Parts etc for machine tools of heading 8456 to 8465 (lathe, machine tools, etc) | 13,846,957 |
| 8432 | Agricult etc mach for soil etc; lawn rollers; pts | 3,369,140 |
| 8433 | Harvest etc machines, cleaning eggs etc nesoi, pts | 1,916,917 |
| 8434 | Milking machines & dairy machinery & parts | 887,307 |
| 8435 | Presses etc for wine, cider, fruit juice etc, pts | 298,858 |
| 8436 | Agri etc & poultry etc equip, inc incubators, pts | 3,440,223 |
| 8437 | Mach for cleaning seed etc & work cereal etc, pts | 10,883,521 |
| 8438 | Mach nesoi, ind prep of food or drink etc, parts | 18,215,097 |
| Total | | 83,664,412 |

### 3.3.2 Selected targets and strategies

*Product*

As stated the TICCG is to deliver the following products:

- Production of specialized capital goods and/or components
- Training and knowledge transfer
- Research and Development
- Facility Rental Services
- Finance Services
- Marketing and logistics

*Price*

The pricing method can be based on skimming prices as the service to be provided is going to be unique. The technology to be implemented in the TICCG will be the only technology of its kind in Ghana and therefore copying by competitors is not foreseen. In theory skimming pricing means that in the beginning prices will be higher, in order to cater for start-up investments.

- **Introduction phase**
  The first three years the price will be kept at this higher level. In these years, the early adaptors will be buying the product. This phase will be used to develop the market, to create awareness and to prove the concept and to prove the quality of production is meeting demands and can face quality of imported products.

- **Growth phase**
  After the development phase, the high skim price will be brought down and there is still solid growth due to lack of competition.

- **Maturity phase**
  In the maturity phase, growth will decline and due to the technology that has been developed by TICCG, competition will increase. At this stage, TICCG will have to defend its market share and change is sales strategy accordingly.

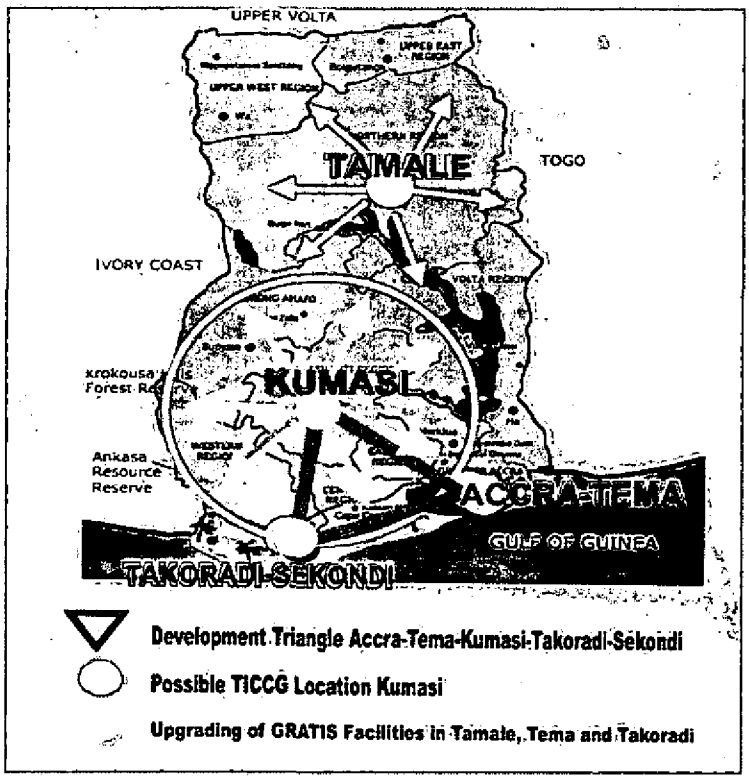
*Place*

The definition of the location of the TICCG will have to be studied in a detailed, separate location study. As indicated in figure 3.10 the Kumasi, region appears to be the most suitable place because of the following reasons:

- Presence of large number of industrial companies
- Presence of KNUST university for R&D cooperation
- Accessibility; a centre in the Kumasi region will have a wide reach

Besides the main centre satellite centres can be opened in Tema (stakeholders indicated the possibility to upgrade the GRATIS workshop in Tema) and in Tamale to catalyze the development of the industries for shea nuts, sorghum and cotton. Here, it could be efficient to upgrade the Tamale GRATIS workshop. In this feasibility studies, the investments in the main centre in Kumasi have been taken into account and the possible expansions to Tema and Tamale have been left out of this study.

Figure 3.10 Possible location of TICCG




*Promotion*

In the last year of the construction phase, marketing will be started in order to be able to sell in the first year of production. For this purpose, marketing/sales staff will inform the sector, start building customer relations, find out which product lines to implement and obtain production orders. After the construction phase, each business unit will get its own assigned sales staff, who of course can also promote the other products of the TICCG but who will focus on the business unit he works for.

In Ghana, the radio is a communication means which reaches many people, therefore, the radio will be an important channel of spreading the promotional message about the TICCG. Besides, advertisements will be placed in newspapers.

As the TICCG will be of great importance to the industry in Ghana and the centre fits well into the development strategy of the Government of Ghana, the government is also expected to put its effort in the promotion of the TICCG.

### 3.3.3 Anticipated competition

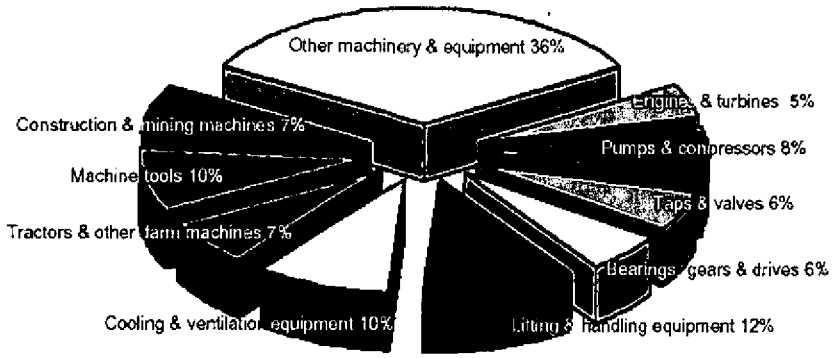
Ghana imports most of its capital goods from the European union, especially Germany and the United Kingdom.

It is expected that the Asian Capital Goods sector will expand and imports from countries as China and India will increase. Therefore, this study also looks at that competition.

*European Union*

The European Union is the largest producer and exporter of mechanical equipment in the world. There are twenty-one thousand enterprises involved in mechanical engineering producing € 360 billion of machines and mechanical equipment (2003).
The figure below shows the products made in by the 15 EU countries:

Figure 3.11 Production of EU countries




Source: EU Engineering Database

Strengths of the European capital goods sector

- Key know-how supply
- Technological edge
- The mechanical equipment made in the EU is of high quality.
- Access to export markets

Weaknesses of the European capital goods sectors

- Limited economies of scale due to specialised production
- Higher price than similar Asian products
- Investment in the Engineering Sector is too low
- Labour costs are relatively high

*Asia*

The most important issue of competition with the more advanced Asian NICs lies in the area of the development of the Asian countries. This process has gained momentum, and the Tiger countries are benefiting from the opportunities; big projects have been launched, especially in the automotive industry and exports of capital goods from Korea and Taiwan to Southeast Asia are booming.

The countries known as the "little tigers" - South Korea, Taiwan, Hong Kong and Singapore - have established themselves as successful machine exporters in competition with the industrialised countries. In the course of their export oriented industrialisation, the consumption of mechanical engineering products by these countries has grown at immense rates in the past decades. In general, these growth rates have offered domestic manufacturers good potential for development.

### 3.3.4 Sales programme

The sales programme is based on a push strategy. This implies that sales will be based on capacity as made available by the TICCG and that sales prices will be set a rate to recover the cost of implementation and operation. This strategy has been applied because of the high and growing demand and the string need for locally produced products and services.

Following is described the sales programme per line of service offering.

*Capital goods and specialized parts*
The Centre will have a flexible production line to meet the evolving market demand in Ghana. The TICCG will produce items that are currently above the capability of the current players and should be adjusting its output in line with the evolving capacities of the Ghanaian producers. The main focus of the TICCG will be the production of machine tools and parts in particular for the food processing industry, the agricultural production industry and the machine tooling industry. For this production, the TICCG will use so called CNC machines (see annex 6 for detailed description). These machines can produce a broad variety of tools and parts and are highly productive.

The sales price is set in accordance with the marketing strategy of price skimming and is based on the cost price of a unit of production and a mark-up. The average cost price of a unit of production is calculated as indicated in table 3.5

Table 3.5 Sales price calculation of output of production business unit

| Cost item | Cost per product USD |
|---|---|
| Raw material | 2.00 p |
| Labour | 2.50 |
| Depreciation on machines | 10.70 |
| Maintenance and repair of machines | 8.90 |
| Operating costs per CNC machine, (energy) | 15.60 |
| Direct cost price of the products | 39.70 |
| The initial sales price | 100.00 |

It is to be noted that electricity accounts for 39% of the cost price of units produced by CNC machines. This appears high though this is an average, some of these machines have multiple engines using a lot of energy, others are smaller and will use less. These machines and are very high productive machines which are increasingly replacing labour intensive production[5]. Some sources consulted state the following;

> **The downside of CNC machining**
> They are complicated machines, full of servomechanisims, and measuring technology that can measure to 0.005mm (0.0001") while covered in oil. A CNC machine has a minimum of 6 motors (including some to change tools, and one or more to pump oil and coolant various places). This translates to running costs that may be well over $1/minute. (The computer is not a significant part of the cost any more.)
> *Source: J. del Papa*

[5] As consulted with Mr. Woode

"CNC driven machines come in many forms, there are small machines using little energy and there are CNC machines for which one needs to build a power plant in order to run it. More specifications of the exact machines and the use are needed to make exact calculations of the energy consumption. Only very rough estimates can be made at this stage of the TICCG project"

*Source: Siemens Energy & Automation Machine Business, CNC Product Community*

Consequently the energy costs are based on the following:

- Operating costs per CNC machine: (USA prices) USD 30 per hour, totaling to 12* USD 60 = USD 360 per hour.
- Production per hour is 20.5 units. Per unit, operating costs will be USD 17.50,- at USA prices.
- USA electricity prices lay around 12% above Ghanaian electricity prices, therefore in Ghana operating costs per unit are set at USD5.60

The sales program is based on the production capacity of 12 CNC machines. Initially with a one shift labour force and is to grow rapidly in the first few years to stabilize at a 10% growth rate after the second shift is started in 2012 (also refer to paragraph 3.4.1).

As a result possible revenues of the core business line of production of specialised capital goods or components amount up to USD 3.3 million in 2008, implying approximately 4% of the current total demand. If the market is to grow on average with 5% per year, the market share of the TICCG is to grow to 9% in 2012 and 10% in 2018, implying conservative sales growth projections (amounts in USD million).

Table 3.6 Estimated sales of TICCG

| Year | Total Market Size | TICCG Gross Sales parts and components | Market share |
|---|---|---|---|
| 2008 | 83.7 | 3.4 | 4% |
| 2012 | 101.7 | 8.9 | 9% |
| 2018 | 136.3 | 13.1 | 10% |

*Training*

The TCCG has a facility to train 25 students at a time. The cost price of the training is built up as indicated in table 3.7.

Table 3.7 Cost price of a training course

| Cost item | Cost per training course USD |
|---|---|
| Depreciation of investment in equipment and furniture[6] | 82.58 |
| Cost of staff | 413.00 |
| Raw material | 80.00 |
| Total cost for training | 575.58 |
| Reservations for profit and contingencies | 184.2 |
| Total price | 760.00 |

[6] Investment in equipment and furniture for the training facility and student dorms as well as the canteen facility add up to USD 91,750.-, this will be depreciated in 10 years, leaving a scrap vale of 10%. This implies a depreciation of USD 82.58 per student

In the first year 75% of capacity is used (75 students) but it is expected that from year 2 onwards, total capacity will be used due to limited capacity and expected level of demand.

*Research and Development*

Research and Development services are demand driven, applied research and development. The client pays the researcher per hour for consulting services and materials will be added to this. Rates for consultancy services are around USD 300,- per day in Ghana. As technology and industrial R&D requires high skilled and continuously educated professional staff, a price of USD 400 per day/ USD 50 per hour can be justified for Research and Development services, including use of raw materials. Yearly nominal R&D capacity is 8,320 hours (4 engineers, having 40 available hours per week for R&D activities).

Capacity will not be used in the first two years due to start-up of the operations. In the third year, it is assumed that 50% of the hours used can be invoiced to clients. This is then expected to grow steadily with 10% per annum until the maximum capacity is reached in 2017.

*Facility Rental Services*

For the facility rental services, several testing and CNC machines can be rented for a half day, per machine, capacity is 720 (360 days x 2). There is one Coordinate Measuring Machine for Automated Part Inspection & Reverse Engineering and a number of tools that can be used. It is expected that in the first year, 50% of capacity will be used and demand will grow with an annual 5%.

For each half day, the costs are as indicated in table 3.8:

Table 3.8 Cost price of use of facilities

| Cost item | Cost price USD per half day |
|---|---|
| Depreciation | 31.25 |
| Labour | 32.80 |
| Energy consumption | 40.00 |
| Total costs | 104 |
| Contingencies | 15% |
| Profit margin | 15% |
| Price of a half day is | 125 |

*Finance Support*

Sales of Finance Support are hard to estimate at this point. The TICCG can attract the funds that are required by the sector, pay a certain amount of interest and charge a certain amount of interest. These are fluctuating and no research has been done about the finance demand in the sector, stakeholders have however indicated that a financing facility would be needed. Income from financing activities has not been taken into account in this model.

*Marketing and logistics*
These are consulting services, for which an hourly rate will be charged. At the start, the business unit will be set up by one professional staff member and one support staff member. According to the demand, additional staff will be attracted at a later stage. In the beginning, one professional staff member will have the capacity of 40 hours a week for consulting services. Charges for consulting services in Ghana are around USD 300 per day/ 37.50 per hour.

In the first 3 year, no chargeable hours are expected to be made as the department will be set up during that period. In 2011 the service unit is assumed to be operational and expected use of 50% of total capacity and a growth rate of 10% is expected. This way, maximal capacity will be reached in 2019.

## 3.4 Production programme required

### 3.4.1 Product

*Production of capital goods or specialized components*
The TICCG should be able to produce items that are currently above the capability of the current players and should be adjusting its output in line with the evolving capacities of the Ghanaian producers. Items expected to be produced are gears, parts and components and at a later stage, precision machines can be produced and sold, such as the CNC machines which are currently unavailable in Ghana. The machinery and equipment of TICCG will allow the centre to be flexible enough to meet this requirement.

The machinery for this production line allows a production of 20.5 units per hour. Growth of the production and sales is set up as follows:

- In the first year of production, 50% of the capacity is expected to be sold.
- As the market is a fast expanding one, a growth in sales numbers of 50% in the first year is considered feasible.
- This way, the total capacity of the factory operating with one 9-hours shift is reached in 2011.
- In 2012, a second shift will be necessary to meet demand.
- After 2012, a more moderate annual growth rate of 10% has been accounted for. In 2020 the factory will be producing at the top of its capacity when operating in 2 shifts. At that time extra investment can be considered or an extra shift can be implemented, starting to operate 24 hours a day. In this feasibility study, neither of these actions is considered.

The TICCG could produce for the local producers as a subcontractor and on its turn, it can also subcontract local producers if deemed necessary. The Centre could also produce items under license.

*Training*
A big gap is existing between the (unskilled) employees base in Ghana and the highly educated engineers graduated from for example the KNUST. In order to create a well trained middle layer of workers for the capital goods industry, the unskilled employees

base should be upgraded by providing the group with training in operating the machines, use and composition of (scrap) materials, etc. One course will take 12 classes with practice elements as well as theory. Per quarter, 25 students can be admitted. Therefore the nominal capacity of training is 100 trainings a year. The students will get the opportunity to work with the advanced machines of the production department. In the first year 75% of capacity is used (75 students) but it is expected that from year 2 onwards, total capacity will be used due to limited capacity and expected level of demand. In addition to the training facilities, the TICCG will explore possibilities to partner with comparable institutes or universities, both in the country and intenationally.

*Facility Rental Services*
For the facility rental services, several testing and CNC machines can be rented for a half day, per machine, capacity is 720 (360 days x 2). There is one Coordinate Measuring Machine for Automated Part Inspection & Reverse Engineering and a number of tools that can be used. It is expected that in the first year, 50% of capacity will be used and demand will grow with an annual 5%.

*Research and development*
Research and Development will be applied science and it is a demand driven service. Hours will be sold as consultancy hours. The hourly price includes raw materials. Initially, there are 4 engineers working at the Research and Development department, who all have a weekly 40 hours to spend on R&D activities. Therefore, the nominal capacity of R&D is assumed at 8,320 hours yearly. Capacity will not be used in the first two years due to start-up of the operations. In the third year, it is assumed that 50% of the hours used can be invoiced to clients. This is then expected to grow steadily with 10% per annum until the maximum capacity is reached in 2017. The R&D department will also be responsible for providing the latest information on technological innovation.

*Finance Support*
For the SME's in the sector it is hard to obtain loans for their investments, due to lack of creditworthiness. The TICCG will assist the sector by attracting funds in the capital market and in time provide the sector with loans. This activity will start after 3 years of production in order for the TICCG to build its Technology Innovation fund and its reputation first. A possible source of funds could be a Technology Innovation Fund that would be managed by the TICCG.

*Marketing and logistics*
The sector has indicated to need help with marketing and logistics including possibilities of ICT. This service will be set up from the date of start of operations of the TICCG but will start producing after a number of years. The services will be offered to the sector as consultancy services, charged for per hour.

Table 3.9 shows the production programme as used in the feasibility calculations.

Table 3.9 Production programme of TICCG

| Product | Start | End | Expected capacity inception | Expected capacity from 2012 |
|---|---|---|---|---|
| Production of capital goods or specialized components | 1/2008 | 12/2027 | 6,7200 | 134,400 |
| Training | 1/2008 | 12/2027 | 100 | 100 |
| R&D | 1/2008 | 12/2027 | 8,320 | 8,320 |
| Facility rental services | 1/2008 | 12/2027 | 720 | 720 |
| Financing services | 1/2008 | 12/2027 | - | - |
| Marketing and logistics | 1/2011 | 12/2027 | 3,840 | 3,840 |
| | | | | |

# 4 Project engineering

## 4.1 Technology and equipment

### 4.1.1 Technology description

An inventory has been made of the technology that Ghana is currently missing. According to this information a list has been composed of the machinery the TICCG will need (Annex 5).

The TICCG will have to produce a flexible number of gears, tools, parts and components. It will produce the standard products using forging and casting. However there are a lot of shapes that forging or casting cannot produce such as shapes with inside angles smaller than 90 degrees. For this purpose, computer numerical control (CNC) machines will be required.

Computer numerical control (CNC) machining is the basis for many near-net and net-shape manufacturing processes. Its advantages are the high accuracy that can be achieved as well as the large number of engineering materials which can be shaped by machining. CNC machines can be used to make shapes with inside angels, it can make very complex shapes including the moulds (tools) for forging/casting a product. Forging/casting and CNC machining are complementary. The forged or cast metal will is often finished by a CNC machine. For example, it can cut away at a material up and down a sloping profile in any degree specified. Each cutting path can also be programmed to be as close as 0.1mm. The implications are profound, as CNC parts require little or no secondary finishing work, and parts fit together the way they are designed. The centre will be equipped with 12 CNC machines and forging and casting machines as well as other equipment.

The main disadvantage of CNC machining is the complex process which is necessary to generate appropriate code for the CNC-path generation. The conventional CNC-code generation for a part with complex geometry can be a time-consuming task which has to be done by an experienced engineer. To simplify this task, several strategies have been developed which can help to make CNC based techniques useful for RP applications. Besides, a CNC machine has a minimum of 6 motors (including some to change tools, and one or more to pump oil and coolant various places). This translates to running costs that may be well over $1/minute[7].

[7] Source: J. del Papa "Forging, Casting and CNC machining" http://www.sheldonbrown.com/dp-forging.html

### 4.1.2 Rough layout of proposed equipment

The layout of the equipment is indicated in the site drawings included in annex 4.

### 4.1.3 Rough estimate of investment costs of equipment (classified as above)

As indicated in the list of machines and equipment required (annex 5), the total estimate the costs are around USD 12 million.

## 4.2 Determination of Centre's capacity

The capacity of the production business unit is 67,200 units at first. The feasibility study has based its assumptions on one single shift per days, 7 days per week. This results in a yearly output of 67,200 units. This can be increased up to 201,600 units by operating the machines 24/7.

## 4.3 Pre-selection of location

*Selection of the location*
At the stage of this feasibility study, the site has not yet been selected. It is therefore difficult to make very precise estimations and descriptions on the civil engineering works. The most attractive location will be in the Kumasi region, due to its accessibility and the possibility to cooperate with KNUST, also refer to figure 3.10.

A basic layout and an estimate of costs if the TICCG is to be constructed from scratch have been made. Paragraphs 4.4 and 4.5 describe the assumptions made.

The most important specifications for the location are (not limited to)

- Accessible by road
- Able to connect to municipal infrastructure (energy, water, communication)
- Possibilities for expansion

*Cost of the land*
Investment in land is based on high end price for industrial land in the Kumasi region, being USD 100,000 for a plot of land of 2 acres[8] .The area requirement for the industrial Centre of TICCG is 7,4 acre, totalling to around 29,940 m² (8,334m² of buildings and 12,000 m² of pavement, parking space, loading unloading facility and 9,000 m² of unpaved area, including two parts for future extension). For purposes of accommodation (1 acre) and expansion and development by the private sector (6,5 acre) the purchase of 15 acres of land has been assumed. No pavement is envisaged in this extra land. Total investment costs are therefore USD 750,000 for the purchase of land.

[8] Source: Ghana Institute of Surveyors, P.Longdon

## 4.4 Basic lay-out of the TICCG

For the cost estimates done at this stage, it is assumed the TICCG industrial centre will be build on a square plot of land of 205m by 145m (see Autocad Drawing in Annex 4). The industrial centre will exist of 15 buildings. Outside this industrial Centre, the accommodation facilities will be built, this includes bungalows for the three management staff and their families and the student dormitory.

Between the buildings there is a paved area for loading and unloading. Assumptions that are made in the basic layout proposal are:

- Water supply is available or near the site
- The area is served by all weather roads and/or railway lines
- The site is served by main sewer
- Electrical supply is available at or near the site: 33/11KV, 3 phase, 50 HZ.

As the location has not been chosen yet, a detailed study for civil works required needs to be done once the location has been determined and details of the plot of land are known. A reservation is made for this study in the pre production expenditures.

## 4.5 Civil engineering works

### 4.5.1 Site preparation and development

Site preparation and development is highly depending on the site that will be selected for the TICCG. The cost estimate for site preparation is based on an area that is attached to infrastructure; therefore no additional infrastructure is budgeted for. Pavement of the surface of the centre is based on the drawing in annex 4 and additionally there should be some pavement in the accommodation area. The main streets between the buildings and the loading and unloading facility will be paved, the rest of the plot will remain unpaved. There is a fence around the centre, the industrial area and the accommodation area will also be separated with a fence.

### 4.5.2 Buildings and special civil works

Of the 15 buildings on the TICCG area 6 are large buildings for production, storage and future extensions. Smaller buildings include a building for the teaching facilities, wash rooms, staff offices a canteen and a health facility, a canteen building including kitchen, a small building for the foundry shop and a heat treatment room, a building for fuel storage, a garage and a maintenance yard, a building for effluent treatment and a boiler room, a building for fire fighting and a pump room, water tanks, a gate house, a building containing a room for standby genset, a switch room, a transformer room, a maintenance store and a room for solid waste collection. The accommodation area will include three management bungalows and a student dormitory.

Total costs estimated for the construction works of the buildings is[9]:

| | | |
|---|---|---|
| Stores/warehouse | USD | 571,000 |
| Factory buildings | USD | 1,713,000 |
| Office buildings | USD | 62,675 |
| Training facility building | USD | 86,250 |
| Student dorms | USD | 143,750 |
| Bungalows for management (3) | USD | 258,750 |
| Health facility building | USD | 28,750 |
| Canteen building | USD | 57,500 |
| Washrooms | USD | 86,250 |
| Solid waste collection room | USD | 36,250 |
| Fencing | USD | 165,000 |
| | | ========== |
| Total | USD | 3,209,175 |

### 4.5.3 Rough estimate of investment cost of civil engineering works

Costs of civil engineering works exist for 60% of construction of the buildings, another 40% (USD 1,287,570) is reserved for other civil works. Costs of landscaping works are estimated to be 15% of costs of construction of buildings, being USD 482,839.
Total costs of construction of the TICCG are therefore around:

| | |
|---|---|
| Buildings | USD 3.2 million |
| Civil works | USD 1.3 million |
| Landscaping | USD 0.5 million |
| | ========== |
| Total | USD 5 million |

## 4.6 Fixed investment costs

Investment in land is based on high end price for industrial land in the Kumasi region.

Initial working capital is for the first year of production, in which half the nominal capacity is expected to be produced. It is assumed that the IICCG will be constructed and maintained in an environmentally friendly manner. The plant and equipment will be installed and maintained in accordance with international standards. The pre-production expenses include the costs for an environmental impact assessment.

[9] Source: Barbissotti Ltd and Consultant's calculations

Table 4.1 Fixed investment costs

| Cost item | Currency | No. yrs depreciation | Scrap value % | Cost project year 1 | 2 |
|---|---|---|---|---|---|
| Land purchase | USD | - | 100 | 750,000 | |
| Site development | USD | 20 | 10 | 482,838 | |
| Civil works buildings | USD | 20 | 50 | 4,989,334 | |
| Machinery and equipment | USD | 15 | 10 | | 12,000,000 |
| IT facilities | USD | 5 | 10 | | 160,000 |
| Transport facilities | USD | 5 | 10 | | 250,000 |
| Auxiliary and service plant equipment | USD | 10 | 10 | 968,000 | 185,750 |
| Pre-production expenditures | | 20 | 0 | - | |
| *Of which Pre investment studies* | USD | *0* | *0* | *250,000* | |
| *Of which preparatory investigations* | USD | | | *100,000* | |
| *Of which company formation fees* | USD | | | | *175* |
| *Of which procurement/ contracting* | USD | | | *50,000* | |
| | USD | | | *30,000* | |
| *Of which pre-production supplies, marketing* | USD | | | | *150,000* |
| *Of which Project management* | USD | | | *450,000* | *450,000* |
| | USD | | | *3,300* | *3,300* |
| *Of which recruitment and training* | USD | | | *7,500* | *120,000* |
| Initial working capital | USD | - | - | | 84,000 |
| Subtotal | | | | 21,001,359 | |
| Contingencies 10% | USD | | | 2,100,136 | |
| Total investment | USD | | | 23,101,495 | |

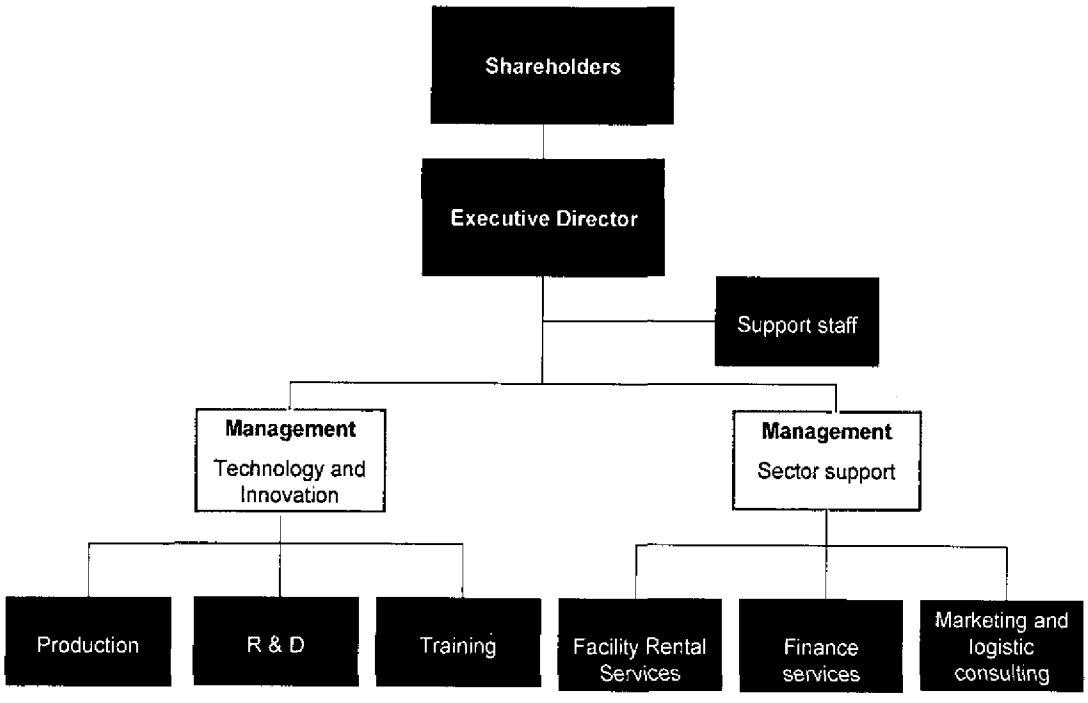
All depreciation is from linear to scrap

# 5 Draft specifications for the selected project alternative

## 5.1 Organisational design

The TICCG will provide a number of services as well as commercial production, training and R&D. All the activities should be located in different business units, or profit centres. As the TICCG has to be self-sustaining, each business unit should ideally be profitable on its own merits. The support staff service unit includes staff division supporting all business units and is not generating revenue itself. Support staff exists of sales and marketing staff, warehouse staff, gate keepers and other security staff, IT services, cooks and other canteen staff. Figure 5.1 shows the organisational design of the centre. The Training division will be managed by the school manager but will receive teaching input from all divisions and could provide the divisions with temporal staff as students will be able to apply theory in practise during internships in the various divisions. Each division will have its own responsible manager and teams will have a team leader.

Figure 5.1 Organisational design



## 5.2 Estimated human resources requirements and costs

It is assumed that the TICCG has 4 levels of employees and according wages[10]:
Skilled 1: monthly wage: 27,450,000 Cedis
Skilled 2: monthly wages of 10,000,000 Cedis
Unskilled 1: monthly wage of 2,000,000 Cedis
Unskilled 2: monthly wage of 1,500,000 Cedis.

*Labour overhead*
Labour overhead is 12.5% per annum.

### 5.2.1 General management

The general management will consist of 4 members.

### 5.2.2 Support staff

Support staff division exists of a number of disciplines, the table below shows the division of its 16 fte's

Table 5.1 Human resources for support staff

| Discipline | No. Skilled 1 | No. skilled 2 | No. unskilled 1 | No. unskilled 2 |
|---|---|---|---|---|
| Marketing | | 2 | | |
| Warehouse | | | | 2 |
| Security | | 1 | 3 | |
| IT | | 2 | | |
| Cooks | | | 2 | |
| Book keeping | | 2 | | |
| Canteen staff | | | | 2 |
| Total | 0 | 7 | 5 | 4 |

### 5.2.3 Production of capital goods or specialized components

Production is the most labour intensive department of the TICCG. There are 12 machining machines, which each need to be operated by operational workers (unskilled staff level 1). There are enough fte's for the shift of 9 hours and operation of 7 days a week under assumption of a 40 hours working week (19 fte). There are also other machines that need to be operated, therefore there will be 5 extra operational fte's. Besides, there will be a team leader on each shift assuming a 40 hours working week (1,5 fte skilled labour level 2) and 5,5 fte professional staff that will assist the operational staff, solve problems, repair machines etc. Besides, there is a group of 12 fte unskilled labour level 1, which receives training on the job and assist the operational workers.

[10] Source: wages for management and skilled staff have been indicated by the steering committee, wages for unskilled staff are based on the market research performed for the opportunity study.

Table 5.2 Human resources for production staff

| Description | Type | Monthly wages (Cedis) | Specification | No. production | |
|---|---|---|---|---|---|
| | | | | 2008 | 2012 |
| Skilled labour | Type 1 | 27,450,000 | General management | 0 | 0 |
| Skilled labour | Type 2 | 10,000,000 | Professional staff and team managers | 7 | 14 |
| Unskilled labour | Type 1 | 2,000,000 | Operational workers | 24 | 48 |
| Unskilled labour | Type 2 | 1,500,000 | Other unskilled staff | 12 | 24 |
| | | | | | |

### 5.2.4 Training

There will be 4 teachers working in the TICCG, all with different expertise. As there is only a limited number of students, the teachers will not work full time, therefore, the amount of fte for training is only 2.

Table 5.3 Human resources for Facility Rental Services

| Description | Type | Monthly wages (Cedis) | Specification | No. Training (Fte) |
|---|---|---|---|---|
| Skilled labour | Type 1 | 27,450,000 | General management | 0 |
| Skilled labour | Type 2 | 10,000,000 | Professional staff and team managers | 2 |
| Unskilled labour | Type 1 | 2,000,000 | Operational workers | 0 |
| Unskilled labour | Type 2 | 1,500,000 | Other unskilled staff | 0 |
| | | | | |

### 5.2.5 Facility Rental Services

The machines available for this department will be rented to the sector and there will be 2 skilled staff to assist in the operation of the machinery as well as one unskilled staff member to support.

Table 5.4 Human resources for Facility Rental Services

| Description | Type | Monthly wages (Cedis) | Specification | No. Facility Rental Services |
|---|---|---|---|---|
| Skilled labour | Type 1 | 27,450,000 | General management | 0 |
| Skilled labour | Type 2 | 10,000,000 | Professional staff and team managers | 2 |
| Unskilled labour | Type 1 | 2,000,000 | Operational workers | 1 |
| Unskilled labour | Type 2 | 1,500,000 | Other unskilled staff | 0 |
| | | | | |

### 5.2.6 Research and development

The Research and Development department depends highly on skilled professional staff. A number of 4 of professional staff and 2 support are assumed to be employed in this department.

Table 5.5 Human resources for research and development

| Description | Type | Monthly wages (Cedis) | Specification | No. R&D |
|---|---|---|---|---|
| Skilled labour | Type 1 | 27,450,000 | General management | 0 |
| Skilled labour | Type 2 | 10,000,000 | Professional staff and team managers | 4 |
| Unskilled labour | Type 1 | 2,000,000 | Operational workers | 2 |
| Unskilled labour | Type 2 | 1,500,000 | Other unskilled staff | 0 |
| | | | | |

### 5.2.7 Finance services

In the financing department, an initial number of 3 finance professionals will be attracted. One of them will be the team manager. The TICCG is expected to start giving finance solutions after the first 3 years of operation of the centre, but the staff will start working in 2008, setting up the department, manage relation ships, find funds etc.

Table 5.6 Human resources for Finance Support

| Description | Type | Monthly l wages (Cedis) | Specification | No. Financing |
|---|---|---|---|---|
| Skilled labour | Type 1 | 27,450,000 | General management | 0 |
| Skilled labour | Type 2 | 10,000,000 | Professional staff and team managers | 3 |
| Unskilled labour | Type 1 | 2,000,000 | Operational workers | 1 |
| Unskilled labour | Type 2 | 1,500,000 | Other unskilled staff | 0 |

### 5.2.8 Marketing and logistics

Marketing and logistic department will have 1 professional staff and 1 unskilled staff to begin with. It is expected that marketing and logistic services will be started to be provided after the first three years of operation. However, this staff will start working from the start of 2008 in order to set up the department, obtain expertise etc.

Table 5.7 Human resources for marketing and logistics

| Description | Type | Monthly wages (Cedis) | Specification | No. Marketing and logistics |
|---|---|---|---|---|
| Skilled labour | Type 1 | 27,450,000 | General management | 0 |
| Skilled labour | Type 2 | 10,000,000 | Professional staff and team managers | 1 |
| Unskilled labour | Type 1 | 2,000,000 | Operational workers | 1 |
| Unskilled labour | Type 2 | 1,500,000 | Other unskilled staff | 0 |
| | | | | |

### 5.2.9 Total staff

The total staff amounts up to 91te. Table 9.8 shows the division of the fte's between the business units.

Table 5.8 Total human resources TICCG

| Business unit | Number fte 2008 | Number of people |
|---|---|---|
| General Management | 3 | 3 |
| Service staff | 16 | 16 |
| Production of capital goods or specialized components | 43 | 43 |
| Training | 2 | 4 |
| Facility Rental Services | 3 | 3 |
| Research and development | 6 | 6 |
| Finance Support | 4 | 4 |
| Marketing and logistics | 2 | 2 |
| Total | 71 | 81 |

# 6 Financial plan and funds mobilization strategy

## 6.1 Business results of TICCG

This chapter starts with the description of the business results of the TICCG assuming the input as described in annex 1 and this feasibility study report. This chapter only highlights the most important results of the feasibility calculation. For full details please refer to annex 2.

Paragraph 6.2 gives an introduction to project finance and shows a selection of development banks and other finance sources relevant for the TICCG in Ghana.

Paragraph 6.3 gives an introduction to private sector involvement. Paragraph 6.4 translates the previous paragraphs into a financial plan for the TICCG.

### 6.1.1 Net income statement

The net income statement shows costs and expenditures of the project during the entire planning period. Income from operations is considered against costs of that where needed to achieve this income. The table below shows the ratios generated from the preliminary net income statement of TICCG every 5 years. For more details and yearly figures please refer to annex 2.

Table 6.1 Cost and expenditure ratios

| Ratios | 2008 | 2013 | 2027 |
|---|---|---|---|
| Net profit to equity (%) | -1.72 | 22.47 | 21.95 |
| Net profit to net worth (%) | -1.73 | 12.76 | 5.33 |
| Net profit + interest to investment (%) | 3.60 | 14.00 | 14.78 |
| | | | |

### 6.1.2 Balance sheet

The balance sheet of the TICCG shows its wealth and how this is financed. A summary of the balance sheet is shown in the table below. For details please refer to annex 2.
The table shows that retained profits are high, this is because there have not been made any assumptions about company policy and Ghanaian business law with regards to profit retaining. Retained profits are available for re-investments

Table 6.2 Balance sheet of TICCG

| | 2008 | 2013 | 2027 |
|---|---|---|---|
| TOTAL ASSETS | 24,101948 | 28,424,895 | 113,078,259 |
| Total current assets | 610,487 | 9,255,778 | 94,222,741 |
| Total fixed assets | 23.290.874 | 19,169,117 | 18,855,518 |
| Accumulated losses brought forward | 0.00 | 0.00 | 0.00 |
| Loss in current year | 200.587 | 0.00 | 0.00 |
| TOTAL LIABILITIES | 24.101.948 | 28,424,895 | 113,078,249 |
| Total current liabilities | 4.389 | 8,097 | 12,896 |
| Total long term debt | 12.325.788 | 9,988,139 | 0.00 |
| Total equity capital | 11.771.771 | 12,021,771 | 27,559,271 |
| Reserves retained profit brought forward | 0.00 | 4,239,835 | 79,475,975 |
| Retained profit | 0.00 | 2,167,053 | 6,030,117 |
| Net worth | 11.571.184 | 12,862,105.25 | 113,065,363 |

### 6.1.3 Cash flow

The cash flow table for financial planning shows the cash flows of the project. For the table please refer to annex 2. In the construction phase, the cash flow table shows negative cash balances as in the assumptions, interest on loans in those two years has not been financed. A grace period can be negotiated with the bank to solve this problem.

The discounted cash flow table of annex 2 shows the net present value of the as well as the payback period. The normal payback period a 0.00% is 8.03 years (2014), the dynamic payback period, including the discounting rate of the total investment at 12%, is 12.74 years (2018)

| | 2008 | 2012 | 2027 |
|---|---|---|---|
| TOTAL CASH INFLOW | 3,462,000 | 7,878,800 | 14,125,000 |
| Inflow operation | 3,462,000 | 7,878,800 | 14,125,000 |
| Other income | 0.00 | 0.00 | 0.00 |
| TOTAL CASH OUTFLOW | 1,533,261 | 4,027,928 | 7,422,990 |
| Increase in fixed assets | 0.00 | 250,000 | 435,750 |
| Increase in net working capital | 47,433 | 38,927 | -191 |
| Operating costs | 1,393,861 | 2,804,291 | 4,550,419 |
| Marketing costs | 91,967 | 91,697 | 91,967 |
| Income tax | 0,00 | 841,743 | 2,345,046 |
| NET CASH FLOW | 1,370,634 | 3,850,872 | 6,702,010 |
| CUMULATIVE NET CASH FLOW | -17,715,082 | -6,705,692 | 76,757,246 |
| | | | |

### 6.1.4 Net present value

The net present value for this project at 12,06.% is USD 7,943,651. Investment in the project can thus be considered profitable.

## 6.2 Fund mobilization

Having assessed the feasibility of the project as positive, this paragraph will present some possible sources of funds.

The heart of the financing of TICCG, is the project company - a special purpose vehicle (SPV), which consists of a consortium of shareholders; sponsors and lenders and others who may have interest in the TICCG, such as contractors and operators. The SPV is created as a separate legal entity, and in doing so it is possible to segregate project related cash flows and contracts from other governmental activities.

The SPV enters into contractual agreements with number of parties necessary to finance the project. The contracts stipulate each party's roles and make clear their liabilities, such as, methods of construction, financing and operation of the facilities. Included are also procedures to be implemented in the event of default, and what should happen when unforeseen circumstances are encountered.

During the operation phase, the SPV generates a stream of revenues that come from sales and tariffs for services. These revenues are used to service loans and other agreements.

### 6.2.1 Criteria, terms and conditions

Before deciding on whether to invest in the TICCG, potential investors evaluate the project using both quantitative and qualitative measures. As a fundamental, the investors require certain basic legal, regulatory and economic conditions throughout the life of the project. These include various investment agreements; especially those related to debt, including a number of terms and conditions.

Also, investors in developing and emerging countries may select their investments on the basis of, for example, environmental viability, geographical location, political stability, income level of Ghana, and the benefits the project will bring to the local economy.

### 6.2.2 Participants

Finance in developing and emerging countries typically brings together an array of participants both domestic and foreign. The participants may be grouped into the following three general classes: (a) *Private sector participants*, such as contractors, operators and commercial banks. (b) *Government and government entities,* local and foreign, and (c) *Multilateral institutions*, for instance the World Bank and the African Development Bank. When financing a project in Ghana, the involvement of multilateral agencies is essential to attract commercial financing, as their involvement underpins the project and covers risks, which may be undesirable to the private sector. Multilateral institutions interesting for the TICCG are the following:

- World Bank (IBRD)
- World Bank (MIGA)
- African Development Bank
- Africa Development Fund
- National Investment Bank,
- Agricultural Development Bank,
- International Commercial Bank
- Trust Bank

*Word Bank: International Bank of Reconstruction and Development (IBRD)*

Background

IBRD supports middle-income countries, which generally have some access to private capital markets. IBRD offers loans at near-market terms but with long maturities. It finances wide range of activities aimed at creating the physical and social infrastructure necessary for poverty alleviation and sustainable development.

Eligibility

Eligible counties must fall under the category of *middle-income* countries, which is per capita income of less than $5,115. Also, that they have limited access to other loans on reasonable terms.

Priorities

Proposed project must represent a priority activity for the country's development.

Allocation

IBRD allocates its resources evaluating "... where its involvement ... is likely to make the most impact". The project must also promote development goals of the country; financial return must generate sufficient revenues to meet debt obligations and finally, the project must be economically, environmentally and socio-economically viable.

Funding terms and conditions

| | |
|---|---|
| **Facilities:** | Loans |
| **Length of facilities:** | 15-20 years |
| **Grace period:** | 3-5 years |
| **Repayment structure:** | Annual basis |
| **Interests/service charges:** | Variable or fixed spread, which generally represents app. 50 basis points over IBRD costs. (IBRD has a triple A rating) |
| **Currency denomination:** | One of the major currencies, some cases local currency |

Guarantees

IBRD also offers different kind of guarantees; these are *partial risk, partial credit, enclave* and *policy-based guarantee*. Governments, government-owned entities, and privatised or private sector entities are all eligible. Service charges are manifold and include guarantee and standby fee (max 125 bps/annum), front-end and processing fee (up to 1,5%) and initiation fee (0,15% or USD 100.000). For guarantees provided in IDA-only countries IBRD charges guarantee fee and standby fee (curr. 400 bps/annum), and front-end, initiation and processing fee.

Other

IBRD can make loans to any entity within the country, including any of its political subdivisions and any private company or other enterprise located in the country (requirement for a country guarantee). The average lead-time for an IBRD loan is approximately two years, during which time projects undergo extensive evaluation.

The IBRD is much more involved in the activities of its borrowers than are most other financial sources.

*Multilateral Investment Guarantee Agency (MIGA)*

Background

MIGA's mission is to promote foreign direct investment into developing countries, to support economic growth, reduce poverty and improve people's lives. MIGA promotes foreign investment by bringing together foreign investors, host governments, and project sponsors. MIGA provides investment guarantees against certain non-commercial risks to eligible foreign investors for qualified investments in developing member countries.

Eligibility

Investment projects should contribute to host country needs, such as job creation, technology transfer, and export generation. The projects must also be financially, economically, and environmentally sound.

Allocation

*Investments:* new, cross-border investments originating in any member country and destined for any developing member country. Also new investment contributions associated with the expansion, modernization, or financial restructuring of existing projects, and acquisitions involving privatisation of state enterprises.
*Applicant:* must be a national of a member country other than the country in which the investment is to be made. Corporations or financial institutions are eligible if they are either incorporated in and have their principal place of business in a member country or if they are majority-owned by nationals of member countries. State-owned corporations are also eligible if they operate on a commercial basis.

Procedure

Applicants submit a confidential preliminary application before the investment is committed. Once investment and financing plans are established, applicants submit a definitive application along with relevant project documentation.

Terms and conditions

| | |
|---|---|
| **Facilities:** | Guarantees |
| **Transaction:** | Insures normally $110 mill. per project, but can go up to $200 mill. |
| **Coverage period:** | 15-20 years |
| **Coverage:** | Foreign investments that can be covered include equity, shareholder loans, and shareholder loan guaranties. *Equity investments* for up to (i) 90% of the investment contribution, (ii) 450 percent to cover earnings attributable to the investment. *Loans and loan guaranties*, up to (i) 90% of the principal, (ii) 135% to cover interest that will accrue over the term of the loan. *Technical assistance contracts* and other contractual agreements, up to 90% of total value of payments due under the insured agreement. |
| **Repayment structure:** | Paid annually |
| **Premium rates:** | Per project, according to the specific risks to be guaranteed |

Other

MIGA can cover against *transfer restriction*, *expropriation*, *breach of contract*, and against *war and civil disturbance*. Regardless of the nature of the project, an investor is required to remain at risk for a minimum of 5 percent of any loss.

*African Development Bank (AFDB)*

Background

The ADB is a regional multilateral development bank, engaged in promoting the economic development and social progress of its member countries in Africa. The Bank

promotes amongst others infrastructure projects by providing financial support through direct equity investment and the provision of loans.

Eligibility

The enterprise must be lo located and incorporated in a regional member country of the Bank. It must be privately owned and managed, be self-sustaining and leave adequate surplus income for sustainability in the medium and long-term.

Priorities

The Bank focuses its assistance in areas, which portend long-term development prospects for the private sector in Africa. It also gives a special attention to national and multinational projects and programs, which promote regional integration.

Procedure

Contact is made directly with the bank and it undertakes a comprehensive appraisal of the applicant enterprise and the project for which assistance is sought.

Funding, terms and conditions

| | |
|---|---|
| **Facilities:** | Loans |
| **Length of facilities:** | Max. 20 years |
| **Transaction:** | 33,3% or max USD15m |
| **Grace period:** | Maximum 9 years |
| **Repayment structure:** | Semi-annually |
| **Interests/service charges:** | Fixed or variable interests with a 0,5% margin. Commitment charge 1% p.a. |
| **Currency denomination:** | Loans are approved in UA (unit of account) and disbursed in either local currencies or other currencies. |

Other

The Bank can also provide equity investments, quasi-equity, guarantees, lines of credit, loan syndication and underwriting.

*The Africa Development Fund (ADF)*

Provides low cost loans to low income member countries

The African Development Fund provides development finance on concession terms to low-income regional member countries, which are unable to borrow on the non-concession terms of the Bank. In accordance with its lending policy, poverty reduction is the main aim of Fund development activities in borrowing countries.

Sources of funds and replenishment

Its sources of funds are mainly contributions and periodic replenishments by State Participants. The Fund is normally replenished on a three-year basis, unless State Participants decide otherwise. The total subscriptions, at the end of 1996, amounted to USD12.58 billion.

The Fund finances projects and technical assistance as well as studies.

Funding, terms and conditions

| | |
|---|---|
| **Facilities:** | Loans |
| **Length of facilities:** | Up to 50 years including a grace period |
| **Grace period:** | Maximum 10 years |
| **Repayment structure:** | Semi-annually |
| **Interests/service charges:** | No interest charge. Commitment charge 0,5% p.a. and statutory commission 0,75% p.a. |
| **Currency denomination:** | Loans are approved in UA (unit of account) and disbursed in either local currencies or other currencies. |

### 6.2.3 Funding strategy

The TICCG can be funded through issuing different combinations of debt, equity and hybrid instruments. It is in the interest of the shareholders to minimize their equity contributions, as equity commands higher rate of return, and as such is more expensive than the costs of using debt. On the other hand, lenders will always seek comfortable level of equity from shareholders to ensure that the project sponsors are seriously committed to the project and have vested interest in seeing the project succeed. Thus, projects with strong cash flows and low risk can be structured with low levels of equity, whereas higher risk weak projects require higher equity levels. In this feasibility study, the conservative assumption is made that 50% of the project will be financed with equity.

During the construction phase a project does not generating any revenues to service loans and agreements. For such projects, lenders will often defer repayment of capital until the construction phase is completed and the project is generating revenues - this is called Grace Period. For this project repayment of capital is assumed to start in 2008 for commercial loans and the development bank is expected to grant a grace period for 5 years.

Once a project has passed the development phase, often including construction, its risk profile reduces. With positive cash flows, the project sponsors will want to refinance the project to obtain better financing terms and lower rates for the rest of the project's life. This can result in restructuring of debt to equity ratio. For this purpose an exit strategy for equity holders is often specified in the contractual agreement - it typically involves selling participation to the project sponsors or selling the investment via public offering. In this feasibility study this is not taken into account and it is assumed that the debt/equity ratio for initial investments remains stable. For the re-investment needed for machinery and equipment, no debt/equity ratio has been assumed as these are future management decisions. It is therefore automatically assumed by the COMFAR expert model to be paid for from equity.

## 6.3 Possibilities of private participation

A variety of public-private project structures have been suggested for all kinds of projects. These structures differ in the manner, how public- and private sector entities share the responsibilities, risks, and rewards associated with the project. Most projects fit within one of the following categories: Management and lease contracts; Concession. (incl. Greenfield projects); and Divestiture. However, boundaries between these categories are not always clear, and some projects have features of more than one category.

In PPP contracts, a number of contract items can be combined in an innovative contract. Chapter 6 will discuss the different innovative contract forms in more detail.

Design – The architecture/design of the structure and buildings of the TICCG, this can also include design or selection of the machinery and equipment, depending on the contract form used (if operations are included in the contract, this could very well be negotiated in the contract)

Build – Construction works and if applicable the equipment of the centre

Maintain – Maintenance of the industrial park, this can include maintenance of the machines and equipment

Finance- Finance of the TICCG

Operate - Operations of the TICCG, 'running the business'

### 6.3.1 Management and lease contracts

The private entity takes over the management of a state-owned enterprise for a fixed period of time, while ownership and investment decisions remain with the state. These contracts provide little potential for expanding service coverage, or for increasing investment obligations.

*Management contracts*

Management contracts transfer the responsibility for operations and maintenance of a government-owned entity to the private sector. Under such contract, ownership of the entity and the responsibility for service provisions remain with the government, likewise, the bulk of the commercial risk and all capital- and investment risks.

Management contracts generally have duration of three to eight years, and the compensation may be in the form of fixed fees, be linked to performance indicators or include revenue sharing. On contrary to fixed fee compensation, performance-based and revenue sharing contracts give contractors incentives to improve operating efficiency, and achieve timely compliance with the milestones set forth in the contract.

Management contracts are most beneficial where the main objective is to rapidly enhance public enterprise's efficiency or to prepare for a deeper level of PPP. They are also attractive when there is strong political or public resistance to increasing the price of services or where there are concerns about handing over control of investments to a private partner.

*Lease contracts*

Under lease contracts, a private firm (lessee) leases the assets from government authority (lessor) and assumes full responsibility for operations and partial responsibility for investments for a certain period, usually between 10-15 years.

Typically under lease contracts, the users' fee (or tariff) is used to pay the "Lessee Fee", which remunerates the Lessee for costs, plus a reasonable return. The remainder of the tariff goes to the government and is used to fund further capital investments. As the Lessee's fee is dependent upon revenues, it assumes much of the commercial risk of the operation. The Lessee's profitability will therefore depend to a large degree upon how much it can reduce costs, while still meeting the quality standards set forth in the lease agreement.

Leases are most appropriate where there is scope for large gains in operating efficiency but only limited need or scope for new investments. Leases have also sometimes been advocated as a stepping-stone towards a deeper level of PPP.

### 6.3.2 Concession

Under concessions (incl. greenfield projects), the private partner (Concessionaire) bears overall responsibility for the services, including operation, maintenance, and management, as well as capital investments for rehabilitation and renewal of assets, and for the expansion of services. The fixed assets either remain in the property of the public authority, or are revert to public ownership at the end of the concession period.

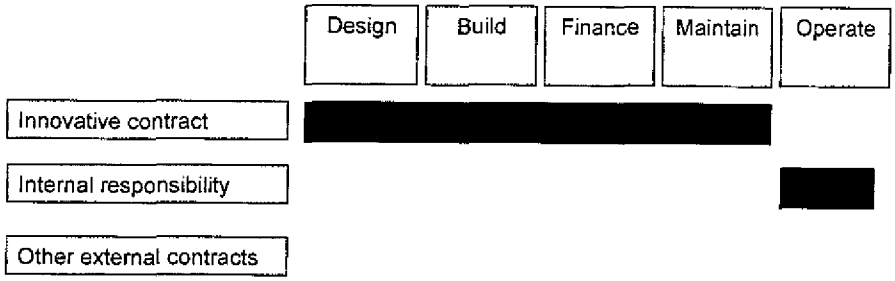
Concession contracts usually have duration of twenty to thirty years, depending on the type and the level of investment. Concessions are typically awarded based on price, with the award going to the bidder proposing to provide the services and meet the investment targets for the lowest fee or tariff. The concession is governed by a contract, which sets out service standards, performance incentives, arrangements for capital investment, mechanisms for adjusting fees or tariffs, and arrangements for dispute resolution.

The Concessionaire is paid for the services directly by the clients, based on contractually set prices. The Concessionaire retains the balance of revenues after paying back any taxes and charges levied by the government. Combining the responsibility for operations and investments under a concession agreement provides the Concessionaire with an incentive to make efficient decisions regarding investment and technological innovations, because the operator will benefit directly from any efficiency improvements.

*Innovative contract: Design, Build, Finance, Maintain (DBFM)*
In the DBFM contract, the development agency is contracted for the design of the works, the building , the financing and the maintenance once the construction phase is finished. The machinery and equipment can also be included in the contract. In a DBFM contract, the initial construction works are followed by an industrial park management services contract for a longer period (up to 20 to 30 years). This contract includes repairs, improvements and maintenance. Private companies or a group of companies (a consortium, for instance made up of a building contractor, a funder and a landlord) will be the contracted party.

The private company or the consortium will own the TICCG facilities and after the concession period, ownership will be transferred to the Government of Ghana. The company or consortium that wins the contract is responsible for financing the construction costs and if applicable also the investment in machinery and equipment. The private party receives an annual management fee from the Government of Ghana. This contract form is comparable to an operational lease contract.

Figure 6.1 DBFM contract




A DBFM contract form has some advantages over the traditional procurement method:

- DBFM creates life cycle optimisation (the contract includes maintenance of the building and, if applicable, the machines and equipment during the entire life cycle of the TICCG)
- financial incentives such as bonuses can be built in for purposes of quality optimisation
- Quality can be enforced by withholding payments in case of failure or in case contractual agreements have not been met.
- The private party will have banks to provide the funds for the investments. Banks will ensure that the contract is of very high quality before they accept the risk. Therefore, the quality of the contract and business plan will be ensured.

The stakeholders have indicated that Government of Ghana's equity should be at least 50% of the investments as this project is to be seen to have both developmental as commercial purposes. At a later stage, shares can be sold to the private partner or investment funds. The remaining 50% should be financed with loans. Therefore, the DBFM contract or any other PPP contract including private financing is not applicable for this project as in those cases, the ownership of the TICCG will be (partly) in hands of the private sector.

## 6.4 Finance Plan

It is assumed that debt/equity for initial investments will be divided on a 50/50 basis in accordance with generally accepted financing principles for start-ups in emerging markets.

Table 6.3 Finance plan for TICCG

| Source of finance | Interest/return on equity | Percentage of total | Repayment |
|---|---|---|---|
| Local equity | 16% | 50% | |
| Foreign equity | 18% | 0% | |
| Development bank loan | 5% | 25% | 10 instalments, starting 2013 |
| Commercial long term debt | 12% | 25% | 15 instalments starting 2008 |

Equity participation is assumed to the Government of Ghana initially, as the Client indicted to be desirable. At a later stage, shares could be sold to private (foreign) shareholders (e.g. investment funds or private concessionaires).

Commercial long term debt is assumed to be attracted internationally as well as nationally. International interest rates will probably be below the 12% estimated, but the interest rate in Ghana are quite high; lending rate is 28% in September 2005 according to Bank of Ghana. Consequently commercial loans are expected to be attracted against an average of 12% return on investment.

Commercial local banks focus mainly on short term credit, but commercial banks that could be consulted for a loan are: Ghana Commercial Bank, Standard Chartered Bank (Gh) Ltd., Barclays Bank (Gh) Ltd., SG-SSB Limited, Metropolitan Allied Trust Bank. Local development banks are National Investment Bank, Agricultural Development Bank, International Commercial Bank, and the Trust Bank.

# 7 Sensitivity analysis for different alternatives

In order to test the robustness of the financial viability a sensitivity analysis has been performed. The analysis assesses the impact of the change of several key variables on the payback period and the net present value.

It can be concluded that no pessimistic value of a key variable will lead to a negative net present value and that consequently the model can be assessed as fairly robust. It can also be concluded that the model is most sensitive to changes in sales price. It should be noted that no scenario is tested with all variables set at a pessimistic level.

## 7.1 Inflation

The investments and raw materials used in the TICCG are imported whereas sales are projected to be focussed on Ghana. Therefore, if inflation of Cedis is higher than that of the USD, project results might be affected. This paragraph shows the main results assuming that the inflation in Ghana remains stable around 15% and the inflation in Europe and the USA will remain around 2.5%

Taking inflation into account is positive for the profitability of the investments. This can be explained as the income is expressed in USD and the salaries and wages are expressed in Cedis. The larger part of the project is expressed in USD.

Table 7.1 Sensitivity relating to payback period

| | Normal payback 0% | Dynamic payback 12% |
|---|---|---|
| Reference scenario | 8.48 years | 13.19 years |
| Inflation | 6.58 years | 8.19 years |
| | | |

Table 7.2 Sensitivity relating to Net present value

| | Net present value |
|---|---|
| Reference scenario | 7,943,651 |
| Inflation | 10,702,767 |
| | |

## 7.2 Business units

- The TICCG exists of a number of business units, it may however be interesting in terms of business results to focus on one or less of the business units. To

determine which are the critical variables having the greatest share of cash inflow and outflow, the cash flow structures as provided in annex 2 have been analysed. It is clear that production of capital goods or specialized components is the most critical factor in the success of the TICCG. Therefore, variations in price, sales numbers and project inputs focus on this business unit.

## 7.3 Price

For the variable 'price' the pessimistic scenario means that prices are set too high and should be lowered to USD 60 to generate the sales numbers projected. The optimistic scenario states that sales number remain the same, if prices are increased to USD 110.

If the prices of sales are at USD 90, the dynamic payback moment will fall after 15.44 years of production. If prices increase to USD 110, payback period will be a lot shorter.

Table 7.3 Sensitivity relating to payback period

| | Normal payback 0% | Dynamic payback 12% |
|---|---|---|
| Reference scenario | 8.48 years | 13.19 years |
| Pessimistic scenario (price = 90) | 9.18 | 15.44 |
| Optimistic scenario (price = 110) | 7.93 | 11.67 |
| | | |

The table below shows the net present value for the different options.

Table 7.4 Sensitivity relating to net present value

| | Net present value |
|---|---|
| Reference scenario | 7,943,651 |
| Pessimistic scenario (price = 60) | 4,213,823 |
| Optimistic scenario (price = 100) | 11,646,534 |
| | |

## 7.4 Prices of raw materials

Prices of raw materials can fluctuate. The pessimistic scenario increases the price of steel with 1USD/kg, the optimistic scenario reduces the price of steel with 1 USD/kg.

Table 7.5 Sensitivity relating to payback period

| | Normal payback 0% | Dynamic payback 12% |
|---|---|---|
| Reference scenario (prices = USD 4 per tonne) | 8.48 years | 13.19 years |
| Pessimistic scenario (price = USD 5 per tonne) | 8.52 years | 13.28 years |
| Optimistic scenario (price = USD 3 per tonne) | 8.45 years | 13.09 years |
| | | |

Table 7.6 Sensitivity relating to net present value

| | Net present value |
|---|---|
| Reference scenario | 7,943,651 |
| Pessimistic scenario (price = USD 6 per tonne) | 7,748,005 |
| Optimistic scenario (price = USD 4 per tonne) | 8,139,296 |
| | |

## 7.5 Prices of labour

If the TICCG is unable to attract staff required against the salaries used in the feasibility study, salaries should be increase. In the pessimistic scenario, salaries are increased with 5%. In the optimistic scenario, TICCG can find a lot of staff and salaries can be decreased with 5%

Table 7.7 Sensitivity relating to payback period

| | Normal payback 0% | Dynamic payback 12% |
|---|---|---|
| Reference scenario | 8.48 years | 13.19 years |
| Pessimistic scenario (salary increase 5%) | 8.51 | 13.12 |
| Optimistic salary decrease 5%) | 8.45 | 13.26 |
| | | |

Table 7.8 Sensitivity relating to net present value

| | Net present value |
|---|---|
| Reference scenario | 7,943,651 |
| Pessimistic scenario (salaries increase 5%) | 7,800,487 |
| Optimistic scenario (salaries decrease 5%) | 8,086,816 |
| | |

## 7.6 Energy prices

Energy prices fluctuate and they are a large part of production costs (39%). In the negative scenario they will increase with 10% and in the optimistic scenario they will decrease with 10%.

Table 7.9 Sensitivity relating to payback period

| | Normal payback 0% | Dynamic payback 12% |
|---|---|---|
| Reference scenario | 8.48 years | 13.19 years |
| Pessimistic scenario (price = increase of 10% | 8.65 | 13.67 |
| Optimistic scenario (price decrease of 10%) | 8.43 | 13.05 |
| | | |

Table 7.10 Sensitivity relating to net present value

| | Net present value |
|---|---|
| Reference scenario | 7.943,651 |
| Pessimistic scenario (price = increase of 10% | 6.979.040 |
| Optimistic scenario (price decrease of 10%) | 8.228.027 |
| | |

# 8 Institutional and legal framework

## 8.1 Legal requirements

In the paragraphs below the requirements and points of special interest when setting up a company in Ghana have been listed. Please refer to annex 5 for more insight in the costs of starting a company in Ghana.

### 8.1.1 Operational approvals, consents and permits

The following requirements exist with regards to operational approvals, consents and permits:

- Incorporation or Registration of the Technology Innovation Centre for Capital
- Goods ("TICCG") at the Registrar General's Department to facilitate its corporate activities and to own property.
- Registration with the Ghana Investment Promotion Centre for the grant of requisite investment benefits and incentives.
- Approval/consent of the Bank of Ghana for the transfer of foreign currency as required for operation of the Owner, including any amounts payable by the Owner to the Contractor pursuant to the Agreement, but not for operation of the Contractor or its Subcontractors.
- Approval by the appropriate Governmental Authorities that the Owner (and the Contractor and its Subcontractors) are exempt from customs duties and similar charges on the import and export of Equipment and Materials to and from the Republic of Ghana in connection with the New Facility, subject to the Contractor's provision of pertinent documentation, including arrival schedules, lists of equipment, import declarations, and bills of lading.
- Approval by the Commissioner of Internal Revenue that the Owner and the Contractor and its non-resident Subcontractors are exempt from tax and withholding taxes on payment of management and technical services fees and interest, value-added taxes, stamp duties, National Health Insurance Levy, and similar taxes and imports in the Republic of Ghana.
- Work/residence permits as required for personnel of the Owner and the Operator, but not for personnel of the Contractor or its Subcontractors.
- Republic of Ghana's Environmental Protection Agency's approval of the New Facility with regards to emission controls, pollution, waste disposal etc, under the Environmental Protection Agency Act 1994 (Act 472).

### 8.1.2 Land or property acquisitions

Acquisition of land and or building ("Premises") for the TICCG consists of the following legal activities.

- Identification of the Owner(s) of the land or building.
- Examination of Site Plan and or Title Deeds to the Premises.
- Official search at the Deeds/Lands Registry to confirm or verify Ownership of the Premises.
- Drafting of appropriate Deed or Instrument to transfer Ownership of Premises to TICCG.
- Payment of approved compensation to Owner of Premises.
- Registration of acquired premises in the name of TICCG.

### 8.1.3 Building or structure for the Technology Innovation Centre for Capital Goods

For the building and structure of the TICCG, a number of legal steps need to be taken:

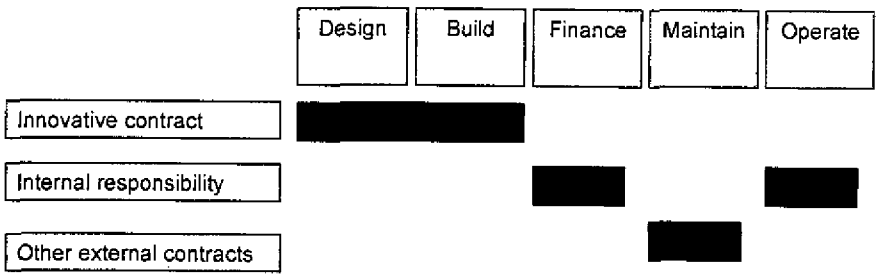
- Drafting of Agreements for Architects, Quantity Surveyors, and Contractors etc.
- Obtaining building Permits and developmental plans.
- Drafting and execution of Labour Contracts for variety of Labourers and Workmen.
- In case of a Public Private Partnership, some of the above legal steps will move to the private partner, depending on the type of contract negotiated. Paragraph 5.1.4 give information about different innovative contract forms that could be applicable for TICCG. Figures 6.1 to 6.4 show the responsibilities each party has in the different contract forms. The five items to be contracted can be combined in other combinations as well.

### 8.1.4 Contact forms

*Design - Build*

The contracts for the construction works can be granted in a Design-Build contract, in which the construction company provides the design for the TICCG civil works and the subsequently builds the TICCG complex. The Government of Ghana is responsible for the financing of the project as well as operating, operations can be contracted out to another party in a management contract.

Figure 8.1 DB contract

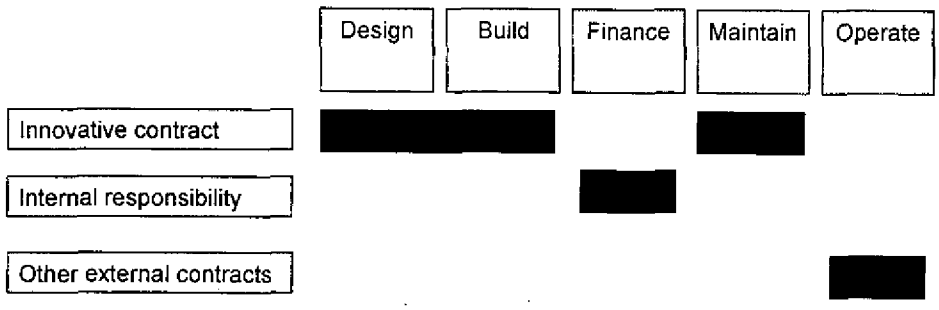


*Design, Build, Maintain*

In the DBFM contract, the development agency is contracted for the design of the works, the building , and the maintenance once the construction phase is finished. The management contract for the maintenance can be granted for short term periods as well as for long term period, ranging from 5 years to up to 20 years , according to the wish of the contracting parties. This contract includes repairs, improvements and maintenance. Private companies or a group of companies (a consortium, for instance made up of a building contractor and a landlord) will be the contracted party.

The ownership of the TICCG will in his case be with the Government of Ghana.

Figure 8.2 DBM contract




A DBM contract form has some advantages over the traditional procurement method:

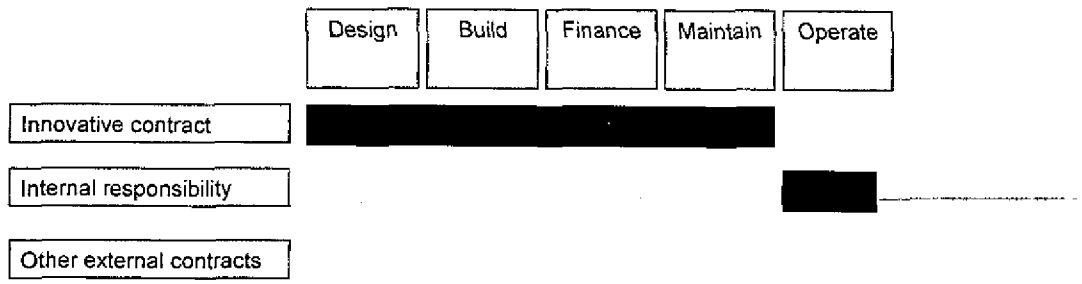
- financial incentives such as bonuses can be built in for purposes of quality optimisation
- The party that designs and builds the TICCG will also be the party that will maintain the centre, therefore budget for maintenance can be reduced as the design and has been adapted to be the most efficient in terms of maintenance.

*Design Build, Finance, Maintain (DBFM)*

In the DBFM contract, the development agency is contracted for the design of the works, the building , the financing and the maintenance once the construction phase is finished. The machinery and equipment can also be included in the contract. In a DBFM contract, the initial construction works are followed by an industrial park management services contract for a longer period (up to 20 years - the life cycle of the TICCG). This contract includes repairs, improvements and maintenance. Private companies or a group of companies (a consortium, for instance made up of a building contractor, a funder and a landlord) will be the contracted party.

The private company or the consortium will own the TICCG facilities and after the concession period, ownership will be transferred to the Government of Ghana. The company or consortium that wins the contract is responsible for financing the construction costs and if applicable also the investment in machinery and equipment. The private party receives an annual management fee from the Government of Ghana. This contract form is comparable to an operational lease contract.

Figure 8.3 DBFM contract



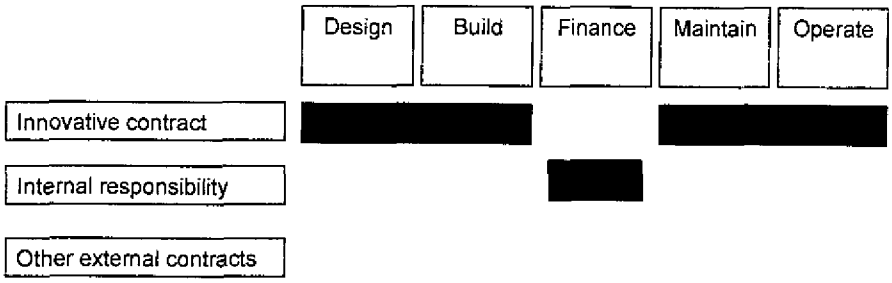

A DBFM contract form has some advantages over the traditional procurement method:

- DBFM creates life cycle optimisation (the contract includes maintenance of the building and, if applicable, the machines and equipment during the entire life cycle of the TICCG)
- financial incentives such as bonuses can be built in for purposes of quality optimisation
- Quality can be enforced by withholding payments in case of failure or in case contractual agreements have not been met.
- The private party will have banks to provide the funds for the investments. Banks will ensure that the contract is of very high quality before they accept the risk. Therefore, the quality of the contract and business plan will be ensured.

*Design, Build, Maintain, Operate*

In a DBMO contract, the Design of the Centre, the construction (Build), the Maintenance and Operations of the TICCG will be for the account of the private consortium. The Government of Ghana will have to finance the investments. Ownership of the centre will be with the Government of Ghana. Management contracts can be granted for a shorter period than in case of a contract including private financing.

Figure 8.4 DBMO contract




For the Government of Ghana, the advantages of the DBMO contract are:

- financial incentives such as bonuses can be built in for purposes of quality optimisation
- The design of the centre will be done by the party that has to operate and maintain it, therefore efficiency of the centre will be optimised.
- Ownership of the centre will be with the Government of Ghana, who has expressed its wish to be the owner in at least the first years.

### 8.1.5 Employment and labour issues

When employing staff in Ghana, the following laws should be taken into account:

- Issuance of contracts of Employment in consonance with the dictates of the Labour Act, 2003, (Act 651) which mandates, *inter alia* that Notice of Termination of Employment and Remuneration on termination of employment be given to all employees.
- The Social Security Law 1991 (PNDCL 247) stipulates a compulsory pension plan for all employees in Ghana.

### 8.1.6 Intellectual and industrial property rights

It is important that the TICCG protects its products and findings with Copyrights, Licenses, Patents, Trademarks and other property rights. These must be actively protected by registration and observance and performance of relevant protocols and conventions.

### 8.1.7 Insurance and security

Insurance and Securitization of the Capital Goods to be imported or purchased are recommended. The cost of insurance and registration of chattel mortgages will depend on the declared value of the goods.

### 8.1.8 Change in law

- The TICCG may negotiate a Government Consent and Support Agreement which shall accord it specific exemptions and insulate it from changes in law with regard to import and export restrictions and taxes.

In case the Government of Ghana chooses to work with one of the innovative contracts or PPP forms as described in paragraph 5.1.4, it is recommended that the relevant legislation will be reviewed and if applicable adapted in order to access the legal feasibility and sustainability of the contract form.

# 9 Project implementation, including pre-investment phase

## 9.1 Proposed approximate implementation time schedule

For this project, a construction phase of 2 years is assumed. After that, a planning horizon of 20 years has been incorporated as per the Terms of Reference. However, it has to be kept in mind that the model does not allow for additional construction during the operational part of the project. It is therefore assumed that capacity will not increase during this period.

In view of the stakeholder acceptance of the concept it is recommended to implement the project as soon as possible. This implies to undertake the following activities upon agreement of the findings of this study.

Table 9.1 Implementation Plan

| Activity | Start | End |
|---|---|---|
| 1. Mobilise the necessary funds both within the Government of Ghana as well as the funding from other sources. Initially the necessary funds amount up to USD 2.4 million for the pre-production expenditures and the acquisition of land. | Ongoing | Dec '05 |
| 2. Setup a Project Implementation Unit to be responsible for the implementation of the TICCG. | Dec '05 | Dec '05 |
| 3. Define a location for the TICCG through a detailed location study and acquire the land or agree on a lease contract. | Jan '06 | March '06 |
| 4. Agree with the involved municipality (or municipalities) on allocation of responsibilities and risks. | March '06 | April '06 |
| 5. Define the tender and contracting strategy for the implementation and operation of the TICCG. | Jan '06 | March '06 |
| **Pending on the tender and contracting strategy, the following activities need to undertaken or allocated to the management of the TICCG:** | | |
| 6. Define the specifications for the construction of the civil works | April '06 | June '06 |

| Activity | Start | End |
|---|---|---|
| | | |
| 7. Define the specification of the utilities | April '06 | June '06 |
| 8. Define the specifications of the transport facilities | April '06 | June '06 |
| 9. Define the specification for the machinery equipment | April '06 | June '06 |
| 10. Recruitment of staff | June '06 | Dec '06 |

Consequently the contract for the works can be tendered mid 2006 and it construction works could start before the end of 2006 and be finalised by the end of 2007 or beginning of 2008.

## 9.2 Estimated implementation costs

The implementation costs of a new business are estimated around Cedis 1.5 million. Please refer to annex 5 for an overview of all costs involved in setting up a company in Ghana. The pre-investment phase has already started and is expected to last until 1 January 2006. A number of studies have to be performed such as a location study, a detailed business case should be drafted including the exact products to be produced, the input requirements, the operational costs etc. After that, the feasibility study should be updated according to advancing insight of the exact business of the TICCG. For these studies, an amount of USD 350,000 has been reserved in this study. The table below gives an overview of the other costs involved in the implementation of the TICCG.

Table 9.2 Implementation Costs

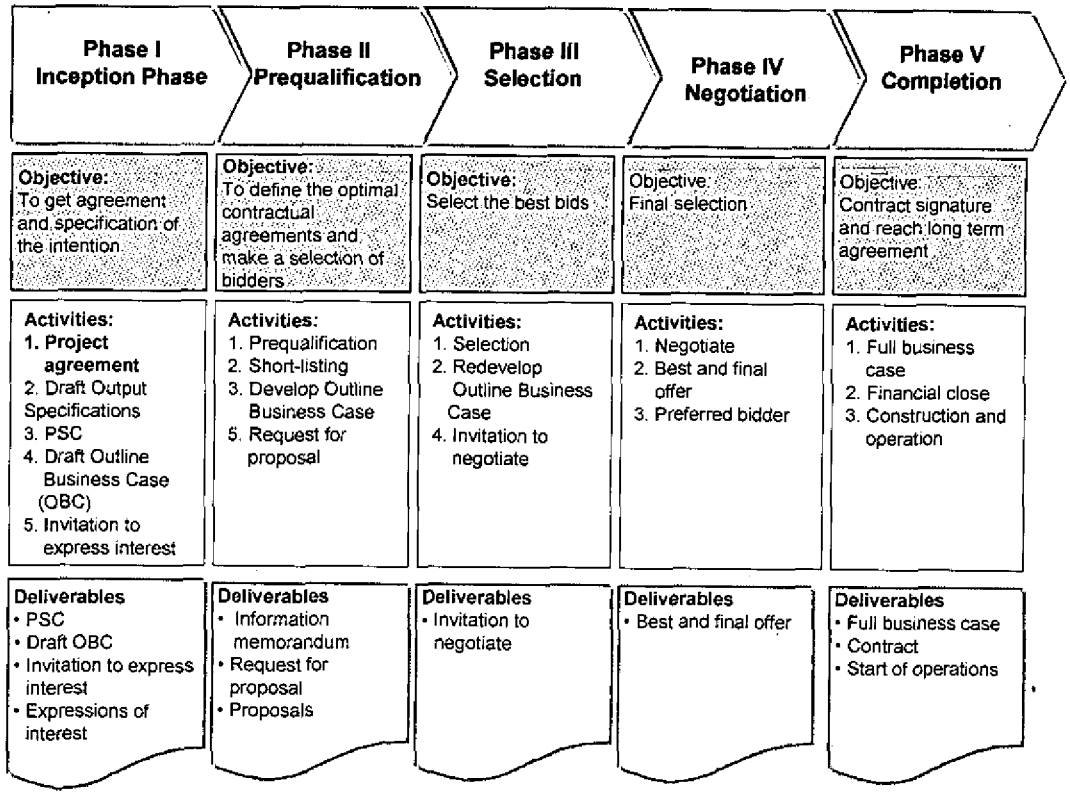
| Cost item | Currency | Amount year 1 | Amount year 2 |
|---|---|---|---|
| Pre investment studies | USD | 250,000 | |
| Preparatory investigations | USD | 100,000 | |
| Company formation fees | Cedis | | 1,500,000 |
| Procurement/ contracting | USD | 80,000 | |
| Preproduction supplies, marketing | USD | | 150,000 |
| Project management | USD | 450,000 | 450,000 |
| Recruitment and training | USD | 7,500 | 120,000 |
| **Total** | **USD** | **887,500** | **720,000** |

In case of a innovative PPP contracting strategy, costs of procurement will increase as well as the time needed for procurement. Paragraph 7.3 shows the tender process in case of use of an innovative contract.

## 9.3 Tender process

The figure below gives a schematic overview of the tender process in case of use of a innovative contracting strategy, the objectives of each phase, the activities in the different phases of the project and the results or deliverables of each phase.

Figure 9.1 Tender process




### 9.3.1 Phase I Inception

*Objective*

The objective of this phase is to get agreement between the stakeholders about the necessity of the work, about the desired output and the way to procure the project (DB or traditional versus PPP).

*Activities*

First of all, when the necessity of the works has been agreed upon, a draft output specification needs to be formulated for which the opportunity and feasibility study will be the base documents, indicating exactly which products and services will have to be produced and which quality is required. The requirements for the industrial area and the buildings and civil works have to be specified in detail. After that, a Public Sector Comparator shall be done, considering the costs of the project when contracted in the traditional way (Government of Ghana contracting different parties for the pre-investment, studies, design, build, management contracts etc, ) versus the costs of the project when a innovative contract such as DBM, DBFM or DBMO is to be used and assessing which type of contract offers most value for money. When a choice has been made between both contracts, a draft Outline Business Case will need to be agreed upon, including output specifications and payment mechanisms. After that, an invitation to express interest should be published along with the Draft Outline Business Case.

*Deliverables*

1. The results of the Public Sector Comparator
2. Draft Outline Business Case
3. A published invitation to express interest
4. Expressions of interest of different private parties/consortia.

### 9.3.2 Phase II Prequalification

*Objective*

The first objective is to make a selection of the bidders that have expressed their interest (shortlist). Besides, there has been time to continue working on the output specifications and the payment mechanisms. The expressions of interest might provide new insights that help optimise those documents.

*Activities*

After studying the expressions of interest, a shortlist will be produced of the preferred partners. The Information Memorandum will have to be written based on the outline business case. This can be revised after studying the expressions of interest and therefore has to be send again to the short listed firms.

*Deliverables*

1. Information memorandum
2. Request for proposal
3. Proposals

### 9.3.3 Phase III Selection

*Objective*

The objective of the selection phase is to select the best bids and to invite one or a restricted number of bidders for negotiation.

*Activities*

After studying all the proposals thoroughly, the best proposal(s) shall be selected. The selected bidders will receive an invitation to negotiate. In the meantime, bidders might have made remarks concerning the information memorandum which are to be included. A redevelopment of Outline Business Case or output specifications or payment mechanisms can therefore take place in this phase.

*Deliverables*

This phase will result in an invitation to negotiate to the best bidder(s) and if applicable to a revised output specification or payment mechanism.

### 9.3.4 Phase IV Negotiation

*Objective*

The negotiation phase is meant to bridge possible differences between the outline business case and the bid(s) received. The ultimate objective is to make the final selection

of the bids (if not already done so in the previous phase) and to agree on the terms and conditions of the contract, the output to be considered etc.

*Activities*
After the first negotiation round, in which the Government of Ghana has the opportunity to request more information, amend deliverables, review of the basis of design and remarks about the costs calculated by the bidder, the bidder gets the change to amend the bid accordingly and to present its best and final offer. This is the basis on which the Government of Ghana will make the final selection.

*Deliverables*
1. Best and final offer

### 9.3.5 Phase V Completion

*Objective*
The objective of this phase is to sign the contract and to start the works.

*Activities*
In this phase, the contracted bidder will develop a full business case in close cooperation with the Government of Ghana. The business case is to include the construction works and in case of a DBM, DBFM or DBMO contract, it will also include the output specification for the maintenance contract including financial incentives. In case of a DBFM a financing plan of the whole project will have to be included. After that, the construction and subsequently the operations and maintenance will start.

*Deliverables*
1. Full business case
2. Contractual agreement
3. Operational works

Please note that depending on the selected contractual form, this process might include Design, Build, Finance Maintain, Operate or any combination of those. Each of the items not included in the innovative contract, should be arranged internally (within the Government of Ghana and other stakeholders) or externally through other contracts.