A Critical Assessment of the Technical and Vocational Education and Training Programme for the Libyan Chemical Industry

By

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ABSTRACT

Libya traditionally suffers from a shortage of skilled manpower. A network of Technical and Vocational Education and Training (TVET) institutions were introduced in Libya, for the purpose of enhancing the supply of skilled manpower needed for the manufacturing industry and the national socio-economic development plans. The shortage of qualified manpower, such as engineers and technicians, skilled workers, is largely attributable to the failure of TVET to supply the country with its requirements of trained manpower in scope of manufacturing industry. The assumption behind this research is that Higher Education Institutions (HEIs) in general and TVET in particular suffer from a lack of appropriate planning mechanisms and procedures for the linking TVET with manufacturing industry.

This study was exploratory and descriptive in nature and used a quantitative research method. This study presents initial results from a survey of students at HEIs; and engineers and technicians at a manufacturing industry. It investigates their perception regarding TVET programmes as well as work-related issues in Libya. Some of the research key findings are: there is a substantial mismatch between the outcome of TVET and the exact requirements of the Libyan manufacturing industry; most of the TVET suffer from limited human and physical resources, and the unavailability of a framework for the development of TVET and to assist in organising the link and narrow the gap between Libyan TVET institutions and chemical manufacturing industry. On the bases of the data analysis and the findings, recommendations for a framework to strengthen the link between TVET providers and manufacturing sector has been put forward to be used by educational planners in Libya in establishing or improving existing TVET. Some suggestions are also made for further research to address the issue of acceptance of industrial and vocational work and related influencing factors.

Key words: Higher Education, Technical and Vocational Education and Training, Libya, manufacturing Industry.

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DECLARATION

I declare that the work presented in this thesis entitled 'A Critical Assessment of the Libyan Vocational Education and Training for the National Manufacturing Industry' has not previously been submitted for a degree or similar award at Edinburgh Napier University or any other institution. To the best of my knowledge and belief, no material in this thesis has been previously published or written by another person, except where due reference is made.

This thesis includes material that has been published in internationally refereed conference proceedings and international journal papers. The following is a list of publications of the candidate, which are direct products from this thesis:

1. **Triki, N., Gupta, N., Rafik, T. and Wamuziri, S. (2009).** Review of Curriculum Delivery for the Libyan Manufacturing Industry. *International Conference on Engineering Education and Research, "Engineering Education and Research under Knowledge Based Society"* ICEE/ICEER, 23-28 August 2009, Seoul, Korea. ISBN 978-89-963027-1-1.

2. **Triki, N., Gupta, N., Rafik, T. and Wamuziri, S. (2009).** A Survey on the Effectiveness of the Curriculum for the Libyan Manufacturing Industry. *International Conference on Engineering Education and Research, "Engineering Education and Research under Knowledge Based Society"* ICEE/ICEER, 23-28 August 2009, Seoul, Korea. ISBN 978-89-963027-1-1.

3. **Triki, N., Gupta, N., Rafik, T. and Wamuziri, S. (2009).** A Critical Evaluation of Vocational Education and Training Requirements for the Libyan Manufacturing Industry. *International Conference on Engineering Education and Research, "Engineering Education and Research under Knowledge Based Society"* ICEE/ICEER, 23-28 August 2009, Seoul, Korea. ISBN 978-89-963027-1-1.

4. **Triki, N., Gupta, N., Rafik, T. and Wamuziri, S. (2009)**. An Assessment into the Technical Skills Gaps in the Libyan Manufacturing Industry: Students' and Engineers' Perception about Strategies and Policies. *International Conference on Human Capital Development "Enhancing Human Capital Development through Different Roles and Perspectives"*, 25-27 May 2009, University Malaysia Pahang, Malaysia. ISBN 978-967-5080-51-7.

5. **Rafik, T., Treadwell, P., Triki, N., Gupta, N. and Najah, R. (2008)**. An Investigation into the Technical Skills Gaps in the Libyan Manufacturing Industry. *International Conference on Engineering Education, "New Challenges in Engineering Education and Research in the 21st Century"*, 27-31 July 2008 Budapest, Hungary. ISBN 978-963-7298-20-2.

Journal Paper

Triki, N., Gupta, N., Rafik, T. and Wamuziri, S. (2010). An Investigation into the Role of Engineering and Technical Education in Providing the Skills needed by the Libyan Manufacturing Industry. *International Journal of Engineering Education, Vol.26, No.1, PP.195-204. ISBN: 0949-149X/91*

Journal Paper under Consideration

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The soul of my father; Mohamed,

My beloved mother; Najia, the first and best ever school from whom I learnt the alphabet of life,

My beloved wife; Gamela, the best spouse, brilliant companion; and superior manager,

My beloved children, Reham and Monther, the source of my happiness and contentment, for making it possible for me to come this far in my educational career.

ABBREVIATIONS

The meaning of the abbreviations used in this research is listed in alphabetical order bellow:

AICs	Advanced Industrial Countries
APEC	Asia Pacific Economic Cooperation
CPD	Continue Professional Development
EIS	Employment Insurance Scheme
EHEA	European Higher Education Area
GDHVECs	General Directorate of Higher Vocational Education Colleges
GAIT	General Authority for Information and Telecommunication
GCCI	General Company for Chemical Industries
GPCE	General Peoples' Committee of Education
GPCEVT	General People's Committee for Education and Vocational Training
GSEC	General Secondary Education Certificate
GDP	Gross Domestic Product
HE	Higher Education
HEIs	Higher Education Institutions
HRD	Human Resource Development
IABS	Internal Administrative Boundaries System
IBRD	International Bank for Reconstruction and Development
IIP	Investors in People
ILO	International Labour Office
IT	Information Technology
KOMA	Korea Manpower Agency
KRIVET	Korean Research Institute for Vocational Education and Training
LNCECS	Libyan National Commission for Education, Culture and Science
LD	Libyan Dinars
NAID	National Authority for Information and Documentation
NCETR	National Centre for Education and Training Research
NESHE	New Educational Structure for Higher Education

NIER	National Institute for Educational Research
NSTF	National Skills Task Force
NTOs	National Training Organisations
NVTC	National Vocational Training Council
MVLK	National Vocational Training Council in Malaysia
NVQs	National Vocational Qualifications
NGI	National General Industrialisation
NOSS	National Occupational Skills Standards
NDTS	National Dual Training System
OECD	Organisation for Economic Co-operation and Development
OJT	On-the-Job Training
PBL	Project/Problem Based Learning
PVC	Poly Vinyl Chloride
QA	Quality Assurance
SMEs	Small and Medium-sized Enterprises
SPLAJ	Socialist Peoples' Libyan Arab Jamahiriya
SPSS	Software Statistical Package for Social Science
TSP	Time Sector Privatisation
TVET	Technical and Vocational Education and Training
VCM	Vinyl Chloride Monomer
VET	Vocational Education and Training
VCDP	Vocational Competency Development Programme
UK	United Kingdom
UNESCO	United Nations Educational, Scientific and Cultural Organisation
UNDP	United Nations Development Programme
UNESCO-UNEVOC	The International Centre for Technical and Vocational Education and Training
USA	United State of America
WBL	Work-Based Learning
WDE	World Data on Education

Chapter One

Introduction to the Research Problem

1.1 Introduction

This introductory chapter provides a general description about the area of study and the theoretical framework of the research. Issues such as background to the study, research problem, research aims and objectives, methodology used and justification and significance of the research are addressed. It also provides a brief outline of the thesis.

In order to retain the originality of the published work by other authors cited in the present study, the term VET (Vocational Education and Training) has been used exchangeably for TVET (Technical and Vocational Education and Training).

1.2 Background to the Proposed Research

The rapid advancement of technology and manufacturing industry has affected the national economies and education systems of different countries. In addition, the rapid manufacturing industrial developments which are happening at remarkable pace, imposes enhanced requirements for highly skilled and better trained engineers and technicians, particularly in developing world. These engineers and technicians are provided with the basic technological skills and expert knowledge that should be renewed regularly, to meet globalisation and manufacturing sector demands.

In this regard, Ashton and Green (1996); Raggat and Williams (1999) observed that this quick technology development has shaped manufacturing industry requirements for a new and competent generation, well prepared technical human resources to meet this demanding challenge. Musmari (2002) further highlighted the significance of engineers and technicians to manufacturing industry, arguing that it is in general acknowledged that the expansion progress and development of society are achieved by the quantity and quality of the country's natural capital and its technical human resources.

Human Resource Development (HRD) has provided the requirements of organisations to offer employees a modern expertise. HRD has acknowledged the need for a future orientation to provide practitioners role in making organisational strategy (Torraco and

Swanson, 1995). In spite of that, HRD is meant for offering learning and development chances that back the achievement as an economic progress, development strategy and improvement of organisational and individual performance (Raide`n and Dainty 2006). According to Rodrigues and Chincholkar (2005), HRD is helpful to the development of knowledge workforce and the organisation in addition to it is very desirable in a knowledge intensive sector, for example, education.

However, several developing countries have given high priority to developing human resources by means of expanding secondary and high level of education (Rodrigues and Chincholkar, 2005). As a result, more attention has been given in organisations to HRD through employees' TVET in an attempt to prepare and provide them with new skills, knowledge, methods and strategies to assume more responsibilities. Clarke (2004) maintains that the most important developments of HRD had been increasing focus on Work-Based Learning (WBL) or what is often referred to as informal methods of learning.

Higher Education (HE) in general and TVET in particular have seen significant changes in the last few decades, such as the introduction of new technology, especially information technology (IT) and the adaptation of student-centred approaches which necessitated the development of new skills and changes to teaching practices (Bennett and Lockyer, 2004). One of the main drivers for these changes is the increasing pressure to link Higher Education Institutions (HEIs) with the job market and to embed employability into the curriculum (Rafik, 2009). This is important for developed countries to up-skill their workforce and stay competitive but even more important for developing countries to "catch up" with industrialised countries (Rafik, 2009; Rafik et al. 2008). Again, HE in general and TVET in particular, play a vital and significant role in the development of countries having a direct effect on the economy of the country (Rodrigues and Chincholkar, 2005; Masri, 1999). Schofer and Meyer (2005) maintain that in the past few decades have witnessed substantial growth with regard to enrolments and courses in HE in developed and developing countries. Undoubtedly, those quick variations have significantly enhanced the requirement for graduates who are equipped with significant skills and high qualification, which as a consequence of that put further pressure on HEIs for improving their plans and awards to face the new challenging requirements.

Within the previous few decades TVET has shown a quick growth in both developed and developing countries as a result of the noticeable economic expansion and strong social need for its services also to develop individuals and communities (Grubb and Ryan, 1999). Nonetheless, many countries consider TVET as a major element regarding their development that is adhered to the economic progress, creation of vacancies and total flourishing of their people (Elzalitni and Lees, 2007; Elzalitni and Lees, 2006b; Misko, 2006; Rena and Biniam, 2006; Minnis, 2000; Qureshi, 1996). Mellahi (2000); Wilkins, (2001); Psacharopoulos (1997) report that the benefits of TVET include the following: its capability of making economic growth quicker, providing industry with workers with the skills that are in short supply, reducing unemployment of young people, promoting the development of technical knowledge, providing an opportunity for less academically able students, decreasing poverty among low income people, and gaining from economic globalisation. According to the UNESCO (2006, p.15):

> *"TVET refers to a range of learning experiences which are relevant to the world of work and which may occur in a variety of learning contexts, including educational institutions and the workplace".*

Generally, there is a mounting awareness in developing countries for the need to adapt TVET to meet the rapidly changing requirements of the economy, at the national, regional and global levels. Increased co-operation between TVET providers and those in industry has progressively become a factor in a number of systems for updating curricula, equipment and facilities, as well as an introducing new programmes and cost-effective delivery approaches (Farmer et al. 2004; Lehto, 2003; Masri, 1999). These include establishing specialised TVET institution in oil industry to provide the skilled workforce for this vital sector, organising and running training courses and ad hoc research and consultancy projects. Therefore, TVET can help not only to supply skilled and knowledge workforce to the workplace; it can contribute to support and update skills and knowledge of the existing employees (Lynton and Pareek 2000; Lynch, 2000). This will enable employees to cope with the growing development in technology. Musmari (2002) and Ahmed (1995) highlighted the significance for the developing countries of thoroughly restructuring their TVET institution system to meet the urgent shortages of technical human resources for economic and industrial expansion requirements. However, TVET in Libya is therefore, regarded as most important element given that the country cannot attain economic and

social development without a trained, creative workforce that could meet the shifting needs of its environment.

Libya has paid more attention to the administration reform of the TVET and HRD during the past ten years or so. For example, the Libyan government has established many new TVET institutions, reviewed organisational structures of existing institutions and sent abroad many people in order to gain skills, knowledge and to be more trained in the various fields required by their institutions and organisations (Agnaia, 1996; Keibah, 1998; Sharif, 2000; Alrubaie, 2004). Furthermore, it is generally supposed by the Libyan government that TVET plays a key role in producing the technical human resources and skilled employees needed for industrial development and economic growth (Musmari, 2002). The concept of HRD through TVET is a vital procedure for the development of manufacturing industry in Libya. Through the development of human resources and the presence of efficient TVET, socio-economic development can be achieved via the provision of the skilled and knowledgeable workforce to meet the Libyan demands of such workforce in various sectors of the Libyan economy.

To this effect, the Libyan government believes that TVET is one of the main important factors that contribute in the solution of the nation's shortage of skilled workers in many sectors, and ignoring its effect in both economic and industrial development is impossible; and therefore it is producing the highly trained and well qualified technical human resources required for economic industrial development (Ali and Almithnani, 2006; Algazal, 2006; Ahmed, 1995). Although it is considered to be a vital part of the formal education system, and the most important goals are to provide learners with specific essential and significant skills and knowledge and to provide them with the required tools to expand and modernise their knowledge through the life-long learning process, and to deliver and backing the industrial sector in Libya with qualified technicians.

Ahmed (2006); El-Hawat (2003); Alfaidy and Muftah (1989) have shown that at the beginning of the 1980s, the Libyan authority gave TVET greater consideration and attention; hence, it focused on the concept of technical education by initiating and developing several institutes which are highly specialised in technical education. Therefore, a mounting number of general education schools and vocational institutions have been established. It is expected that through the establishment of these technical and vocational

schools that supply the country its urgent needs of qualified technicians with the necessary expertise and professional knowledge of its indigenous people, to meet the increasing labour market demand for those skills (Secretariat of Education, 1993). The institutes, for example, the Higher Institute of Industrial Technology in Angela, The Technical Institute in Masrata, and Institute of Industrial Research in Tajoura, etc. to face the increasing needs to provide technical human resources with good training and experience needed to meet their industrial expansion (Ahmed, 2006; El-Hawat, 2003; Alfaidy and Muftah 1989). The fundamental goals of the Libyan TVET institutions are to overcome the problem of dependence on foreign technical manpower, by developing and creating highly trained and qualified Libyan technical human resources, as well as supplying the country with skilled technicians in various technical fields in different sectors of the economy according to their particular demands and needs (for further details see Sections 3.4.2 and 3.4.3).

1.3 Statement of the Problem

Libyan labour market has traditionally suffered from a shortage of skilled human resources. The lack of the national manpower particularly in engineers and technicians led to more employment of foreign technicians in many fields, especially those requiring the technical expertise which is lacking among national human resources (El-Magouri, 2006; Abusnina, 1996; Ahmed, 1995; Mogassbi, 1984).

The national human resources in Libya lack the skills needed by the manufacturing industry which contributes around 89% to all economic sectors requirements (GAIT, 2007). As a consequence of the poor standards of education and training, the labour force consists largely of under-qualified workers, which have produced an important skill gap in almost all sectors of the Libyan economy. In more than two-thirds of Small and Medium-sized Enterprises (SMEs) in Libya, less than half of the workers have received sufficient vocational training in their field of work. Libyan businessmen often cite the 'disconnect' between the skills they need for the labour market, and the skills that the Libyan workers bring to the sector (Porter and Yergin, 2006).

It is clear that, the Libyan manufacturing industry has suffered from a shortage of skilled manpower. The need for competence and qualification has been created by adoption of new technology in most sectors of industry produced a demand for highly skilled; this need has created the requirement on foreign skilled labour in many fields to recruit skilled workers,

such as engineers and technicians to cover the severe shortage which can not be filled by national workers (Alshakshoki, 2006; Eltaif, 1999; Mogassbi, 1984). This situation has been clear within the previous few decades as the country attempted to keep pace with the technological developments affecting many developing countries which are affected by the technological revolution (Eltaif, 1999). As a result, many projects have been designed and executed, including: petrochemical, chemical, cement, iron and steel industries etc. There is no doubt that these industrial projects require foreign qualified, competent and skilled workers, because the local labour force can not meet these high requirements. So dependence on foreign skilled workers went parallel proportional to the increase of this type of projects (Elzalitni and Lees, 2006a; Attir, 2005 and 2006).

In general, Libya has undergone considerable changes through the last three decades since the Libyan Revolution. A variety of radical changes have taken place to revise the economic, educational and social conditions of the country (Musmari, 2002). There has been significant progress in developing the Libyan TVET systems as experienced by the increased number of technical institutes in Libya to more than 120 institutes by 2004 from 84 in 2000 (Elzalitni, 2007), to meet the sharply growing needs for engineers and technicians. The Libyan government has placed large emphasis on TVET programmes to support the manufacturing sectors and a significant part of training needs has been met nationally by the universities and specialised institutions. However, most of these developments lack a strategic direction and very little has been done to study and analyse the effectiveness in supplying the skills needed by the national industries (Rafik et al. 2008).

The studies conducted by Elzalitni (2008); Albadri (2006 and 2007); Zginin and Isawi, (2007); El-Magouri, (2005 and 2006); El-Hawat (1996 and 2003); Aldhaif et al. (2001); Keibah (1998); Alfaidy and Ibrahim (1997); Mogassibi (1984) regarding the HE and TVET in Libya, they brought evidence that HE and TVET graduates do not meet the needs of the manufacturing industry. To this effect, Eltaif (1999, p. 29) points out:

> *"A quick glance at the existing labour market indicates that students graduating from higher education institutions are irrelevant to the demands of economic sectors. According to the 1995 census, unemployment among graduates has reached 10%. The greater majority of these unemployed are graduates of humanities and social science fields in spite of the fact that there is an urgent need for graduates of science and medicine. This has led to relying heavily on expatriate labour to fill the shortages in these areas."*

The Libyan system of HE in general and TVET in particular offers a traditional education, which is not connected with the labour market demands. Furthermore, the lack of strategic collaboration between HE and TVET institutions on one hand and the manufacturing industry on the other hand has resulted in graduates that are not "Fit for Purpose." This is an important issue because manufacturing industry contributes, together with the construction industry, around 20% of the Libyan GDP (Twati and Gammack, 2006). Therefore, it is well realised that Libya as a developing country needs more trained manpower in the fields of engineering and technology, and to continue to train and produce a significant number of graduates in these areas.

1.4 Research Questions

To guide the current study, the following research questions were identified:

1. To what extent do TVET programmes supply Libyan society with the skilled manpower that it needed by the industrial sector?
2. How the match between the skills developed through Libyan TVET and the needs of industrial sector can be maximised?

TVET requirements will be different for different types of industries. The investigation in this research is related to the manufacturing industry.

1.5 Aim and Objectives

The aim of the research is to identify the gap between the skills needed by the Libyan chemical industry and those provided by the Technical and Vocational Education and Training institutes; and make recommendations to bridge the gap. The objectives of this study are:

1. Relate the present study to key theories, principles and debates in the areas of HRD, TVET and Engineering Education.
2. Explore and investigate the current TVET systems and practices in Libya and their links with the chemical industry. This will cover the Government strategies/policies, Education and Training Providers' strategies and practices, how these strategies/policies are implemented and the effectiveness of their implementation.

3. Explore and investigate skills needed by the Libyan chemical industry and the extent and effectiveness to which these skills are provided by the current TVET systems.
4. Critically analyse the results of Objectives 2 and 3 and identify key issues related to skills' gaps or deficiencies.
5. To make recommendations to establish system that improves the awareness of the TVET providers to the emergent needs of the chemical industry.

1.6 Research Methodology

The methodology used in this research is quantitative method (questionnaire survey). As very little research has been conducted covering TVET issues in Libya this research is explorative and descriptive in nature. The explorative research is appropriate since it aims to understand areas with few or no earlier studies and uses a quantitative approach to the collection and analysis of primary data (Saunders et al. 2007; Collis and Hussey, 2003). The quantitative method will involve the design and an administration of a questionnaire for students' perceptions of the skills and knowledge they acquire during their study at the engineering departments in different Libyan HEIs, and the perceptions of engineers and technicians working in manufacturing industry about the education and training they received before joining the organisations (Chapters Four and Five provide more detail on the methods used in this research).

1.7 Scope and Limitations

The study is limited to HEIs and the manufacturing industry. The focus here will be on public sector institutions and industries rather than private sector enterprises and HEIs. The latter have been excluded from the study, due to their frequency and the lack of data about them. The study carried out, the first of its type in Libya, encountered some limitations that can be summed up as follows:

- The population selected in this study is limited to students in engineering departments in several Libyan HEIs, and engineers and technicians who work in the manufacturing industry (General Company for Chemical Industry) (GCCI). Data collected were based on a questionnaire to collect views and experience from first and second year students at nine HEIs in Libya; and engineers and technicians who are working at GCCI. Results

from students, engineers and technicians in other institutions and organisation respectively may differ from those of the selected institutions and organisation.

- Given the limited time available and the vast area of Libya, the survey was conducted only in certain regions of the country and therefore results may vary across other cities, these are: North-represented (Tripoli), East-represented (Benghazi), Middle represented (Sirt) and Southwest represented (Jable Garbi).
- The data used in this study were collected within a certain period of time, namely March to June 2008.
- The industry that was used as a case study is mainly in the chemical engineering industry. Although this is a big industrial and most other manufacturing industries have the same HRD issues, the chemical engineering does not represent the whole manufacturing sectors in Libya. There might be other issues related to other specific sectors including fast changing sectors like communications and IT.
- The other limitation of this study is that it concentrates on high level skills, such as bachelor degree (Bsc.) and higher diploma (HND) (level 4 and high).
- Limitations could also stem from the fact that the research findings are dependant upon the views of the respondents, that is, what the respondents said they were feeling may differ from what was really being felt.

1.8 Justification and Significance

The justification of this study comes from the increasing interest in the link between TVET and manufacturing industry in the world in general and Libya in particular. However, one of the major elements in the progress of organisation is TVET institutions and the efficiency of these organisations depends on the influence of the individuals rendering the activities of these organisations.

The Justification of the researcher to choose the topic of this study was due to the following factors:

- Libya is a developing country, whose oil wealth has produced a distinctive position among developing countries.

Despite the fact that most developing countries, which suffer from shortage of resources and a large amount of manpower, Libya has a capital surplus and shortage in qualified of the workforce. This problem led to the imbalance between supply and demand of national labour force.

- The lack of collaboration between manufacturing sector, on one hand, and HE in general and TVET institutions in particular, on the other hand, have created a gap between work requirements and HE/TVET institution delivery.
- As a result of the lack of career information programmes and career counselling throughout the university/institute study, students face difficulties to make the right decisions concerning their future occupation.
- The schedule of courses at most universities/institutes is in the morning hour, which makes it impossible for workers to leave their work and attend college classes during their work hours.
- To the best of the author's knowledge no research concerning the above described problem has been reported in the literature.

Consequently, the significance of the current study stems from the fact that Libya with its small population and shortages of skilled manpower compared to its good resources and large area differ from many other developing countries. So, it can depend upon TVET programmes as a solution for meeting the shortages of skilled manpower.

The study results may be used for promotion and assistance in the assessment of the relationship between the TVET and manufacturing industry in order to improve the programmes of study for students and training and development for engineers and technicians in employment. The findings of the study will help policy makers, programme developers and practitioners to obtain more information regarding the efficiency of the relationship between supply (TVET institutions) and demand (manufacturing industry). The hope is that this study results will find its way to decision makers in Libya, who can delegate partner organisations to play a stronger role and more involvement in the planning and execution of TVET programmes, such as narrowing the gap between providers of TVET and manufacturing industry requirements. As per mentioned above, this study is important for the following reasons:

1. This study focuses on the problem or the gap between TVET institutions and manufacturing industry in Libya, which can be applied to other industry sectors and to other developing countries experiencing similar problems.
2. The study results can be used as a guide to understanding Libya's problem in balancing the delivery of HEIs with the skills necessary for future national development.
3. The study results may encourage researchers in Libya to conduct further studies to help resolve the problem of imbalance between the skills required for national workforce and the delivery of HEIs in Libya.

1.9 Contribution to Knowledge

Literature survey of the present research has shown that there is a very little research and literature covering the problems and issues associated with TVET programmes in Libya. With this in mind, this research has contributed to knowledge of TVET programmes in Libya. It is important and providing a better understanding of TVET programmes. The research presents detailed and comprehensive information related to the development and linkages between TVET institutions and manufacturing industry in the context of socio-economic considerations in the country. In addition, the findings of this research present practical and useful recommendations of a framework which could be implemented by HE planners and policy-makers in Libya in particular and developing countries in general to enhance their performances. Finally, the research adds to the existing body of literature within the area of location analysis of TVET.

1.10 Layout of the Thesis

This thesis is divided into nine chapters (Figure 1.1). The following is a brief summary of these chapters:

Chapter One provides the background to this study. The statement of the problem, research questions, aims and objectives of the study, methodology used, and significance of the research are also discussed.

Chapter Two reviews and analyse the literature relevant to the study topic which will help determine the current state of research in the areas of TVET. These areas have been reviewed from different subject perspectives: TVET and national HRD, in developed

countries linked with industry such as UK and Germany, and developing countries linked with industry such as Korea and Malaysia.

Chapter Three provides a general background about Libyan environment and its manufacturing industry. Issues relating to history and strategies, such as TVET are discussed and the structure of HE is described.

Chapter Four explains the indicators and methodology employed to achieve the study objectives. Also, the methodology used to analyse these indicators (quantitative/questionnaire) and the validation of the research tool are discussed.

Chapter Five explains the data collection methods for this research, protocol for carrying out the survey, sample selection and distribution of the questionnaire are discussed.

Chapter Six explains the findings the overall data analysis of quantitative (questionnaires) survey. This covers participants' experience and perception regarding strategies and policies, curriculum design, curriculum delivery, partnership with industry, accreditation, quality assurance, staff development and culture aspects.

Chapter Seven presents and discusses the findings of the quantitative survey analysed in Chapter Six

Chapter Eight provides recommendations for a framework to link the Libyan TVET with the manufacturing industry.

Chapter Nine provides the conclusions and recommendations for future work.

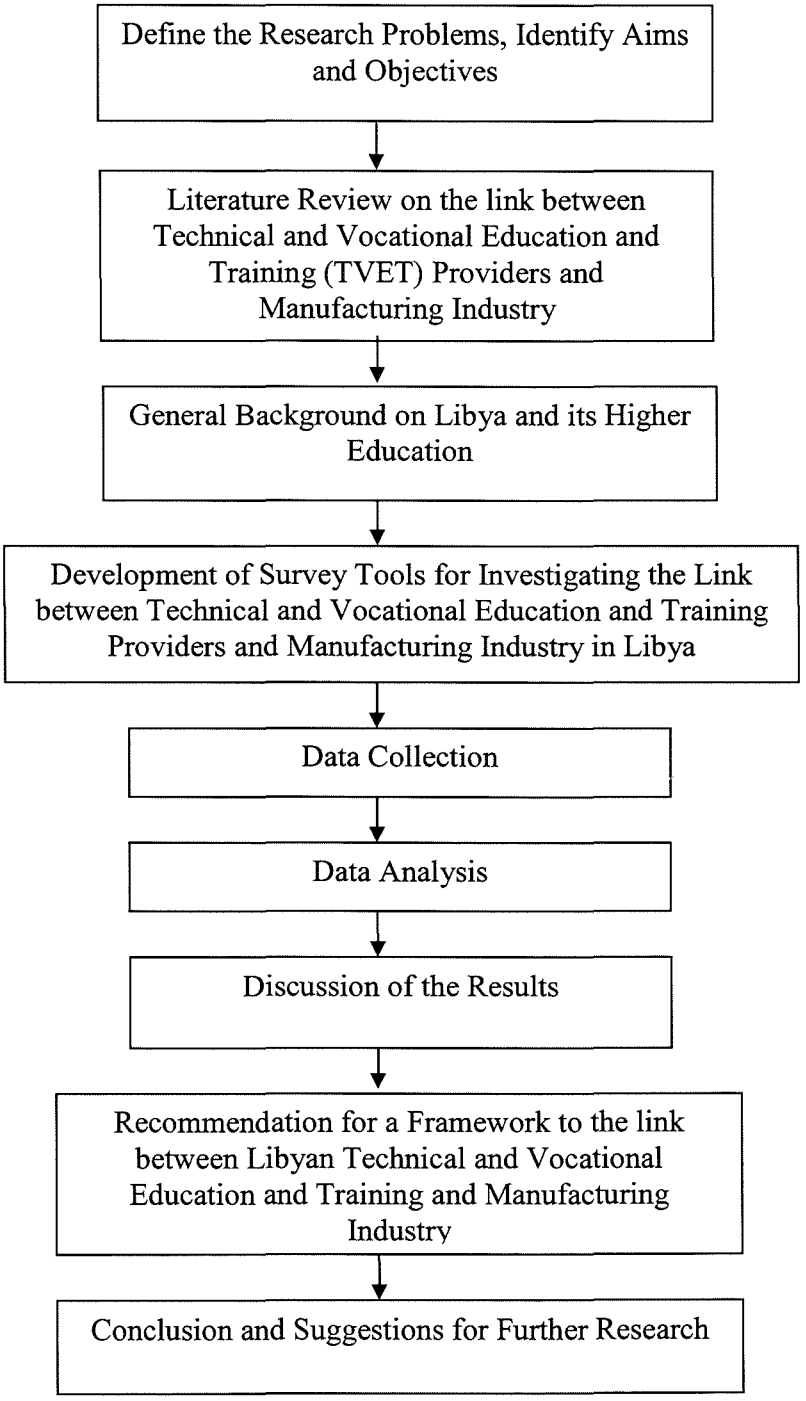


Figure 1.1 Structure of the Thesis

Chapter Two

Literature Review on the Link between Technical and Vocational Education and Training (TVET) Providers and Industry

2.1 Introduction

The previous chapter dealt with introduction and the general guides of the research was presented. In this chapter, the relevant literature shall review and discussed. Carrying out literature review is an important point to start within any research scheme. In the light of the significance of TVET, this chapter provides an overview of the various TVET programmes in developed and developing countries with a view to identifying the factors that must be developed to generate effective programmes to meet the needs of the manufacturing industry and its workers in Libya. However, the aim of this chapter is to seeing over TVET linking with HRD and to review TVET systems in some of the developed and developing countries, compare and contrast them, and how these systems are linked to industry.

The rapid advancement of technology industries, for instance, manufacturing industry in particular, workforce require a high level of education and training to provide them with the skills and knowledge necessary to carry out their work effectively. Therefore, any organisation should provide opportunities to its employees to enhance their skills, and to achieve optimum performance the employees should be properly selected and adequately trained to carry out their jobs. In recent years, TVET have become increasingly important and plays a vital role in the organisation's life.

The relationship of TVET to the levels of unemployment, national productivity and industry has brought some to describe the TVET as a political issue (Lundy and Cowling, 2002). In fact, national systems of TVET is an important part of the economic environment of most nations, particularly the advanced industrial countries (AICs); accordingly, "*VET is near the top of national political agendas and at the centre of public policy of most countries*" (Hamlin, 1999, p.22). The entire progress of the new technology nowadays led to substituting occupations and changing skill needs, as a result, there is a great need for

skilled and highly trained manpower that can comply with the changing situations (Holden, 2004). The Leitch Review of Skills (2006, p. 12) final report has seen that the improvement of skills are carried on by employers, individuals and government has and shall be benefited and invested by employers, individuals and government as well.

2.2 TVET and National HRD

TVET has been known to increase the productivity of individuals, employers and expand the success of national development. The workers' educated, which is very highly trained as in the profession, is seen as an essential element of human capital necessary for the country development (Kazmi, 2007). In the case of Libya and most of the Arab region, the workers is described as low-skilled and poorly prepared for the competition of globalisation. Literature also indicated that TVET programmes should prepare well defined knowledgeable workforce with high performance and emphasised on the standards of the educational quality and to develop employees for technical jobs (Rojewski, 2002; Keiser et al., 2004).

The UNESCO and ILO (2002) recommendations (p.7) report that technical TVET is further understood to be:

(a) An integral part of general education.
(b) A means of preparing for professional areas and for active participation in the world of work.
(c) An aspect of lifelong learning and preparation for responsible citizenship.
(d) A tool for encouraging permanent and environmental development.
(e) A way of decreasing indigence.

The most important result of an effective HRD system is that it opens up opportunities for employment. HRD also emerged as the main and most effective means to reduce poverty and gender-oriented. Thus, investment in priority areas like education and skills development is very important to bridge the gap between acknowledge-based workers and low-skilled workers (Kazmi, 2007). Musmari (2002) stated that, HRD is linked to economic development in a number of ways, for example, to give technically trained personnel at all levels to accommodate the socio-economic requirements for industrial growth and progress without which capital would be wasted. Hence, education for HRD can help people to obtain skills and knowledge for the development of society and solving

industrial problems that society or the country may face. Mader (1988, p.216) pointed out that:

> *"The aim of human resources development is to raise the standard of skills at all levels needed to support the economic growth and to provide an adequate supply of all ranges of professional expertise needed to run a modern nation".*

While Todaro (1989, p.67) explained that:

> *"Education for human resources development is seen as an integral part of long life education which contributes decisively to economic and cultural development, social progress and world peace as well as to the development of an educational system".*

The UNESCO-UNEVOC (2008) has recently indicated that TVET has a particular role in awarding knowledge and skills relevant to people's life quality improvement and upon linking with adequate recruitment chances, it shall help to expand their skills, and increasing their outcome as well as their incomes, thus, it result into high living levels and rival economies. The UNESCO-UNEVOC (2008) also referred to TVET policies and practices may help people, or can support overall development of individuals, the whole progress and make them ready for better sharing in the community, harmony and containment.

2.3 TVET in Developed and Developing Countries

Many developed and developing countries in the world are looking to their TVET systems to provide a response to changes in the global economy. Some countries are proactive with respect to theses changes, adopting long-term strategies that should benefit their economies (Comyn, 2007). He further stated that, linking industry with TVET systems is a key priority and often a central principle of policy reform in several developed and developing countries.

The experiments of some developed countries (United Kingdom and Germany) and developing countries (Korea and Malaysia) relating to TVET will be reviewed. However, these countries have been selected due to their history in this field, and also it have been established that achieved prudence in the global workplace as well as socio-economic gains. Meanwhile, they provide the most comparable data sets among those countries that have similar educational structures.

2.3.1 TVET System in UK

In the UK, decisions concerning HRD are taken mainly "*by those in organisations in what is referred to as* a voluntarist *approach*" (Gold, 2003, p.322). At this approach Page and Hillage (2006) have also recently referred that in UK there is a voluntarist system concerning the training of employer, under this system the owners of the work are in choice whether they train their employees or not, by little needs. The role of the authorities here is to promote the organisations to bear responsibility of training and development and its funding, therefore, this approach is in the contrary to the interventionist approach, for that, the government or its agents try to affect the process of decision making in organisations and make decisions that complying with the whole economy (Gold, 2003).

There was an increasing effect on the institutions and the training structures by the employers, this led to changes done to involve employer engagement, and therefore the government training system meets business they need. Accordingly, the nature of the productive, education and training systems are decided by market forces, provided that the role of the government is finite to setting up the legal framework in which the business and training activities and disserting market failure (Centre for Labour Market Studies, 1999). Consecutive UK governments used these national skill systems, giving the major responsibility to the organisations and individuals to get benefit of these skills (Beattie, 2002). Ashton and Green (1996) stated that, the government contribution is required to shift to economy with high skill that links the major actors to provide certain high skill policies, consisting of policies that affect the requirement for skills. The literature also shows that when industrial base influenced by a rapid change, government should carry on a coordination role consistency with demand (Ashton et al. 1999).

The UK TVET system is reviewed in 1980, and it became clear that the system has many weak points, of these are (Tapin, 2002, p. 2):-

- No clear mode of vocation qualification provision and there are gaps in these qualifications on offer.
- The constituents and components of the course were determined by organisation with a humble knowledge of industry. The system was "supply driven" and not related to work sufficiently.

- A method of Evaluation, such as examinations depends upon testing the knowledge of a student on the day, rather than examining the skills or competence within a period of time, in the worksites.
- Many restriction to access, progression and transfer credit beside that there is no flexibility of vocational qualification.
- There are some expensive and unfocused training.

However, after that radical reformation of TVET in the UK has taken place, those reforms are listed below (Tapin, 2002, p. 2):-

- Government policies promoting strong relation between the fields of education and training and the employers leading in the design and development of UK standards of employment.
- Substituting industry training arrangements which are levy supported with the local sectors skills driven by employers.
- Promoting the framework of the national qualification.
- Legalisation to activate the delivery sector of TVET to development and change.

The main policies and practices of the UK TVET system can be summed up as follows (Holden, 2004, p.337):

- *"New Deal – Training to 18-24-year-olds out of work longer than 6 months, and training for over 24-year-olds out of work for longer than 2 years*
- *National Training Organisations (NTOs) – sectoral bodies whose function is to analyse skills gaps using international benchmarking, scenario planning and local focus groups*
- *National Skills Task Force (NSTF) – body composed of government, employees and union representatives investigating skills shortages nationally and recommending proposals*
- *Learning and Skills Councils – regional bodies replaced Training and Enterprise Councils in April 2001. Have been expanded in 2002 to look at skills needs in specific sectors*
- *National Vocational Qualifications (NVQs) levels 1 to 5*
- *Investors in People (IIP) – to encourage companies to attain a recognised level of strategic training*
- *New Apprenticeships – set in the early 1990s to encourage quality skilled training*
- *Colleges of higher and further education*
- *Universities (including the 'old polytechnics')*
- *Business schools, usually not part of universities*

- *Training culture–voluntarist: finance rather industry oriented; class based; public/private education."*

Lifelong learning in the UK is often defined as learning which occurs after finishing formal education and training. The common definition of continuing TVET within the UK context refers to learners over 19 years old. It consists of full and part-time education and training, work-related training (incorporating the unemployed) and training adult education courses, designed to meet a variety of social and community requirements (Cuddy and Leney, 2005). Cuddy and Leney (2005) also report that TVET providers need to make sure that curricula are kept up-to-date along the lines of industry requirements.

The importance of the world of work and, hence, the nature of the partnerships between work and education have been given a new confirmation in the world of UK HE (Smith and Betts, 2000). Smith and Betts (2000, p.590) pointed of Brennan and Little (1996) in giving a good starting point for the said renewed drive to the study of activities based on work due to their review of work-based learning. This interest has updated by main political initiatives, according to Smith and Betts (2000), and the Dearing Report (Dearing, 1997).

Formal industry input into training is taken on by sector skills councils, which are commissioned with establishing links with employers in each industry sector in search of their collaboration in developing priorities and goals for different sector activities (Sector Skills Development Agency 2005a cited in Misko, 2006). These councils are also commissioned with developing priorities and targets for action on equal opportunities as well as improving the provision of education and training, comprising apprenticeships and HE, and are also involved in instituting sector skills agreements to meet priority skill needs to drive business performance, and in conjunction with standards setting agencies, these councils develop, maintain, and update national occupational standards in line with industry needs and patterns of work in a specific sector change (Misko, 2006). Although these councils cover the full range of industry activities, the coverage of industry sectors within each council is slightly different, as indicated in Table 2.1.

Table 2.1: Sector Skills Councils in the United Kingdom by Industry Sector

Skills sector council: Name	Industry sector
Asset Skills	Property housing, cleaning and facilities management
Automotive Skills	The retail motor industry
Cogent	Chemical, nuclear, oil and gas, petroleum and polymer industries
Construction Skills	Construction
Energy and Utility Skills	Electricity, gas, waste management and water industries
SEMTA	Science and engineering and manufacturing technologies
Skill fast-UK	Apparel, footwear and textile industry
Skills for Health	All staff groups working in the National Health System, independent and voluntary health organisations
Skills for Justice	Custodial care, community justice and police
Skills for Logistic	Freight logistics industry
Skills active	Active leisure and learning
Skill set	Broadcast, film, video, interactive media and photo imaging
Skill smart Retail	Retail
Summit Skills	Building services engineering (Electro-technical, heating, ventilating, air conditioning, refrigeration and plumping

Source: Sector Skills Development Agency (2005b) [Quoted in Misko, 2006, p. 45].

In the UK, when students complete their full-time compulsory schooling they may enter an apprenticeship (Misko, 2006). However, the status of apprenticeship among students and employers declined significantly during the 1980s and 1990s, which has resulted in substantial skill shortages in the technical trades. To help meet this shortage and to prepare more young people for participation in the changing economic environment Modern Apprenticeships were introduced in 1994 in Scotland and 1995 in England and Wales (Misko, 2006).

Apprentices need to have a job placement with an organisation, or full-time employment. Misko (2006, p.18) reports that the "*on-the-job training is provided by the employer and the off-the-job training is provided by the learning provider. The monitoring and assessing of the training is also largely left to the learning provider.*" Apprenticeship 'frameworks' consist of the mandatory outcomes of the apprenticeship, which includes the level of the qualification, key skills (core skills in Scotland), and technical certificates, and in some frameworks, employment rights and responsibilities requirements. Misko (p.18) refers to such requirements as "*the rights and responsibilities of workers, the role of their organisation within the wider industry and the effect of public law and policy on industry.*"

In the UK, Schaber and Turner (2009) argue that, the government provides strategic guidance on innovation, employability and industrial engagement through a number of

publications, issued by the Treasury Department. In the Cox Review of Creativity in Business (2005), Cox put forward various recommendations promoting multi-disciplinarity in HE as a driver of innovation. These include better preparing students to work with and understand other disciplines. The Leitch Review of Skills (2006) focuses on skills and employability, with implications on involving HE with learners, industry and community partners as well as the Lambert Review of Business-University Collaboration (2003).

2.3.2 TVET System in Germany

The German TVET system, commonly referred to as VET system, is a 'directed' and dual system of vocational training which according to (Holden, 2004) considered as an example of excellent practice. Besides describing it as (dual system), it is important to indicate that this terminology is not suitable to the rules of the German VET (Reinisch and Frommberger, 2004). According to Reinisch and Frommberger (2004, p.27), dual "*indicates simultaneous education and training at the workplace, in enterprises and public utilities and in special schools, but it does not mean that the two parts of the system are equivalent.*" They add that training at the workplace dictates the school-based part of TVET.

Afeti (2007) maintains that the dual system of vocational training in Germany makes allowances for learning to take place in a vocational school and in an enterprise concurrently. Around 70% of all school leavers, aged between 15 and 19 years, undertake training under the dual system. The dual system promotes the linkage of vocational training to the world of work. The term "Dual System" refers to "*an institutional framework including legal provisions and training arrangements which is determined by the partnership of two "learning sites": the firm providing the apprenticeship and the vocational part-time school*" (Deissinger, 2007, p.365). Deissinger (2007) argues that through linking up entry-level training with workplaces the dual training systems have the advantage that they are capable of preparing skills required by the world of work. These training systems are often well-liked for the reason that training costs are mainly met by private enterprises although can be in part compensated for by utilising the trainee's productive contribution during the training period that is distinctively manifest in many occupations of the craft sector (Deissinger, 2001, 2007).

The dual system is the main pathway from school to working life for young people in Germany. For example, in 1999 there were around 3.3 million students between 16 and 20 year old in Germany, of whom about 29% attended the Gymnasium or a full-time higher vocational school to obtain permission to study at a university or at an institution of applied science ('Fachhochschule'), and more than 50% of them chose the dual system to get a qualified vocational certificate (Reinisch and Frommberger, 2004). TVET in Germany is guided not only by the requirements of the labour market, but also by the need of individuals to acquire skills, knowledge and competences which enable them successfully to establish themselves on the labour market. Training programmes are designed on the principle that they should be as broad as possible and as specific as necessary (Hippach-Schneider et al. 2007).

The German dual system of TVET represents an excellent case example of the best way of conserving the integrity and relevance of TVET outcomes, by directing both providers and industry modes within a relationship of a particular type. By the same nature of the relationship, strong information links between the providers of TVET and employers are strongly fixed and contained in the dual system (Durden and Yang 2006). However, the German system has been subject to some criticisms. Three core mechanisms of the system appear to be failing concerning new economic and social challenges (Greinert, 2004 cited in Deissinger and Hellwig, 2005): the "recruiting mechanism" that must provide a training and labour market with qualified apprentices appears to fail due to companies preferring to recruit employees from outside the dual system, consequently, opportunities for skilled workers to climb to a position of a technical assistant are gradually disappearing and qualified school leavers prefer pathways outside the dual system; the "funding mechanism" seems to fail since the stabilisation of the dual system is cost-intensive, particularly regarding the new federal states in the East of Germany, which yet have not been successful in implementing an appropriate funding scheme; and problems have not been resolved concerning the "mechanism of learning places" which comprises periods of theoretical learning in the compulsory vocational part-time school and periods of practical learning in the workplace.

Hamlin (1999) described the German system as depending upon a 'corporatist' approach, containing at the national level a tripartite Federal Institute of Vocational Training composed of workers, trade federalist education specialists and governmental

representatives. These work as per of the Federal Vocational Training Act of 2005 (Federal Ministry of Education and Research, 2005). Contrary to the belief that the German VET is funded and run by the state; the fact is that "*employers fund two-thirds of VET, and employers and trade unions have a considerable influence on the control of the system, together with central and local government*" (Holden, 2004, p.338). However, though laws and regulations relevant to TVET are abide to offer funding and training resources, the employers union and state shall directly render the institutions and procedures which operate the system (Holden, 2004).

The dual system as shown in Figure 2.1 begins in the latter years of school where emphasis is sited on a high level of education for all. The common trend of thinking represented in that general education supplies a consolidated base for the coming learning (Holden, 2004). Rose and Wignanek (1990, quoted in Holden, 2004) stated that most of those who leave school, and about 25% of young people with new qualification equivalent to (A) levels have access to the college and university system. In the dual system, on-the-job training is provided by the employers and off-the-job training by the training providers (VET providers). This is carried out in coordination between the components of the systems: the state, the employers and the union. After having obtained the qualifications required, trainees can find employment in the sectors they have been trained in.

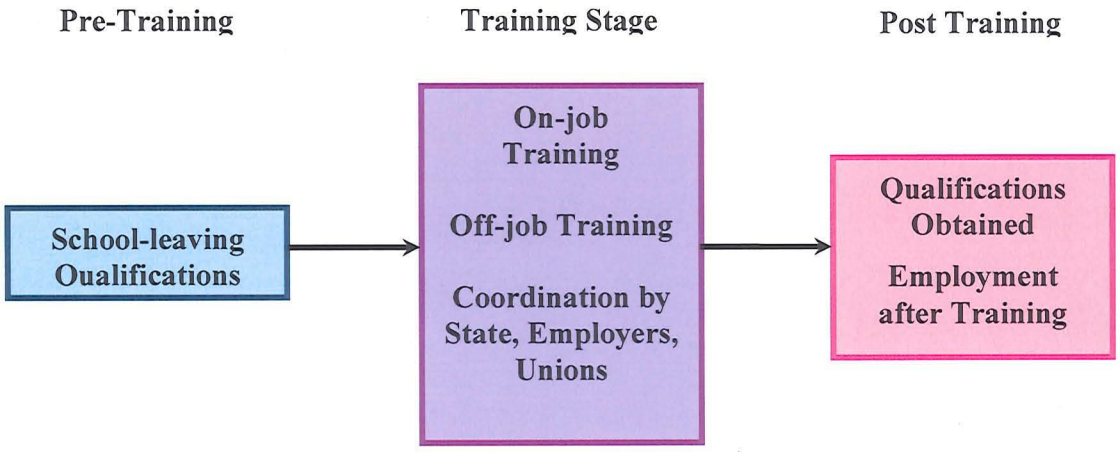


Figure 2.1 Outline of the Dual System of VET

(Source: Adopted form Rose and Wignanek, 1990, as cited in Holden, 2004, p. 338).

The main policies and practices of the German TVET System can be summed up as follows (Holden, 2004, p.337):

- *"Dual system – in-company training (practical); vocational school (theoretical)*

- *Apprenticeships – 319 000 places, though demand is decreasing*
- *Technical colleges*
- *Universities*
- *Training culture – directed; functional; industry oriented, particularly engineering."*

2.3.3 TVET in Korea

Korea got a quick economic development due to the effort of its strong government which has invested in TVET system (Hawley and Paek, 2005; Lee, 2004; Ashton et al. 2002). Both senior secondary schools and post-secondary institutions (junior colleges) are provided by TVET programmes, while training outside the schools is given as non-formal education (Mu-Keun, 1999).

Korea's vocational system at secondary level is divided clearly between vocational and secondary schools. This system rendered by the government. Usually the vocational education programming and the activities of the secondary schools are under taken by the Ministry of Education and Human Resources (Hawley, 2009; Lee, 2004). The ladder of education starts with primary school (6 years), junior secondary school (3 years), and then comes the senior secondary school that has (3 years) programme, these vocational senior secondary schools are the main institutions for training craftsmen as well as skilled manpower (Mu-Keun, 1999).

Junior vocational colleges provide (2 year) post-secondary programmes, and the objective of the junior college education is to turn out the technicians with middle level who has got a theoretical background and practical qualifications to comply with the increasing demand for technicians after quick industrialisation (Mu-Keun, 1999; Jeong, 1999). The public vocational training is carried out by the Korea Manpower Agency (KOMA) directed by the Ministry of Labour and Local Governments. It gives programmes which last from three months to two years for train both skilled and semi-skilled manpower. The local governments concentrate on training in trades for enhancing the income of farm house holds, whereas KOMA renders institutes doing in a wide range of occupations (Lee, 2004; Mu-Keun, 1999).

The Vocational Competency Development Programme (VCDP), which concerned in training the employed who are (or were) insured by Employment Insurance Scheme (EIS)

which came in force in January 1999, has replaced the compulsory training levy system (Lee, 2000; Mu-Keun, 1999). However, 'training for the employed' is often done via e-learning or through training by correspondence. In the year 2003, there were 44 institutes out of 53 public vocational training institutes were under the Jurisdiction of HRD Korea. Moreover 4,155 private vocational training institutes joined in the VCDP (Lee, 2004).

The expansion in the HE establishments is the cause of the increase in the number of graduates in Korean universities and junior colleges through the last three decades (NIER, 2007; Lee, 2004). But it can be noticed that although the HE advancement quickly but without rapid change in the Korean economy and the industrial structures to employ these college graduates. As a result of that there is no equilibrium in supply and demand side as predicted (NIER, 2007; Jeong, 1999). The most important thing in this aspect is that although there is an increase in HE enrolment, there is degradation in its quality, as indicated by the increased number of undergraduates.

There are many approaches to be taken in consideration when studying the pathway of school-to-work; these approaches include school-based learning, work-based learning and combination of liberal arts education and vocational education (Jung et al. 2004). Rosenbaum (1996) said that school-to-work transition has three elements, including the following: The part played by the schools in providing skills, the role of the enterprises in demanding skills, and joint partnerships between schools and enterprises.

2.3.3.1 2+1 Programme in Technical High Schools in Korea

The programme's 2 +1 in technical schools is similar to the dual system in Germany. Applied in the technical high schools, the 2 +1 programme provides students with two years training and helps students to obtain practical knowledge and skills in these vocational high schools, where 2 + 1 programme operates, the students spend their last year of high school in industry, the students may join between learning and work under a contract for On-the-Job Training (OJT) (Jung, et al. 2004).

The aims of 2 +1 system for technical high schools is to give training to students by which they acquire the skills required by the industrial sector and transition to work market there is an effective participation of enterprises in school-industry partnerships for the submission of education and training. These enterprises helping in two ways:-

- ❖ It helps to an organised use of materials and human resources in the delivery of education.
- ❖ To leave the theoretical education and adhere to practical and work oriented education (Jung, et al., 2004). There is a global trend towards encouraging the close relation between learning and work, and between school and the worksites to comply changing economy and industry. The 2+1 system is in line with international trend (Lee 1998).

The function of the 2+1 system can be summarised in its important role of giving students school education and work experience, and using the current resources of the school and upgraded facilities as well as equipment to industrialisation, for training. Finally the system aims to create trained people to carry on the work efficiently (Jung, et al., 2004; Lee 1998, p.3). Table 2.2 summarises the number of students and technical high schools participating in the 2+1 programme between 1994 and 2002.

Table 2.2: Number of Students and Technical High Schools Participating in the 2+1 Programme (1994-2002)

	1994	1995	1996	1997	1998	1999	2000	2001	2002
Number of schools	20	68	96	90	45	35	37	33	30
Number of students	3169	10470	13745	12922	-	-	17283	14253	12862

Source: Jung, et al. (2004, p.56)

In Korea, as per education industry promotion code, co-operative education has been established by the Government; according to this law all vocational and technical students must have a practical experience in industry within their regular study courses (Dyankov, 1996). Therefore the relation between education and work market can be reviewed within these approaches:-

1- Using survey to measure the level of HE up to the companies, satisfaction of HE notwithstanding of its restrictions of scope, through this attempt one can reach to a rough understanding of relatedness of existing HE and labour market (NIER, 2007). The Federation of Korean industry has rendered a survey in 2003 comprising 206 member companies which indicated that 78.6 % of the surveyed companies shown that they hope some parts of their training and education for the new employee to be done in HEIs (NIER, 2007). This means that many companies have hopes under the current HE, which indicates that the connection between education and labour market is weak (NIER, 2007).

2- Investigating the employment situation of college graduates also indicating the current situation between education and labour market. With reference to the relation between the

specialisations and employment of college graduates, the Korea Research Institute for Vocational Education and Training carried out a survey of employment facts of 2002 junior college and university graduates and showed that about 30% of them working in fields other than their specialisations, this according to (NIER, 2007; Jeong, 2008), may reflect that there is an excess of human resource takes place, compared to demand of the market. From the survey one can say the providing institutions do not supply the education that satisfies the market demand. At this point, it can be seen that there are no enough highly educated young people. This unbalanced issue has been referred to by (Choi, 2005). Choi (2005) argues that with the increase of the high-educated youths without maintaining the quality of training, it shall face a mismatching problem among the high educated youths. He said also that there is a problem of mismatching between the educational training system and the labour market.

Since the needed production skills became increasingly sophisticated with the manufacturing of higher value-added products in the late 1980s, firms started to emphasise skills upgrading for their workforce and at the same time placing less emphasis on the initial training for trainees before employment (Mu-Keun, 1999). To encourage organisations to provide further training of workforce in employment, the government has introduced the vocational competency development scheme with the enactment of the Vocational Training Promotion Act in 1999. All firms with more than fifty employees are required to provide vocational competency development programmes for their employees and for job seekers (Mu-Keun, 1999).

2.3.4 TVET in Malaysia

In Malaysia the formal vocational education started in 1897 by the British, to train Malay youths with a limited purpose represented in training mechanics and fitters to work in the railway lines. Some changes took place since then, and in 1965 Malaysia has introduced the comprehensive education system (Mustapha, 2001; Mustapha and Abdullah, 2001).

Within the general education, students study vocational and technical studies, and the situation has continued until the introduction of the new vocational education system in 1987, where the student can choose either: to enter the vocational programme to obtain the Malaysian Certificate of Vocational Education examination, or to register in the skills training programme for two year to obtain the National Industrial Training and Trade

Certification Board examination (Mustapha, 2001). Students were also study academic subjects to get a good base in case they decide to carry on their HE in technical and polytechnics colleges, without prejudice the vocational skills development at the lower level (Mustaph and Greenan 2002; Mustapha, 2001, p.5).

The formal technical and vocational education system starts at the upper secondary level to prepare them for further technical education at the tertiary level (at the polytechnic, college, and university levels) or for entry into the workforce. There are 70 secondary vocational schools with total enrollment 33,751 students and 17 secondary technical schools having a total of 11,136 students (Hawley, 2009). TVET as well as skill training in Malaysia is offered by various types of educational and training institutions, but public institutions play the leading role. All skill training-related standards and certification are coordinated by the National Vocational Training Council (NVTC), which includes representation from the government and the private sector (Hawley, 2009).

The Centre for Skills Development (2008, p.203) indicates that the National Vocational Training Council (MVLK) was established by the Ministry of Human Resources in 1989:

> *"to promote and coordinate skills training strategies in line with Malaysia's technological and economic development needs. As part of the National Skills Development Act (2006), the body was relaunched as the Department of Skills Development."*

The main objectives of Department are to (Centre for Skills Development, 2008, p.203):

- *"Establish a coordinated skills training system attuned to Malaysia's development goals and needs.*
- *Promote the development of skills training.*
- *Certify skills competence."*

These objectives are attained during the National Occupational Skills Standards (NOSS), launched in 1992 as an agency to review and implement required changes to the country's training and accreditation system. The National Dual Training System (NDTS) was launched in 2005 in response to recommendations made by German consultants in a 1999 report entitled: *'Basic Study on the Design of a Dual Vocational Training Scheme in Malaysia'* (Centre for Skills Development, 2008). Hence, the Malaysian system is based on the German method of training in both training institutions and the workplace. Training is for two years, with trainees spending 70-80% of their time in workplaces and the remaining 20-30% in selected training institutions (Centre for Skills Development, 2008).

The TVET sector in Malaysia is expected to play an important role in the economy of the country since the government is promoting the development of human resources in the industry sector, to guarantee the competency and the skills of the workers. However, the government established many vocational education and training institutions. These institutions are under supervision of four Ministries: - Ministry of Education, Human Resources, Entrepreneur Development and Youth and Sports (Western Australian Trade Office in Malaysia, 2003). On the contrary to academic institutions, the private sector is not as active in this area due to the fact that vocational training institutions are rather capital intensive (Western Australian Trade Office in Malaysia, 2003).

The Malaysian experiment regarding the combining of relationship between education and worksite has been associated with an extensive development vision that depend upon a group of political, and management levels and upon striving corruption and to maintain the Asian Malaysian culture (Jalal, 2007). The 2020 vision has started in 1981 which represents a strategic plan over forty years, the plan composed of the following (Jalal,2007):

- HRD, it depends on development of skills, knowledge, capabilities, work ethics, human being creativity and self-education. This can be achieved at different phases and categories of educational institutions.
- Concentrating on co-ordination between the TVET and HE of their programmers, competencies and the change needs of the labour market during the long-term of the plan. These need a continuous estimation to show the degree of this alignment and compliance with the requirements of the labour market throughout the continuous coordination with sectors of labour market.

The Ministry of Education has made many programmes which encourage the linkage between TVET and industries, which are consolidated upon when the 'Time Sector Privatisation Policy' (TSP) plan was, introduced (UNESCO–UNEVOC, 1996). This plan (TSP) gives way to industrial and public sector to use the training utilities in TVET institutions and polytechnic schools. As experienced in work the TSP programmes are beneficial to both institutions and industries (Dyankov, 1996). The TSP plan has three programmes, these are:-

- *Joint Training Programmes:* applied via alignment between the institutions and industry. Industry shall contribute through, financing, equipment and technical aids whereas the institution shall provide the space and the workshop utilities.
- *Customised Training Programmes*: to be applied as per the requirements of a particular industry. Staff provided by industry or the institution. Course participants are staff members of the company who needs the competencies to be developed during these programmes. Here the basic equipment and the space of workshop are provided by the institution while training is financed by both industry and institution.
- *Modular Training Programmes*: these are usually short courses demanded by people, and offered by individual institutions throughout their own staff and facilities. The fees of the course and those who are joining the course are determined by the institutions themselves (Dyankov, 1996).

Schooling hours and during holidays, the training facilities are not under use, so this period shall be exploited by industries under the concept of 'privatisation', in this case, fees are charged to cover running and maintenance of the relevant facilities (UNESCO-UNEVOC, 1996). Steps for application of different types of time sector privatisation programmes are made and some of there programmes haven been affected with great success (UNESCO-UNEVOC, 1996) and it has three programmes these are:-

- One of these programmes is a training scheme made jointly between TVET schools and Shell Petroleum Company to qualify welders with highly skilled. The responsibility of Shell is to upgrade the facilities and equipment of the selected vocational schools plus providing teachers of these schools with training in Shell welding sections and industrial plant
- The second programme rendered jointly between a TVET school and EON/PROTON, the manufacturer of the Malaysian car, this programme is to train car mechanics to provide the needs of proton cars.
- The third programme is TECHNO\SCHOOL programme managed by polytechnic and Matsushita Electric Motor Company, a Japanese manufacturer. This programme is to update and modernise the staff of this company.

As indicated by UNESCO-UNEUOC (1996), these programmes have been succeeded in connecting TVET institutions and industries in Malaysia. And it is clear that the time sector privatisation programme can provide a tool for application of programmes which rectified

and improved the relations with industries. The overall policy has created a relationship between technical and vocational education and industries, and in Malaysia it has provided services to strengthen the institutional-industry linkage (UNESCO-UNEUOC, 1996).

2.4 Summary

In this chapter, the TVET in both developed and developing countries has been discussed. TVET is linked to human resource development (HRD) by integrating TVET in the overall HRD system.

The two systems differ considerably concerning many aspects. First of all, the UK system is *voluntarist*, whereas that of Germany is *directed*. In the voluntarist system there is little or no government interference, effectively leaving training to the choice of the individual or the organisation, whereas in the directed system state legislation or regulation exists and such legislation or regulation has an element for employers to train their staff.

However, the German dual system promotes youths to learn skills by working in the industry and allow them at the same time to study theoretical subjects in schools, on the contrary, the UK TVET system only allow them to upgrade their skills until they will be placed actually for works.

In Korea the senior secondary schools and post–secondary institutions (junior colleges) are provided by TVET programmes and the public vocational training is carried out by the Korea Manpower Agency. The measurement of the linkage between education and the labour market could be carried on by surveying the company's satisfaction level of HE or by investigation of employment situation of the graduates which demonstrates the current situation between education and labour market.

There's similarity between the Korean programme's 2+1 which applied in technical schools and the German dual system, the later gives chance to students to join between school education and working to get experience and by this it combines between the recourses available in school and facilities and equipments which are available in the industry.

Effective measures in the Korean context differ as analysis has indicated, these include promotion of students in TVET institutes to follow careers as qualified skilled workers, and

offering educational programmes that show the requirements of industry and related to national technical qualifications.

To deliver on-the-job training required for HRD, the school–industry cooperation is needed, this means that companies need to give good training for those students who are accepted in the company, that is, at school level, it shall be useful to establish a formal linkage between school, industry and enterprises, therefore advisory committees for employers and schools should be initiated to provide advises on how to develop and apply the curriculum.

The Malaysian approach regarding relationship between education and work place is a companied with a comprehensive development vision that depends upon a complete set of reforms at political and administrative levels and on prohibiting corruption beside on the positive aspects of the Asian Malaysian Culture. The TSP plan was introduced, and this programme allows the industrial sector and the public to use training facilities in TVET schools and polytechnics.

The Korean system depends upon offering both formal and non-formal programs covering both public and private training (from this aspect it is similar to the German system which include employers, trade union members, educationalists and government representatives). But the Malaysian system is formal, involving the government, where the time sector privatisation has been introduced in the last years.

Chapter Three

General Background on Libya and the Libyan Higher Education (HE)

3.1 Introduction

In the previous chapter the relevant literature about the link between TVET and industry has been reviewed and discussed. Studying education in the Libyan context or of any other countries would be deficient without reviewing and understanding the general background of the country. The purpose of this chapter is to provide a general picture and information about the Libya, its HE system in general and TVET in particular and its impact on manufacturing industry development. Investigating these issues in this way will facilitate determine the impact of TVET on the GCCI, and also help offer suggestions for improvements in this company and in the Libyan manufacturing organisations at large.

3.2 The Libyan Environment

3.2.1 Location, Geographical Features and Population

The geographical location of Libya and its physical geography have been decisive factors in its history which involved successive domination by foreign powers. Libya is situated in Central North Africa and has a Mediterranean coastline of around 1,900 kilometres. To the north it is bordered by Mediterranean Sea, to the east by Egypt and Sudan, to the south by the Niger, Chad and Sudan. In parts of the south and west Libya touches Algeria, and in the north west Tunisia. Libya has a particularly strategic position as a link between Africa and Europe, and between the Middle East and North West Africa. It is located between 33° and 18° North latitude, and between 9° and 25° East longitude (Figure 3.1). Libya has a very large land area of about 1,760,000 square kilometres which is making the fourth country in area among the Arab countries and third among the African countries (Najeh, 2006; Weir et al. 2006).

The climate of Libya is characterised chiefly by its aridity and by its wide variation in temperatures, which subjected to the climate influence of both Sahara and the Mediterranean Sea, and is the most striking feature, resulting from the Saharan Plateau,

which forms about 90% of the country, making it truly a desert land. This aridity is an obvious constraint to expansion of economic activities (Fisher, 2004; Mguili, 1995).

Figure 3.1: Location and Physical Features of Libya

Source: http://www.merriam-webster.com/cgi-bin/nytmaps.pl?libya (Accessed 15/07/2008)

The national censuses are the main sources of statistics for studying the population characteristics of the country. Farley (1971) assumed that the character and skills of any population determine the character and the success of its development. Nonetheless, he also indicated that the economic status of a country determines the material quality of people's lives. In Libya, as Farley claims, there is a striking imbalance for the reason that the human resource situation is exasperatingly weak, in contrast to its financial situation which is exceptional as a result of the oil revenues. Two census estimations of Libya during the Italian control in 1933 and 1936. However, since then, the six official censuses have been carried out; the first was in 1954 and the most recent one was in 2006, as demonstrated in Table 3.1.

Table 3.1: Population Growth in Libya, 1933-2006

Year	Total Population	Annual Growth Rate
1933[1]	655,000	-
1936[1]	704,123	2.3
1954[2]	1,041,599	1.9
1964[2]	1,515,501	3.3
1973[2]	2,257,354	4.3
1984[2]	3,231,059	4.2
1995[2]	4,389,739	2.5
2006[3]	5,673,000	2.2

Sources: el Mehdawi and Clarke (1982, p.68)[1]; Secretariat of Planning (1995, p.3)[2]; GAIT (2006)[3].

An examination of the figures presented in Table 3.1 shows that the Libyan population was growing slowly prior to 1954; due to high mortality rates, because of the economic situation of that time. However, between 1954 and 1984, the population grew faster with annual growth rate of approximately 4%. This high growth rate is attributable to high level of natural birth increase and the return of numerous Libyans who fled to neighbouring countries during the Italian control and the Second World War (el Mehdawi and Clarke 1982). However, the growth rate has declined to about 2.2% which indicates that the population has started a new stage of growth as a result of improvement in education and participation of women in work (Elzalitni, 2008). Al-Rubeai et al. (1983) reported that the family size in Benghazi was 10.67 for parental generation, and 7.77 for then present generation (In 1983). In recent information by the Pan Arab Project for Family Health (2008), the family size is reported to be 6.1, which is lower than 1983.

The comparatively small population was reported to have influenced the availability of the labour force for economic development, which is deemed to be a major complication for economic growth (Weir et al. 2006). Accordingly, although Libya recognises the significance of workers in its ambitious development programmes, the size of the population, in addition to the limited role played by women in the economy, limit this development. Despite development programmes for employee's education and training, in 1990 only 21.2% of the population was in paid employment and only 10% of this workforce was female. Libyan culture and particularly the social structure have created this environment. In 2002 the population density average is very law, less than 3 people per sq km (8 per sq mi), but 85% of the population were concentrated along coastal area in general and, North-Eastern and North-western in particular (Elzalitni, 2008).

3.2.2 Historical Background

For most of its history, Libya has been subjected to several foreign controls. Libya comprises diverse range of people. However, the dominant ethnic groups are of Arabic origin. Most of the indigenous peoples adopted the Islam as the main religion and about 97% of all Libyans are Sunni Muslim, and also the Arabic is the official language and culture (Weir et al. 2006).

Historical and archaeological records reveal that Libya was conquered by the Phoenicians, Carthaginians, Greeks, Romans, Vandals, Byzantines, Arabs and Turks. From the Sixteenth

Century to beginning of the Twentieth Century (1551-1911), Libya was part of the Ottoman Empire. In 1912, the Ottomans signed a treaty with Italy. Between 1942 to 1951 Libya was under temporary British-French administration, ruled all or parts of the country (Najeh, 2006).

Nevertheless, Libya was independent on December 24, 1951 and was the first country to achieve independence through the United Nations which approved the establishment of the United Kingdom of Libya, a constitutional monarchy (Najeh, 2006). In addition, Libya was consisting of three separate states Tripolitania, Cyrenaica, and Fezzan. During that time it was considered one of the poorest countries in the world (Fisher, 2004). Furthermore, the first major development of the new State was its admission to the Arab League in March 1953. The second major development indicated the close links of the new State with Western Europe, and the economic difficulties which it faced. However, the discovery of oil reserves in 1959 and the subsequent income from oil revenues enabled the country to change from being one of the poorest countries in the world to become rich country (Fisher, 2004).

On September 1, 1969, the monarchy was abolished and Libya was declared as the Libyan Arab Republic. Since 2nd March 1977, the system of Direct Democracy was introduced by the General People Congress, and the Libyan Arab Republic became known as the Socialist Peoples' Libyan Arab Jamahiriya (SPLAJ), which means 'State of Masses' as distinct from a Republic (Joffe, 2001).

3.2.3 Education Background

Yousif et al. (1996) described education is an important and significant factor in development and a vital way of communication between development and population growth. Hence, Libya has made commendable efforts to create education at all levels. Education is the perfect way for preparing the labour force required for the society development (WDE, 2006).

Before independence, the development of education in Libya was approximately unknown. The most important reasons were that Libya was subjected, due to series foreign occupations, which before the First World War was the Ottoman Empire's that extend from (1551-1911), and then after the Second World War Libya was subjected to the European

protection (1911–1951). Libya under colonisation has two types of education, children had chance an to formal education up to primary level only, after this level few Libyans were enrolled as the medium of education changed from Arabic to Italian (Agnaia, 1996).

In the religion schools, known as Kuttab where Arabic Language and religious studies were the major subjects. This type of schooling has led into high level of illiteracy (Arabsheibani and Manfor, 2001). Arabsheibani and Manfor (2001); Sharif (2000) said that after 1959, oil has produced and exported, and priority has given to education therefore its costs started to increase resulting in growing literacy rates and estimation done in 1963, showed that about 81 % of the population was illiterate.

The Libyan revolution in September 1969, gave much care to education system, hence the rate of educational growth has increased, beside the great changes witnessed in the political, social and economic fields in the country (Alhmali, 2007). The revolutionary government has introduced free education for all stages and financed the education system (GPCE, 2008; Alhmali, 2007). As stated in the Constitutional Declaration (1969) (quoted in WDE 2006, p. 1):

> "*Education is a right and a duty for all Libyan citizens, it is free and compulsory until the end of the preparatory level, and the State is responsible for building and establishing schools, institutes, universities and educational and cultural foundations.*"

Table 3.2 shows the statistical picture of education status of the Libyan population. The table shows that, the general level of education is somewhat low (around 24%). Illiteracy is much higher among females than males. Around two-thirds of total numbers of learners are in the general education (primary, preparatory and secondary education). University graduates or similar degree holders are only 8.7% of the total number of students in education.

Table 3.2: Education Statue Persons Aged 10 Years and over in Libya (2003)

Type	Males		Females		Total	
	No.	%	No.	%	No.	%
Illiterate	146,179	6.78	385,959	18.67	532,138	12.6
Read and Write	254,150	11.78	244,237	11.81	498,387	11.8
Primary Certificate	436,459	20.23	375,008	18.14	811,467	19.21
Preparatory Certificate	449,830	20.85	375,843	18.18	825,673	19.54
Secondary Certificate	648,604	30.07	542,038	26.22	1,190,642	28.18
HE or Similar Degree	221,914	10.29	144,423	6.98	366,337	8.67

Source: GAIT (2003, p. 45).

However, despite the recent improvements, the Libyan education system was incapable of gearing the country's needs for trained manpower. Undoubtedly, the country still depends extensively on foreign experts as Zubi (1994, p. 164) clearly comments:

> *"Despite the increasing and rapid expansion in the educational system, the raising figures for enrolment and well equipped buildings, the country still suffers from acute shortage of the well qualified and skilled human resources that should meet the country's socio-economic development and transformation plan and run the increase number of large industrial establishment like the oil industry, where a large number of foreign personnel still occupy core functions."*

3.2.4 Labour Force

After the exploration of oil in Libya, the economic growth rate has started to increase; this led to change in the labour force profile. In the language of figures it notice that in 1964 there were 96,761 were economically active population (Elzalitni, 2008), and as seen in the table it has increased in the past few years (see table 3.3).

Table 3.3: Development of Labour Force: Libyan and Non-Libyan (000)

Nationality	1975[1]		1985[1]		1995[1,2]		1997[2]		2006[3]	
	No.	%	No.	%	No.	%	No.	%	No.	%
Libyan	454	67.1	678	63.9	1,025,1	82.6	1,054	86.8%	1,963	89%
Non-Libyan	223	32.9	383	36.1	216	17.4	160	13.2%	209	11%
Total	677	100.0	1,061	100.0	1,241	100.0	1,214	100.0	2,127	100%

Source: Secretariat of Planning (1999, p.78)[1]; Antipolis (2002, p.11)[2]; (GAIT, 2007, p.213)[3]

The above mentioned table explains that the portion of non-Libyan was around 33 % in 1975, and this proportion increased to about 36% in 1985, whereas in 1995 the share dropped to about half 17.4 %, and in 1997 it dropped further to about 13%. Recent statistics in 2006 indicate that non-Libyan workers represent about 11% of the total workforce. This drop in the number of non-Libyans was due to the following reasons:

- The decline of the petroleum prices during the 1980s which led to a decrease in the number of foreign workers (Lawless, 1989, p. 252).
- The underestimation regarding the number of migrant labourers given by the official sources does not take into consideration the illegal and unregistered immigration (Antipolis, 2002).

The Libyan population is inversely proportional to the labour supply, this can be read from the distribution of workers in the different sectors which is shown as following:-

Services sector 45%; agriculture 17.9% and industry 28.1%. The male activity rate for population aged 15 and over was 65.8%, and the unemployment rate 10.86% (Antipolis, 2002). The female participation in the labour market was much lower than that of male population, and the most not ably significant opportunities for women employment were in education, health services, and textile and shoe industry. The employees in manufacturing industry around 10.5% in Libya are limited concentrated in (good processing, textile, and chemical industries). The rapid growth and the new projects beside the promising work opportunities have attracted workers from the neighbouring countries to work in Libya (Antipolis, 2002).

Woman represents a considerable percentage in the total population, but her participation in workforce is very small. Elzalitni (2008) women represent 13.2% of the workforce in 1995, and according to GPCE (2008), the participation of women in the labour market has increased to 25% of the total workforce. According to GAIT (2007), about 33% of the total population in 2006 were students in the different stages of education and the percentage of young people whose ages below 15 years is 32.4%. All these factors resulted in requirement of foreign labours.

3.3 Manufacturing Industry in Libya

3.3.1 Historical Background

Historically, prior to oil discovery, Libya was one of the poorest country, with its vast area of land, where its population depends upon agriculture and animal breeding, with some other industrial activities, such as hand–woven crafts, carpets, leather made goods, some metallic goods, for example copper and brass made products, etc. (Abbas, 1987).

Nevertheless, after the exploration of oil, the country has concentrated to develop the industrial sector, this can be noticed in the first five- year development plan (1963–1968) in which about seven million pounds were assigned for the industrial sector (for research training and as deposits in the industrial estate bank (Abbas, 1987). Among 7954 manufacturing firms in 1964, about 56% of the large sized firms were centralised in Tripoli and Benghazi area; because of the comparatively readily availability in these two cities of industrial facilities like electric power, water, skills labour and banking services, these

industrial establishments were specialised mainly in canning, tomato processing, soft beverages, textiles, furniture and wood (Abbas, 1987; Mogassbi, 1984).

A three year plan of the 1969 revolution (1973–1975) has assigned approximately 15% of the total budget to the industrial sector and about (329) million Libyan Dinars (LD) are allocated to industrial projects so as to achieve the objective of increasing industrial production and its contribution to the national income. In addition, the Libyan government established a heavy industry sector, involving vehicle and tractor assembly plants and iron and steel (Antipolis, 2002; Mogassbi, 1984). The objectives of this plan are diversification of production, to enhance export, as an alternative, instead of complete dependence on crude oil and to collect all small and new factories under direct supervision of the National General Industrialisation (NGI) (Algadhafi, 2002, p. 9).

The plan of (1976–1980) for social and economic transformation has assigned about 1.149 million to industry, about 15% of the original budget; the plan has highlighted the field of work for both sectors public and private (UNDP, 2002; Mogassbi, 1984). The budget provided to the industrial, and this can be read from the way in which the fixed capital has been distributed among both above mentioned sectors. The 19.2 % of the total invest assigned for the industrial sector has been divided between public sector and private sector by percentage of 97.7% and 2.3% respectively (Algadhafi, 2002, p. 9).

The country has started heavy industry during the 1976–1980 development plans, the plan showed that the capital invested manufacturing industries that run by the government was 1737 million LD, representing 24.8% of the total amount allocated in the plan. The heavy industrialisation includes Abu Kammash Chemical Complex, the Ammonia Plant at El Brega, producing and Monethylene plant as well as the Urea plant which was under construction (1986). Regarding the oil sector there are two refineries under construction (1987), Ras Lanuf and EL–Zawia, (Abbas, 1987).

An amount of 3.930 million LD (23% of the budget) has been injected in industry, to achieve the objective of the five-year plan of (1980-85), this amount used in construction of new plants that depend on local materials, beside renewal and upgrade the old plants, in addition of providing raw materials (Mogassbi, 1984). Nevertheless, the government plans to expand its industrial establishment throughout the country: the fact remains that

industrial plants are concentrated in two main cities of Tripoli and Benghazi, which creates an unbalanced development in the country (Abbas, 1987).

With designing many development schemes since the first three year plan have been adopted by the Libyan revolution in 1969 within the period between (1973–1975) and (1976–1980) in addition, to those adopted within the five–year plan (1981–1985). Beside that, the annual investment programmes carried on within the years (1986–2000) (Alrubaie, 2005). The above mentioned plans aim to minimise the complete dependence upon oil revenues on the Gross Domestic Product (GDP) by exporting these industrial product to rectify the oil–dependent economic structure, this trial to diversify the exported products shall include agricultural products whose contribution is considerable and manufacturing industry (Alrubaie, 2005).

3.3.2 Size and Nature of Libyan Manufacturing Industry

Growth in Libyan manufacturing industrial capacity began in force after 1969, and developed significantly during the 1970s, but fell far behind the oil sector in the 1980s. As a result of this the manufacturing plants has suffered from the shortage of domestic skill personnel to handle these projects efficiently and effectively (Antipolis, 2002).

Despite this there are many heavy industry efforts done, namely Abu Kammash Chemical Complex, specialised in producing polyvinyl chloride (PVC) and vinyl chloride monomer (VCM). The iron and steel complex at Misratah was on the other hand has started in 1990, and Cement production is one of the most important building material, so efforts were exerted to produce it in 1972 as one of the main non-oil sector industries in Libya. In addition, Libya as oil producer country, has capabilities of producing natural gas, so trials were done to develop production of natural gas by 2002, hence, a pipeline network has started as per 2006 plan, to promote investment (Mobbs, 2006). There are also other small industries in Libya such as manufacturing local Agro-products, including canning fruits, vegetables, tanning leather materials and olive oil, etc. (Antipolis, 2002).

Table 3.4 provided by (GAIT, 2003) reviews the full picture of the development of the industrial sector during (1980-2000). The table indicates the main companies involved in the field of manufacturing industry, their places, and regarding the location of these industrial companies through the country. It should be noted that in terms of location the

majority are concentrated on the coastal area. The reason behind this concentration on the Mediterranean is that it can be easy to ship their products through Mediterranean to the near European industrial countries, besides setting the facilities of the cooling water.

Table 3.4: Manufacturing industries establishment by location, No. of Workers, Capital Investment LD Million and Annual Production

Name of Company	Location	No. of Workers	Capital Investment LD Million	Annual Production
The Libyan Cement Company	Benghazi	589	30.7	760,791 ton cement
Suke El Khamis Cement and Building Material Company	Suke El-Khamis	405	20.0	492,673 ton cement
Pipes Company	Benghazi	582	22.1	4,335 bricks
Tractors Company	Tripoli	450	22.5	695 Tractors
The General Company for Chemical Industry	Abo- Kamash	1150	69.0	120,000 ton salt; 62,500 ton Vinyl Chloride Monomer (VCM); 60,000 ton Poly Vinyl Chloride (PVC)
Iron and Steel complex	Musrata	870	53.5	1,324,000 ton of liquid steel
Cement and Building Material Company	Al-Khomes	270	1.6	133,006 ton cement

Source: GAIT (2003, different pages).

The General Company for Chemical Industry (GCCI) has been selected as the case study for the present study, given that it is the largest company in the Libyan chemical manufacturing industry and has good training programmes for its staff and workers. Accordingly, the company was perceived a case for others in the manufacturing industry (for more details, see next section and Chapter 5, Section 5.3).

Libya tried continuously to promote industry, because it wants to find alternative export materials instead of relying on crude oil, and at all times the country doing plans to develop these industries, this expansion has touched all manufacturing firms, beside the petrochemicals which produced by using natural gas, in addition to Musrata iron and steel complex (Abbas, 1987), the complex in 1990s has started production and it one of the important non-oil projects in Libya.

The non-oil manufacturing and construction sectors together represent 20% of GDP, and expanding qualitatively by processing agro-products, and step towards petrochemicals, cement, aluminium and iron and steel complexes as shown above. Despite the vast area of Libya, the agricultural products are limited due to climatic conditions and the poor soils,

and this justifies the reason of importing about 75% of the Libyan food from outside (Twati and Gammack, 2006; Agnaia, 1996).

3.3.3 General Company for Chemical Industries (GCCI)

The construction of the General Company for Chemical Industries (GCCI) at Abu-Kammash is one of the largest industrial projects carried out in Libya[1]. The Chemical Complex utilises Libyan natural resources of brine from the salt lake or Sebkha, located to the North West of the country which occupies an area of about 50 square kilometres and has reserves of salt to meet the requirements of the Chemical Complex for many years to come in addition to the ethylene produced locally at Ras Lanuf Complex.

The quality of its products reached an excellent level which has been highly recommended by many countries and has been awarded the highest awards by many international organisations (for example, quality system ISO 9001/2000). The design of the complex has been carried out with every effort to minimise the effect of land, sea and air pollution. The area of the Complex is 24 hectares and the infrastructure is 100 hectares. The complex started in April 1980 and a total of 1,150 personnel as shown in Table 3.5.

Manpower and Training

A high level of specialised technical training and experience is required to operate and maintain the complex. GCCI has paid particular attention to these needs and training of key personnel was carried out in Europe and the USA. Training programmes were continued within the Complex in parallel with production in order to qualify national manpower for technical and administrative jobs. 380 personnel were qualified in the Complex Training Centre; other 116 persons were qualified in El-Zawia Training Centre. Additional technical and administrative seminars and lectures have been delivered from time to time to improve the practice of the employees.

Table 3.5: The personnel on the complex

Engineering and Chemists	30
Production Foremen	85
Mechanical and Electrical Foremen	25
Technicians	375
Unskilled Workers	385
Administrative, Financial and Commercial Personnel	250
Total	1,150

[1] Information in this section has been compiled from data published in company's literature.

Production Plants:

The GCCI provides the total demand of salt for Libya. GCCI influences the development and growth of other industries and hence leads to the industrial growth of the country as a whole. These high quality, competitively priced products will also be supplied to the international markets. The Annual level of production Plants at GCCI is presented in Table 3.6. The main products of Chemical Complex are: Suspension Poly Vinyl Chloride (PVC), Caustic Soda, Table Salt, Chlorine, Hydrochloric Acid, and Sodium Hypochlorite.

Table 3.6: Annual Level of Production

Name of Product	Annual Production in Tonnes	Consumption in Complex in Tonnes	For Sale in Tonnes
Table Salt (Sodium Chloride)	120,000	80,000	40,000
Caustic Soda (100%)	51,600	2,600	49,000
Vinyl Chloride Monomer (VCM)	62,500	62,500	-
Poly Vinyl Chloride (PVC)	60,000	-	60,000
Chlorine	45,700	40,700	5,000
Hydrochloric Acid	9,000	1,000	8,000
Hydrogen (Cubic Metres)	14,400	14,400	-
Sodium Hypochlorite	8,900	-	8,900
PVC Granule	10,000-15,000	-	10,000-15,000

3.4 The Higher Education (HE) Sector in Libya

HE is considered the major element for the development and advancement of communities, nations and countries. HE have a basic role in prepared people for having high level skills in different areas required by society, such as to provide the industry with qualified and highly trained professionals to fulfil the requirement of industry, public sector and occupations with experts participating and providing their contributions to economic and social development, as well as the scientific and technological researches (El-Hees and Farhat 2006; Bashshur, 2004). In addition to fulfil this there should be a linkage between teachings, learning and researches from one hand and industry and enterprises from the other hand (El-Hawat, 2007a).

Libya in particular, has been colonised for a long period of time (1551–1951), during this period HE in Libya did not exist. The effect of the colonisation period is not limited to its full ignorance to HE, but ever the primary and secondary schools are very rare too (Agnaia, 1996; Ahmed, 1995). So Libya entered the independence period which started by 1951 without any clear plan, policy or infrastructure to be as base for the desired the system in the country, but this situation has changed gradually throughout the years of independence.

In 1966 a series of university colleges were inaugurated, started by faculty of Agriculture in Tripoli. The latter two colleges also concentrated in Tripoli, Advanced Technology and Higher Teacher Training Colleges by a considerable aid from UNESCO 1967 (El-Hawat, 2003).

Since the first years of the revolution, Libya has involved on a policy of quick socio-economic development plans. These plans could be described as ideal for the needs of Libyan society, as one of the main issues dealt by these plans is the expression of HE in a manner complying the vast area of the country. In 1973 the Libyan university has been divided into two independent universities, the university of Tripoli and University of Benghazi, then renamed El-Fateh and Garyounis University, respectively in the year 1976, with total of 15 faculties covering different types of courses and fields (Aldhaif and Al-Salem, 2006; El-Hawat, 2003, p.392).

Furthermore, as shown in (Table 3.7), HEIs in Libya has increased in number in the last twenty years, due to the increase in oil prices, which gave the country the opportunity to increase in the number of HEIs and to accelerate the process of education development. This can be conformed by the figures of the HEIs, which jump from 1 university and 4 TVET colleges in the year 1970 to 11 universities and 15 TVET colleges in 1980 (El-Hawat, et al. 2005; El-Hawat, 2003). By the year 2000 this number has record a higher figure of 14 universities with 76 faculties and 84 TVET colleges (El-Hawat, 2003). However, researchers (Albadri, 2006; Alfaidy and Ibrahim, 1997; El-Hawat, 2003) have observed that this number of universities was excessive for a population as small as Libya's (about 5.6 million according to 2006 census). Educational planners have suggested one million inhabitants as a lower threshold for establishing a university (Alfaidy and Ibrahim, 1997, p.199).

Table 3.7: Development of HEIs in Libya, 1960-2000

Type of Institution	1960	1970	1980	1995	2000
Comprehensive University	1	1	5	5	8
Specialised University	-	-	5	5	5
Open University	-	-	1	1	1
TVET Institutions	-	4	15	54	84

Sources: Bubtana and Sarakbi (1992, p. 431); NCETR (1996); GDHVECs (2000).

Relying on the records of GPCE (2008), in the academic year 2004/2005 more than 300 scientific sections and departments were opened in these universities. In addition, the plan

of development of HE 2008/2012 has intended to initiate 24 universities in form of (complexes) rather than scattered institutions with observation of their distribution throughout the (32 Shabiat) (administrative regions). However, students' enrolment at these institutions increased rapidly over the last three decades of the twentieth century as shown in (Table 3.8), from 3,663 students in 1969/70 to 269,302 students in 1999/2000. The 1990s, nevertheless, has witnessed more than a fourfold increase of student enrolment with a growth rate of 39.5%.

Table 3.8: Development of Enrolments in HEIs in Libya

Type	1961/62	1969/70	1980/81	1989/90	1999/00
Universities	1,028	3,663	19,315	50,475	204,332
TVET	-	-	1,130	3,916	64,970
Total	1,028	3,663	20,445	54,319	269,302
Growth Rate (%)	-	256.3	458.1	165.68	395.8

Sources: Bubtana and Sarakbi, (1992, pp.431); NCETR, (1996); GDHVECs, (2000); El-Hawat, (2003, pp.393).

Table 3.8 also indicates that the number of students at TVET has increased by sixteen-fold in 1990s. Again the data in table also showing reflect the imbalance in academic education at the account of urgent requirements of TVET programme's, and this relation shall be more clear by considering the ratio of the student admitted to universities (75.9%) and those who were enrolled in TVET (24.1%). Due to the traditions of most Arab countries, among them Libya, the community concept to the vocational learning is negative, irrespective and regarded type of education. Although by time this attitude start to change gradually as the increase in industry and number of people enrolled in this career becoming more and more, but still this mentality is existing in a minor size, and the disrespectful attitude towards vocational training has begun to decline (Al-Heeti and Brock, 1997; Garrett and Farghaly, 1987). This explains the number of students who are attending the university classes reached 279, 150 in academic year 2006/2007 and may reach above half a million by 2025 (GPCE, 2008). The trend to decrease differences resulted from the gender of student is one of the aims in the Libyan education plan (Keibah, 1998). To this effect, the increase of the number of female students enrolment, confirm the fulfilment of the government's obligation to give them access to HEIs. The gender imbalance has decreased within the past decades, as the rate of female enrolment in HEIs has rose in a continuous manner, from 21.1% in 1987/1988 to 47% in 1999/2000 (El-Hawat, 2003, p.395).

Despite this increase in number of both genders, the HE system in Libya has not succeeded to graduate the required qualified personnel in various fields to participate in the activities of the community (El-Hawat, 2003; Sharif, 2000). The records regarding allocation of students according to the area of their specialisation it could be noticed that there is more concentration on the theoretical aspect (Humanities and Social Sciences) instead of applied fields. Although one can feel that there's a balance in the distribution of students in the fields of HE 1986/1987 as shown in (Table 3.9), but in fact there was a considerable change in 1995/1996 as the percentage of humanities and social studies rose to about 70% of the total number of students and only 28% has attend basic sciences, engineering sciences and medical sciences. According to (GPCE, 2008) concerning the graduates of Libyan universities in academic year 2006/2007 indicate that 60% of graduates were in social and humanities sciences and the remaining of graduates were in science and technical specialisations.

Table 3.9: Distribution of Students by Field of Study

Specialty	1986/87		1995/96	
	No.	%	No.	%
Humanities and social sciences	7,893	20.3	11,9404	70.2
Engineering sciences	7,125	18.4	18,092	10.6
Medical sciences	5,625	14.5	6,376	3.8
Agriculture sciences	5,762	14.8	7,672	4.5
Basic and applied sciences	7,621	19.6	15,851	9.3
Other fields	4,814	12.4	2,617	1.6
Total	38,840	100.0	170,012	100.0

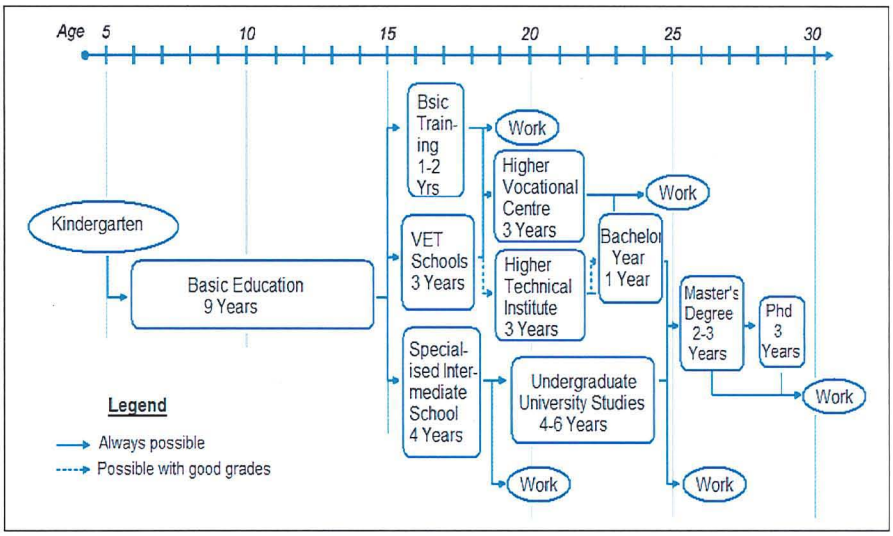
Sources: Bubtana and Sarakbi (1992, p.431); NCETR (1996, pp. 82-88).

Libyan HE is provided by universities (both general and specialised) and higher technical and vocational institutions. HE is funded and controlled by the state, with exception of the Open University which depends upon tuition fees paid by the students, although it is under the control of public sector (El-Hawat, 2003). According to Hamdy (2007), the education system in Libya is free up to university level, whereas post-graduate studies are not free, though are subsidised.

3.4.1 Structure of Higher Education

Libyan education system is designed in four levels (El-Hawat et al. 2005; LNCECS, 2004; GPCEVT, 1999): the Preschool (Kindergarten), Basic education, Intermediate Education, and HE as shown in (Figure 3.2).

Figure 3.2: The Structure of Libyan Education System



Source: Porter and Yergin, (2006, p.123)

Kindergarten: covers two years and it enrols children aged 4 to 5 years.

Basic Education: covers nine academic years from age 6 to 15 years. This level is divided into two parts, the initial part (6 years) and the second part (3 years).

Intermediate Education (Secondary): it extends from 2 to 4 academic years from age 15 to 18 years. This level provides different types of education:

- Basic vocational training (1 to 2 years): provides general vocational training relevant to a professional field.
- Specific vocational education (3 years): provides specific skills-based professions.
- Specialised intermediate education: provides (non-vocational) special education in six main fields. These fields are basic sciences, engineering and industrial sciences, medical sciences, agricultural sciences, social sciences, and fine arts and media.

HE is offered students who obtained the General Secondary Education Certificate (GSEC) duration of which is between 3 to 6 academic years. This level involves two clear categories; post-secondary TVET programmes and university education both of which leads to Bachelor's, Master and PhD degrees. The former is aimed at producing professionals and technicians who, combine both theoretical and practice subjects. The latter type (university education), on the other hand, is inclusive and competent universities which duration is from 4 to 6 years. Graduates from this kind of study get a Bachelor's degree qualification to be specialised in a certain fields (El-Hawat, 1996; El-Hawat et al. 2005).

According to NAID (1996, p.46), the whole student population in 1995 is around 1,688,697 regarding all levels, which corresponded to 35.2% of the country's population, distributed as following: 92.2% was registered in the age-group of basic and secondary education (6-15 years) and 82.4% in the (16-18 years) was admitted to intermediate level, as well as HE, the enrolment among the student population belonging to the age-group (18-24 years) was about 39.4%. The school enrolments in 2005 according to EL-Hawat, (2007b) gave the percentage of 107%, 98% and 57% for basic education, secondary education and HE respectively. According to (GPCE, 2008) the total number of students registered at all levels in the year 2006, was 1,856,368, distributed as following: Basic Education = 1,088,120, secondary education = 348,872, technical and vocational education 121,660, and lastly a number of 279,150 students are attending university.

3.4.2 TVET in Libya

TVET is one of the most important sectors of education which provide the manpower resources that enable industry to more productivity and improve the quality of production (Musmari, 2002; Ahmed, 1995). TVET continues to be favoured tools of social engineering for reach a series of objectives, such as accelerating economic growth, reducing youth unemployment and benefiting from economic globalisation (Psacharopoulos, 1997). Vlaardingerbroek and El-Masri (2008) argue that, TVET provides skilful graduates who may apply directly to the economy sectors, for instance, industry. Al-Muslemani (1996, pp.8-9) stated that an assessment by investigating shall be carried on in any TVET colleges to be aware about the relationship between TVET colleges output and the labour market requirements in three fields:

1. The capability to produce skilled human resources for all technical and vocational areas.
2. The ability to supply skilled human resources for all levels in each position.
3. The need to make all workers to have enough awareness and skill to practise their qualification.

In spite of that, TVET is an important and significant branch of the public education system in Libya. It has been subjected to an active process of re-designed, such as changing the curricula to meet the demands of the labour market of the skilled manpower and has become the focus of the government's strategy of developing skilled human resources in recent years (El-Hawat, et al. 2005; El-Magouri, 2005; El-Hawat, 2003). Accordingly, to

address this critical issue of providing skilled workforce for the national industries, a network of TVET institutions were introduced in Libya during 1990s for the aim of promoting and enhance the supply of skilled workers, which are required for the manufacturing industry and the national socio-economic development plans published by the Ministry of planning. TVET is offered from post-secondary institutions. The main aim of these institutions is to supply highly qualified human resource to achieve the needs of the socio-economic development plans. Therefore, the TVET have been considered by the government as the main provider of highly skilled workers as well as activated economic growth and social development (Ali and Almithnani 2006; Elzalitni and Lees, 2006a; El-Hawat et al. 2005; GDHVECs 2000; GPCEVT, 1999).

In the academic year 1995-1996, there were around 54 higher technical and vocational institutions, and by 1999-2000, this number has raised to 84 TVET colleges throughout the country with a growth rate of 55.5 percent as indicated in (Table 3.10) (El-Hawat, et al. 2005; LNCECS, 2004; El-Hawat, 2003). By the year 2004 the number of institutions is increased and there were more than 120 institutes which an increase of 70% within four years (Elzalitni, 2007). There was also an entire increase in student numbers. During the academics year 1996-2000, the total students' enrolment has increased from 27,584 to 64,970 students with a growth rate of 131% during the same period, also the number of students in universities increased to 204,332 in the academic year 1999-2000, so the number totalled to 269,302 students, as indicated earlier (Table 3.8). The number of academics scored 4,907 in universities and 4,898 academics in higher technical institutes (LNCECS, 2004; El-Hawat, 2003). Faculties of University, in addition to the higher technical institutes, are spread throughout the country. This distribution facilitates local and vocational training chances and act as a tool for social change and cultural development by the local population (El-Hawat, 2003).

Table 3.10: Higher Technical and Vocational Institutions in Libya (1996-2000)

Type of Institutions	1996		2000	
	Institutes	Students	Institutes	Students
Polytechnic	14	6,563	23	13,432
Specialised Higher Institutes	17	9,589	25	17,938
Higher Institutes for Training	8	3,510	9	6,714
Higher Teachers Training Institutes	15	7,922	27	26,886
Total	54	27,584	84	64,970

Source: El-Hawat, (2003, p. 393); El-Hawat, et al. (2005, p. 76); GDHVECs, (2000, different pages)

In Libya, there were about 1.8 million students in the academic year 2006/07. However, in TVET institutions the numbers of students have been steadily declining. For example, there were 64,000 in 1999/2000. By 2006/07 the numbers of students had fallen to 42,000, the reason behind this decline was to the huge numbers who join academic education each year (GPCE, 2008).

Al-Said (1990) discovered the correlation between the lack of Libyan technical manpower and the society-negative orientation towards VET. He rendered a survey study between a sample of students from both general and VET secondary schools in City of Benghazi. He came to a result that a disrespectful behaviour towards VET is very much in existence. In his recommendations he confirmed that so as to raise the effectiveness of the VET schools there is an urgent requirement for mending and enhancing this important branch of education to amend this negative behaviour.

3.4.3 Strategy of Libyan TVET Sector

Historically, during the foreign domination (1551-1951) the country has witnessed the absence of HEIs (Agnaia, 1996). However, in 1959 when the oil discovered in the country and the radical changes which followed since Libya gained independence in 1951 comprehensive changes in terms of all the political, economic and social situations of the country have occurred. The provision of education facilities has been given high priority in the country and free education is practiced at all levels. Due to that educational institutions and enrolments have obviously increased (Elzalitni, 2008; Alhmali, 2007).

Before the 1980s, Libyan society did not illustrate much interest in TVET especially at tertiary level. This situation has been further incited due to the extended inheritance of negative attitude towards technical and manual work, on one hand, and the lack of popularity of TVET programmes among secondary students, on the other (Almashhadani, 1999; Al-Said, 1990). This disequilibrium in the education system did not assist socio-economic plans that the country had allocated on since the early 1970s. Relatively, as a result of this imbalanced development, Libya needs to rely on expatriate labour for the implementation of its ambitious development programmes (Secretariat of Planning, 1999).

The Libyan government defined its policy towards TVET in the light of its education development plan in 1980. The educational plan specifies the following (Musmari, 2002):

1- TVET aims to meet the need of suitably skilled human resources in all types of fields and levels.
2- All concerned educational organisations should pay attention to all types of technical education and support it technically and financially.
3- The curriculum of TVET and tuition plans should be drawn up in such a way that objectives should be diversified and flexible to meet all requirements and all new developments in the field of education.
4- Competent governmental organisation should establish the necessary institutes to meet the country's requirements in industrial, agricultural, commercial and other fields.
5- Competent educational authorities should adopt all possible means of encouragement which should guarantee an interest in TVET and the government should provide opportunities for graduates to work in establishments, companies, organisations and factories.

The Libyan government drew up its first Three-Year Plan 1973-1975, and second Five-Year 1976-1980 Development Plans in both, attention was given to general education including vocational training by establishment and building the number of schools for further education, TVET institutions and universities (Ahmed, 1995). Vocational training was also included in both plans and they both stressed that this form of education must merit special attention. It also recognised that attention must in the future be focused on qualitative rather than quantitative expansion of TVET. Throughout the first and the second development plans, the Ministry of Education became very active concerning TVET. It established the whole body of administration and the structure of vocational training as well as establishing relevant educational curriculum and vocational training centres (Musmari, 2002). The development plan of 1981-1985 established that this branch of education merited special attention. The government perceived that nearly all of its citizens had been debarred from the right to any form of education prior to independence. Since the 1970s until the establishment of the plan there was the need for training provision for a large number of Libyan nationals (Musmari, 2002).

In the mid 1980s, Libya has experienced unprecedented growth of HEIs, and assessed its educational system and found out that student entering in universities were very high in the pure academic studies: social sciences, law, literature, and the arts (EI-Hawat, 2003). In contrast, admissions were very law in basic sciences, technology, and engineering. This

imbalance did not help Libya's industrial development. Libya's advancement into the developed world required a highly specialised labour force as well as technical experts. It is indicated in all national development plans that the real wealth of Libya entirely lies in the productive skills of its labour force. The development plans have given more importance on development of human resources via continuous advance in general and HE, as well as in TVET institutions particularly (Alrubaie, 2004).

As stated earlier, because of the imbalanced development in the education system, the Libyan educational planners have introduced the New Educational Structure for Higher Education (NESHE) (El-Hawat, 2003). This new educational structure required the establishment of TVET at the university level, in what became know in Libya as Higher Technical Institutions. These institutions were among the main types of HE. Studying at this type of HE takes three to five years. Graduates are meant to hold technical positions in the area of industrial and agricultural production and services. In addition, a number of other technical institutions on the secondary education level are known as secondary Technical Educations have also been established (LNCECS, 2004; El-Hawat, 2003). Thus, cooperation between the Ministry of Education and relevant Ministries (i.e. the Ministry of Planning, Labour Force, Industry and Agriculture) has kept the value and importance of this branch of education (TVET) to provide skilled workers and technicians for their economic growth and development plans. This was seen as a required step, since most of the workforce in each sector of the economy was expatriates.

In spite of that, the number of TVET increased substantially during the last ten years or so, and TVET considered by the government is seen as crucial for enhancing economic competitiveness as well as a tool that contributes to social inclusion, poverty reduction and sustainable development as well as the main supplier of highly skilled manpower. Thus, the most important priorities of the new government's TVET goals was to link education to social-economic development and has also plans to provide the required employees so as to deliver trained people and highly technical staff, to meet the shortage in the labour force (Secretariat of Education, 1993). In addition, the TVET reached 84 institutions by the year 2000. It was planned that by establishing these TVET centres they would provide the country with the urgently needed qualified engineering technicians equipped with the necessary engineering technical skills and professional knowledge from the indigenous

population, to meet the growing demand for this particular range of technical skills. This would reduce the flood of technical foreign workers arriving in Libya.

3.5 The Link between TVET and Chemical Industry in Libya

The vital importance of the role of HE in general and TVET in particular are providing the labour force and developing it increases continuously. This made the relationship between the requirement of the national economy of the workforce and the educational system an urgent necessity which has been increasing in recent years. The view is that the educational system has become itself as the most important system for preparing trained human resources. Hence, the surplus of untrained and qualifies labour force can be determined through education. This perception to the educational system plays a major role especially in the developing countries as such they face some problems relating to the manpower, including the surplus in the untrained labour and also the major deficit in some of the specialisations of manpower such as the highly trained engineers and technicians.

HE in general and TVET in particular are regarded as the main source for highly skilled human resources in various specialisations. There are also many spheres in the labour market that require a large number of HE graduates in various administrative, such as, medical and industrial areas (Albadri, 2004; Brooks et al. 2004). Gray (1993, p.252) emphasises the importance of links between TVET institutions and the labour market by arguing that:

> *"Technical and Vocational Education needs to have close links with local industries and employers and to make full use of the cost economies possible in working with them. Just as important, however, are systems for collecting and analysing information about future manpower needs which can be used in good time in order to produce employees with the necessary skills at times and locations where those skills are required".*

Facing the increasing requirements of labour force of different levels of skills and knowledge is perceived as one of the most important functions undertaken by the educational system which also aspires to achieve (Albadri, 2007; El-Hawat, 2007b). The labour force might have successive training, re-training and qualification opportunities in order to develop the individual's productive skills and acquiring new skills relevant to the technological and scientific development (Ali and Almithnani 2006; Algazal, 2006).

The relationship between supply and demand of the labour force since the mid 1980s, it can be said that there had been a surplus in work supply in some specialisations, which can be attributed to the absence of planning between the HE and TVET outputs and the requirements of the labour market (Saleh, 2008; Albadri 2006 and 2007; Alshakshoki, 2006). It seems that this problem still exists, whereby large numbers of graduates in various specialisations could not be fully accommodated by the labour market; only a small part had been accommodated. Despite all this, the numbers of students in educational and training institutions offering these specialisations are still increasing (Saleh, 2008; Albadri 2006 and 2007; Algazal, 2006).

According to Rafik et al. (2008); Albadri (2007); El-Magouri (2005); El-Hawat (2003) it appears that the link between academic institutions and manufacturing enterprises are still weak for several reasons, the most important of which include the following:

- The absence of a national strategy to link HE with the national industries;
- Cultural differences between HE Institutions and manufacturing enterprises;
- Most of the academics lack industrial experience;
- The high demand for engineers and technicians put little pressure on TVET institutions to address the employers skills needs;
- Little attention is given to Continuous Professional Development (CPD) and Life Long Learning;
- Preference to send employees abroad for training as a form of complement;
- Little competition between manufacturing enterprises weakens the drive for improvement.

In order to investigate the above points, quantitative survey has been designed and conducted in nine Libyan HEIs (University/Institutes) and one of the largest chemical manufacturing plants in Libya. The survey was based on eight indicators (for more detail see chapter six).

3.6 Summary

This chapter provided a general background of Libya, its educational system in general and TVET in particular. Recent census of 2006 puts the population at around 5.6 million, which

is a relatively small population that has resulted in low supply of national workforce for economic development and led to recruiting expatriate workers to meet the requirements of the ambitious development plans for human resource.

Education prior to independence in 1951, Libyan children only had access to primary education, and only few went further when learning medium changed from Arabic to Italian. Kuttab (Quranic schools) also provided limited education in Arabic Language and religious studies. The discovery of oil in 1959 has changed in terms of all the political, economic and social situations of the country have occurred and the education facilities have been given high priority. Education expanded much in all its stages after the 1969 revolution and Libyan workforce also developed within three decades.

Manufacturing industries also expanded after 1969, and initial development plans focused on industrial development. Furthermore, the industrial sector is expected to grow by the next few years, factors such as shortage of skilled labour, and the limitation of both markets and raw materials will remain the most important issues for future industrial development in Libya. However, Libyan manufacturing industry remains not well developed. With regard to the GCCI, a high level of technical training is required to operate the company, and key staff members were sent for training in Europe and the USA. On-the-job training was also provided to a large number of technical staff.

HE started in 1966 and by now there are many universities and colleges as well as many TVET colleges. However, HE system in the country has in more recent years become the focus of interest among researchers and public policy analysts. Special attention has been recently paid for TVET in Libya, which has been subject to active re-designing and has become the focus of the government strategy. This is reflected in more than 80 higher technical and vocational institutions and thousands of students and academics.

HE system in general and TVET in particular in Libya as in many other developing countries is facing many problems and challenges which are affected by the quality of their outputs. One of the recent pertaining problems is the issue of the unemployment of the graduates which has occurred as a result of the mismatch between the graduates of TVET in particular and requirements of manufacturing industry. In terms of the link between TVET and manufacturing industry in Libya, it can be said that such a link remains weak and for many reasons.

Chapter Four

Development of Survey Tools for Investigating the Link between TVET Providers and Manufacturing Industry in Libya

4.1 Introduction

The preceding chapter has discussed and provided a general picture and information about the Libyan environment and this chapter presents a comprehensive analysis of some methodological considerations. These considerations are related to the research design and methods that social science researchers can employ with special emphasis on those which are believed to be more appropriate in the research. McDonald et al. (1995) stated that, the assessment of TVET is a vital process, as the assessment can address learning performance and competence of the TVET. Generally, the assessment of TVET programmes involve complex attributes, including strategy and policy, teaching and learning, curricula, resources being adopted as well as the relationship of educational institutes with manufacturing sector (Joy-Mathews et al. 2004; Buckley and Caple, 2004; Vleuten, 1996). Hunting et al. (1986) have provided valuable information and practical guidance regarding the evaluation of TVET programmes. In addition, recently, Ghatol, et al. (2004) have reviewed several themes, which have been adopted by the present study, including curriculum development, cooperation between TVET institutes and the industry, staff development, quality assurance and continuing education.

The literature review indicated that other researchers have focused on the following key themes for the collection and analysis of data: Strategies and policies; Curriculum design; Curriculum delivery; Partnership with industry; Accreditation; Quality assurance; Staff development and Culture aspects. The researcher, therefore, decided to focus on the above mentioned themes for the collection and analysis of his data.

This chapter also, identifies research methods used in this study to assess TVET institutions in Libya. In addition, this study used a quantitative method to collect the data, namely survey questionnaire. The questionnaire aims to elicit the students' perception of the skills and knowledge they are acquiring during their study at the engineering departments in different Libyan HEIs, and the engineers and technicians working in manufacturing

industry about the education and training they received before joining the organisation. This chapter also examines the issues related in the selection of research methods which used in this study. These include, identification of key indicators for this study, methodology used to analyse the indicators which was quantitative, and the last step is the validation of the research tool.

4.2 Identification of Key Indicators for this Study

The key indicators for the different themes studied in this research are discussed in the following sections.

4.2.1 Strategies and Policies

Providers and users of TVET should align their strategies and policies to reach a common aim and increase the effectiveness and efficiency of the national TVET system.

HRD is defined by Garavan et al., (2002) as a place of formed organisational and individual practices which are structured to make better the potential contribution of human resource to the organisation. The purpose of the strategies are to enable individuals, groups and organisations understand and know their full capability for working in manner that permits for individuality and enhances efficiency through particular contexts (Joy-Matthews et al. 2004, p.6). Human resources should be maintained and evaluated within the context of the organisational strategies and policies. The strategic orientation and objectives of a learning organisation can be addressed by the link with the development of human resources. Linking HRD gives priority to learning strategy, which contribute directly with the organisation for the achievement of the strategy (Joy-Matthews et al. 2004). Garavan et al. (2001) stated that HRD strategy has to focus on the enhancement of knowledge and achievement.

Luoma (2000) highlighted that, the role of HRD is to assess and address the skills and knowledge gaps in the organisation in line with its strategy. O'Donnell and Garavan (1997) mention that organisations should make the plan of strategy as the starting point for them. Lokollo (2003) argues that HRD strategy should consider the adequacy of the system to conduct any effective programme of HRD (e.g., the availability of training management, training facility, training material and equipment). Moreover, according to Becker et al. (2006), HRD is seen as one of the key issues in the development and retention of human

capital. HRD should not be viewed as simply the training function inside the organisation, but should be seen as an integral part of the whole organisational strategy. This means that organisations of all sizes and in many sectors, are experiencing similar problems in recruiting and retaining quality employees, and therefore it is becoming increasingly important to make maximum use of intellectual capital are currently working and to develop strategies to maintain and develop all workers. Beaver and Hutching (2005) stated that the role of HRD in relation to strategy is to appraise and address skills and knowledge deficiency in the organisation. Strategic HRD is concerned with linking training and development to organisational objectives.

4.2.2 Curriculum Design

Providers of TVET should design their curriculum in line with the needs of industry and individual students, and should update the curriculum regularly to accommodate advances in technology, learning and teaching methods, social and cultural development, job market needs and globalisation. TVET providers should also design and run short courses for CPD and life-long learning.

As explained by Byers (2005), the designer of curriculum should consult various sources that play significant and vital roles in the development of the programme to choose the course within these sources. Keiser et al. (2004) stated that, the purpose of curriculum in TVET is to prepare competence and skilled workforce with knowledge and skills who are both adaptable and high performing. As Bohmann et al. (2007) said the curriculum of engineering science has an important and major role in the development of professional engineers. For future economic development it seem critical for engineering programmes address the skills required for industry and equip the graduates to play effective roles in their future recruitment (Raide´n and Dainty, 2006). Furthermore, in the new knowledge economy, companies must be involved in curriculum design and implementation (Meredith and Burkle, 2008)

Qureshi (1996) on the other hand indicated that the priorities of curriculum planning in most countries are to clarify the need to connect education with industry. Mbajiorgu and Reid (2006) maintain that the design curricula must meet the requirements of students. The curriculum designed, according to Rowther (2008), must be balanced from the aspect of knowledge, skills and values, and must also be balanced globally and internally. Rowther (2008, p. 2) adds that:

> *"The planning and the development of the curriculum should focus on the content, pedagogy, the teaching and learning processes and also assessment. Apart from the academicians, the industrial sectors are also involved in developing the curriculum. It is hoped this development and change will bring about a knowledgeable and god-fearing individual as well as a workforce befitting the current development and needs."*

Curriculum development is indispensable for the programme to be recognised by the respective education authority and professional bodies. It must provide adequate opportunities for personal and professional development and meet a set of educational and professional outcomes. This will be followed by publicity and acceptance of the programme by local industries. The final stage is the implementation, which involves human and physical resources (Tan, 2009). Nonetheless, the curriculum should be structured to include integrated set of tasks and learning experiences. It aims to achieve particular educational outcomes and meeting a set of generic aspects as set by the profession and the university. Specifically, it must have in depth technical competence in the designated field of study and area of specialisation (Tan, 2009).

The concept of Continuous Professional Development (CPD) has evolved to provide a mechanism that allows the practicing professional to have access to resources that will enable updating of knowledge and skills (Burns and Chisholm, 2003). According to Sobiechowska and Maisch (2007) the importance of minding the workplace as a learning environment for CPD is considered as the tensions that arise for learner who are facing the demands of academia in full–time job. Burns and Chisholm (2003) argued that, engineering institutions have to adopt CPD as an important aspect of ensuring that practicing engineers maintain and update their personal knowledge base.

As Zhang et al. (2009) indicate continuing education is a novel education form which is between the traditional public education and life long education, and also an earlier stage practice of life long education. Continuing education is more close to requirements of social and economical development, and as a bridge connecting the traditional public education and life long education, continuing education is an unavoidable stage of life long education. Life long education provides development of continuing education with theoretical and methodological foundation, and development of continuing education lays a strong foundation for forming and developing the life long education theory. Stefani (2005) stated

that, curriculum should also be specific to the workplace, with the aim to enable students to apply academic knowledge in the future carrier.

4.2.3 Curriculum Delivery

Providers of TVET should use a wide range of delivery methods including part time, full time, flexible learning, work-based learning, distance and open learning to accommodate the diverse needs of the learners and their learning styles.

There have been many significant researches on developing new methods of delivering engineering programmes. These include Work-Based Learning (WBL) (Sobiechowska and Maisch 2007), Project/Problem Based Learning (PBL), Open/Distance Learning, (Bohmann et al. 2007) and Learning Contracts [2](Minton, 2007). PBL is generally regarded as new method for engineering education (Graaff and Kolmos, 2003). The main assumption of PBL is that learning starts by dealing with problems that occur in the professional media (Stojcevski and Du 2008). Generally, they argue that, this method seems a beneficial and promising approach to assist students with deep reflection to develop the competencies in a PBL setting.

Bragg and Reger (2000) argue that WBL determine work-relevant learning opportunities inclusive to the workplace that help students to implement the academic and professional knowledge, skills and orientations they have got in classroom. They continue stating that good linkage between academic and occupational instruction and work- based learning can play an important and vital role in increasing the benefit of the workforce. Rafik (2009) argues that WBL programme is a process for recognising, creating and applying knowledge through, for and at work, which forms part (credits) or all of a HE qualification. He also highlighted that WBL is a component of a learning programme that focuses on the application of theory in a work-based context. It addresses specific competences identified for the acquisition of a qualification, which relate to the development of skills that will make the learner employable and will assist in developing his/her personal skills. Employers and professional bodies are involved in the assessment of experiential learning, together with academic staff. According to Hansson (2007) argues that company–based

[2] Learning contracts are "*agreement between a teacher (or teaching team) and a learner (or occasionally a group of learners)* (Atherton, J. S. 2009). *Learning and Teaching; Learning Contracts.* http://www.learningandteaching.info/teaching/learning_contracts.htm.

training contributes significantly to the total investment in human capital stock hence big amounts of capital are spent on company training annually. E–learning can increase efficiency and quality of education, including job–based education and training (European Economic and Social Committee 2006).

4.2.4 Partnership with Industry

Providers of TVET should use a wide range of methods including joint venture with industry and summer courses to linking between the learning and industry.

University-industry partnership programmes are strategic to government's business objectives and are built into the curriculum at numerous engineering and design courses (Schaber and Turner 2009). Furthermore, successful partnership between TVET providers and industry are essential to the national economy (Pagtakhan and Rock 2002). As stated by Callan and Ashworth (2004) the major aim of working with industry is to develop and improve the TVET curriculum. El-Raghy (1999) indicated that a good relation between university and manufacturing industry utilities, setting students for training and giving case studies for enhancing the delivery of curriculum. Training place shall provide some type of industry supervisions, while university staff shall make visits to trace the advancement of students while they are in the industry.

Al-Jumaily and Stonyer (2000) argue that the development of graduate engineer is not by a classroom based experience, as it requires specific involvement and commitment of industry to be included in the engineering programmes. One of the strategies is achieve this through development of partnership between education institutions and industry. Indeed, the industry can benefit from given the opportunity for training particularly during academics visit to the manufacturing industry. Links of TVET with industry can obviously include a wide range of mechanisms and activities, of which are offering the direction of national policy and determination of skill requirements, placing skill measures and providing technical input into teaching and learning resources (Comyn, 2007). Thus TVET policy design and delivery must be obtained within a new partnership between government, professional institution industry, employers, and employees (UNESCO and ILO 2002).

Partnership of HEIs with industry is very important, as this partnership can identify the needs of the labour market of qualified workforce. The importance of partnerships as a world-wide phenomenon is evident in the comment made by the OECD's Director for

Education, Employment and Social Affairs, Tom Alexander: "*The world 'partnership' movement has come of age; partnerships have become central to education systems, and their messages reverberate across the international scene*" (In Cunnigham, 1997, p.1). Cunnigham (1997) identified a number of benefits to be obtained from partnerships in training, not only for educational organisations and industry, but also for the community at large. One such benefit is that partnership provides relevant training which matches the needs of industry and can also be recognised externally. Partnership of Libyan HEIs with the relevant industries would benefit both and would help identify the needs of the Libyan labour market of qualified graduates.

The industry has frequently called for stronger links with the school system and for greater articulation between the industry and the TVET system in particular. School student workplace experience is one of the major ways this is being affected - either through basic short-term work experience, structured work experience or school-industry placements (Taylor, 2004). Karam (2006); Ryan (2001); Lynch (2000), referred that so as to get benefit of resources and provide high quality TVET for students, it is important to make the TVET system to work together with the market place such as manufacturing industry in a clear way. This co-operation shall include directing resources towards the process of occupational and career preparation where there is the up to most need and opportunity. Callan and Ashworth (2004) indicated that industry partners thought that the strength of their relations with training institutions is to fund knowledge and skills for solving the problems.

4.2.5 Accreditation

Accreditation of programmes by professional body demonstrates that the programme is relevant to the intended industry.

Accreditation of engineering education programmes is a strong instrument to improve both quality of academic and the relation for the job market. The objective of this accreditation is to evaluate engineering education programmes with the agreed measures accepted by the academic community and other shareholders (Augusti et al. 2008). Moreover, accreditation is a very important process to preserve the quality of engineering education in any country, that has a direct effect on the situation and quality of engineering graduates, and technical workers as well (Patil and Pudlowski, 2005; Patil, 2004). Throughout the past years, many

experts recognised that promoting engineering and technology education accreditation has many advantages, including the following (Chang, 2008, p. 2):

- ❖ It promotes universities and departments to re-evaluate their educational purposes.
- ❖ Industry will have way to different human resources, if departments made their own clear objectives.
- ❖ It makes the quality of engineering and technology education and increases the students' learning efficiency.
- ❖ It can make quicker the whole improvement of departments and graduate institutes of engineering and technology.
- ❖ It ensures that the target of departments' courses are a better fit with technology development trends and industry needs, with the result that graduates enjoy more employment opportunities.

Accordingly, it is important to encourage more specialists and scholars to join the engineering and technology education accreditation so as to achieve the objective of improving engineering education (Chang, 2008).

4.2.6 Quality Assurance

Providers and users of TVET should have effective Quality Assurance (QA) system to insure that their products are fit for purpose and that their stakeholders are satisfied.

QA is defined by Aziz (2007) as a continuous process of estimating, securing, maintaining and improving the quality of HEIs or programmes. This approach will facilitate institutional leadership improve efficiency of organisations, student learning and guarantee the need competence to compete in the existing globle environment (Reyes et al. 2008). QA is a term in administration, which refers to individual responsibility in the organisation for understanding, maintaining, and enhancing of the quality product, or services where the management regularly checks the validity of the system for checking quality (Frazer, 1992).

The matter of QA appears to be more important in the TVET sector (OECD, 1999). Franklin (1992); Stephenson (1992) indicates that the simplest definition of quality as fitness for purpose driven by manufacturing sector. Fitness for purpose required that the purpose is measured by extends to which this product or service meet the consumer's needs, or desires (Abu Salih and Othman, 2007; Rowley, 1996). Harvey et al. (1992) maintains that, institutions must have an obvious mission, explicit quality assurance systems and

should be obliged to improving quality. Also they must have effective policies for improving the way to staff development. The study programmes shall have clarified purposes and targets to which the subject content relates. On the other hand ways of teaching method should reflect the different requirements of learners, with valid assessment methods; awareness of the measurements by staff and students is must.

4.2.7 Staff Development

Providers and users of TVET should develop their staff by using, training courses and work-place learning to obtain more knowledge and skills to allow them to develop themselves and the organisation.

Staff is the main and most important resources in any organisation, so this staff is a basic element to maintain the progress of business within the competition (Spratt et al. 2000). Developing of staff needs a long period of time to employ activities regulated by the owner of the business to guarantee the ability of the work effectively in their current occupations in a changing environment and activities selected by individuals to activate their chances for progress (Harris et al. 2001). Staff development is a continuous major factor in all development. However , this critical in the current institutional work schedule , researches show that it is easy to integrate the staff development into newly recruited employee since it can be possible to introduce into their official needs the selected professional development training (Arisoy et al. 2008).

According to Browell (2000), to obtain individual and organisational success it is important to maintain a CPD and lifelong learning. She proposed that universities must be modified to become learning organisations. Mustahpa (2001) on the other hand, suggests that there should be an exchange of staff between TVET institutions and industries, and the staff development and skills modernisation shall have priority in TVET institutions. He adds by saying the governments should aware that absence of educators with good quality, TVET institutions can not provide quality workers. In this regard, Sallis (1993, p.128, cited in ALNabhani, 2007 p.121) states that: *"Staff development can be seen as an essential tool for building the awareness and knowledge of quality".*

Therefore education and training are essential to supply directors and employee who can understand the purposes and intends of the development. Applying this process in the Libyan organisation will help in minimising the fear of applying new methods and enable

us to determine the roots of problems. Also it shall enable the staff to carry on their works in a proper and accurate manner. The employee must know the targets, and what required from them to do in order to achieve the objectives of the organisation. On the other hand the managing body should confirm and guarantee that the workers are able to deliver what is necessary, thus, the organisation must offer effective learning chances.

4.2.8 Cultural Aspects

HRD and TVET education are affected significantly by the nation's culture.

The culture of any organisation is the corporate equivalent of the personal psychology of a human being (Levicki, 1996). Levicki (1996) maintains that individuals' psychological makeup define their personalities, the way they behave, what they look like to other individuals and what they do and do not with reference to any set of situations. The culture of an organisation operates in a similar way and defines the type, or types, of issues that an organisation can and cannot do. This culture defines most aspects of the organisations prospective similar to an individuals' psychology which basically control successes and failures in life. The capacity of workers to complement their efforts and integrate their skills does not only depends on the interpersonal skills, but it may also depend on the organisational context; such context, as it affects internal collaboration, is shape by an intangible resource; that is, the culture of the organisation (Grant, 1998).

The cultural effects may influence on both professional's implied view of what constitutes effective practice and researcher's implied theories. This means that many HRD practices, processes, measures and language are specific to cultures (McGuire et al., 2002). Each culture develops its particular group of values and assumptions. So a culture means what people do, their thoughts, dreams, experiences and values the share (Leigh, 1995; Ross, 1993).

4.3 Research Methodology Used

It is essential to check widely the subject matter of research method with a concept to aware the generic framework that reveal the choice and strategies for the method used to examine the key indicators of this research. In the current research, a quantitative research methodology/approach is employed, using questionnaires to collect the data, given that the

research population includes a large number of elements (respondents) from whom a representative sample is drawn out to generate primary data.

4.3.1 Research Strategy

Research strategy refers to the particular approach chosen by the researcher to conduct the research. According to Yin (1994, p.4) there are three conditions that determine the applicability of a certain research strategy. These are:

- The type of research question posed.
- The extent of control the investigator has over the actual behaviour event.
- The degree of the focus on contemporary as opposed to historical event.

Saunders et al. (2007) have identified several research strategies including: experiment, survey, grounded theory, case study, explorative research, ethnography, and action research. Explorative research is useful when the intention is to examine a new environment or a subject has not been sufficiently covered by other researchers (Saunders et al. 2007; Collis and Hussey, 2003). Guy et al., (1987, p.103) has listed the following benefits for selecting an explorative research:

- To satisfy the researcher's curiosity and desire for better understanding;
- To test the feasibility of undertaking a more comprehensive study;
- To develop methods to be used in a more comprehensive study; and
- To formulate a problem for more precise investigation or for developing hypothesis.

As a very little or similar research has ever been carried out in Libya and because the main goal of this research is to explore a previously un-researched area, explorative research has been adopted.

4.3.2 Quantitative Survey

Quantitative research is depends upon methods of data generation which are described as flexible and sensitive to the social context where data are produced (Hussey and Hussey 1997). Moreover, the role of quantitative research is to explain the correlation between the variables and / or testing some hypothesis (Creswell, 2002, p. 19, 23 cited in Joseph, 2004).

Survey is most widely used technique in the process of data collection required by the quantitative approaches. The quantitative approach depends upon previously determined response classes using standard data collection tools such as mail survey. Data collection in quantitative research is carried by surveys or experiments (Bryman, 2001; May, 2001). The quantitative method has the following advantages:-

- It helps to measure the reaction of many people toward a group of questions, thus shall help the comparison and assembling of statistical data through a range of premises.
- The means and end of generating data are globally acceptable, thus, less prone of confusion or distortion (Smith, 1998).

On the other hand the disadvantage of the quantitative approach is: -

- The assumptions of natural science, natural environment are brought to study the social community (Bryman, 2001).

4.3.2.1 Students, Engineers and Technicians Questionnaire

Evidence of relationship between TVET and the manufacturing industry can come from various sources: national statistics, published reports from the labour market, Ministries, and TVET institutions. For a few types of evidence, however, it is most suitable to go directly to the individuals involved and employers of TVET graduates. An important source of evidence from these individuals is the questionnaire survey. Since much of the information required is of the 'views' kind, it is decided that investigation would be conducted through the use of questionnaires. Furthermore, the choice of a questionnaire as a means for collecting the data required from a large number of students, engineers and technicians. The questionnaire offers an effective instrument of data collection that has enough flexibility to cater for large numbers in a restricted time framework for undertaking field work. This selection of questionnaire rather than interview can be justified more by the following points:

- Questionnaire was the most popular method used by the majority of previous studies5 in term of investigating individuals' views in relating to TVET issues (Mogassbi, 1984; Al-Said, 1990; Ahmed, 1995; Aldhaif et al. 2001; Ali and Almithnani, 2006; Zginin and Isawi, 2007; Elzalitni, 2008).

- ❖ It was felt to be a robust tool in which a large sample can be taken and then more different views and further understanding of the phenomenon under consideration can be obtained compared to the interview method (Hussey and Hussey, 1997).

The questionnaires method is also easier to analyse across all respondents since the researcher can get the same data for all. However, in a questionnaire a respondent can complete it at his private time without interruption (Ng, 2004; Astin, 1997; Judd, et al. 1991). In spite of that the questionnaire method there is no direct communication between the researcher and his/her subject. This method of data collection is widely used in the researches of social science, particularly in places that are defect for researcher to reach the members of the sample and if the sample is large (Judd, et al. 1991). In this regard, Oppenheim (1992, p.100) questionnaire is a suitable and useful method to collect data, and he further explained the usefulness of using questionnaire as a research tool by stating the following:

> *"A questionnaire is particularly suited to obtain information about what a person knows, believes or expects, feels or wants, intends or does or has done and about his explanation or reason for any of the proceeding."*

Thus, the use of a questionnaire is so commonplace within surveys that it is almost mandatory when analysis of research findings by other researchers is considered. The importance of a questionnaire, therefore, is in its practical use as a means of gathering large number of responses and its recognition as a central function of most surveys. Hence, for all the reasons mentioned above, a questionnaire was used to collect data to investigate the linkage between TVET institutions and manufacturing industry in Libya for the purpose of gathering the underlying ideas that the national policy of training in technical and vocational education skills to apply is one way of attempting to gain as close an insight as possible to the realities of Libyan culture and to attempt to locate gaps between policy and what actually occurs in practice.

Students were selected in this study to provide their perception about the skills and knowledge they are acquiring during their study at the different Libyan HEIs (University/Institutes). Engineers and technicians were also selected as they have a good background in the process, approaches and the experiences related to the implementation of TVET. Both students and engineers were asked to express their opinion and attitude related to this issue and solutions which they would suggest in order to improve the relationship

between TVET and manufacturing industry. In this way the researcher hoped to be able to assess the strength of their demand for skills and the ways in which they had been developing their recruitment and training practices for this level.

Like other methods of data collection, questionnaires have their advantages and disadvantages, which can be briefed as following:

The Advantages are: -

1– Easy to reach a large number of respondents with economical costs in terms of time, money and effort (Saunders et al. 2007; Oppenheim, 1992).

2– It is inexpensive for both (researcher and respondents).

3– Low cost for the researcher and respondent (Saunders et al. 2007).

The Disadvantages are: -

1– Low response rate (Saunders et al. 2007).

2– Inaccuracy caused by non-response bias or data missing.

3– Inability to correct misunderstanding or to offer explanation.

4– Can not be implemented by illiterate people (Adnan, 1999).

a. Questionnaire Design

Before constructing the questions in the questionnaire, the researcher carried out an extensive review and analysis of the environmental influences on the both sectors (HEIs and Manufacturing Industry) practices within the context of Libya. Moreover, previous studies that were undertaken to determine the attitudes of students at different engineering departments (Elzalitni, 2008; Alhmali, 2007; Mogassbi, 1984) and engineers and technicians working in manufacturing industry toward environmental responsibility such as (Musmari, 2002; Ahmed, 1995; Zubi, 1994; Abbas, 1987) were also reviewed and taken into account.

In this research, in order to benefit from the advantages of the questionnaire and to avoid its limitations, the researcher designed the questionnaire in a way to achieve its aim which was to gather the views from a large number of respondents in order to enhance the usefulness of the questionnaire. In addition, the questionnaire was designed and developed to be administered to students regarding to their study at different engineering departments in HEIs and the engineers and technicians who are working in manufacturing industry concerning education and training they have taken from HEIs (A copy of the questionnaire

in both sectors are enclosed in attachment in Appendix A, B). The questionnaires were printed on one side of sheets only not back to back in order to make the capturing of the data more easy. The aim of questionnaire is to collect date from students and engineers and technicians in order to measure the effectiveness of the link between the TVET providers and users (manufacturing industry).

High-quality questionnaire design principles should centre upon the principles of wording. The wording and tone of questions is important in developing the questionnaire because the information and its quality largely depend upon these factors (Ahmed, 2004). Consistent with Sekaran (1992), the principles of wording allude to a variety of factors, including, among other things, how questions are worded and the level of complexity of the language used the kind and form of questions asked, the sequencing of the questions in the questionnaire and the personal data required from the participants. According to Najeh (2006), the questions used have to activate the respondent to provide the required information, and the main considerations included in stating questions are based on the following factors:

- **Structural:** The structural outline seek to know the type of information emerged from each question, to observe the data flow, the number of questions required, series and components of these questions .
- **Design:** Each question shall be written with much attention to ask the perfectly the issue to bring respondent to an understanding level and then improve response rate.
- **Wording:** The language used in the context must be clear and legible.

b. Type of Questions

When constructing the questions for the questionnaire, there are two types of questions to be considered, namely: open-ended and closed-ended questions (Saunders et al., 2007; Hussey and Hussey, 1997). Open-ended is one where the respondents write down the answers in his/her words in a line or space, which is left for that. Closed-ended, sometimes referred to as closed question (Saunders et al. 2007), is one where a range of alternative answers is set out in the questionnaire and the respondents are asked to tick or circle the appropriate box(es).

Adnan (1999) declared that, these two categories (open–ended) and (close–ended), each has its characteristics the opened question has full freedom to express his/her views and is

expensive and not easy to analysing and coding, while the closed questions are usually quicker and easier to analyse, and can be easily coded to give results with clear meanings to be used in the analysis process and this shall help the understanding of the respondents and also can recreate their memories, as the respondents shall made their own answers, in the closed question also the respondent has a limited freedom as he/she has choice to make his/her answers. Wiersma and Jurs (2005) said that, questions with open-ends need additional time compared with the closed statements, they give individuals more freedom of answering as specific information may be disclosed what would not be forth coming with the closed statements. They further argue that, closed statements in a questionnaire promote the uniformity of response across respondents; data scheduling is generally straightforward and consume less time compared with the open-ended questions. Saunders et al. (2007) indicates that close-ended questions with forced choice responses are probably to be completed by respondents than open-ended questions.

As the researcher wishes to determine the level of importance attached to different influences on the respondents' (students, engineers and technicians) decision to disclose environmental information, closed-ended questions were adopted in the questionnaire of this survey. However, to overcome the disadvantage involved in such a questionnaire, a thorough range of responses was listed to avoid biasing responses. With the intention to avoid forcing respondents to express views on issues, in which they have no opinion, it was decided to use the six alternative answers "strongly disagree to strongly agree".

c. *The Scaling of the Questionnaire*

Certain scales have been devised that allow the researcher to measure the variable of interest. For this questionnaire, these questions assisted with collecting students' and engineers' perceptions of the effectiveness of each stage of the instructional design process. As the questionnaire predominately used a six-point Likert scale style format, the majority of questions were written as attitude statements. This format allows the students and engineers to place themselves on an attitude continuum for each statement-running; also the respondents were asked to indicate the 'degree of importance' of each factor in a list as 'Strongly Disagree', 'Disagree', 'Slightly Disagree', 'Slightly Agree', 'Agree', 'Strongly Agree' (Oppenheim, 1992). A Likert scale is a series of statements regarding an attitudinal object for which a respondent is requested to agree or disagree (Alhmali, 2007). The Likert

scale is one of the most popular forms used to create interval or approximately interval scales. This type of question is used because it seems to be efficient and specific in measuring attitudes, and simple and direct in compilation. Hence, this scale was also designed to enable descriptive statistics to be compiled and to measure the magnitude of the differences in the preferences among the individuals. The questionnaire was modified to suit the research objectives stated. The choice was justified on the basis that variables are to be measured empirically. Furthermore, a blank space is provided in the last section of each questionnaire to give the respondents the possibility of writing down any further or additional information and comments.

The student's questionnaire starts with general information about the institution and student details then it consists of eight categories Table 4.2 to obtain information as the following:

Table 4.1: Component of Students Questionnaire

Subject Areas Measured	No. of Items
Strategies and Policies	6
Curriculum Design	8
Curriculum Delivery	9
Partnership with Industry	4
Accreditation	1
Quality Assurance	10
Staff Development	3
Cultural Aspects	2
Space for Further Comments	1

In addition, questions were structured to examine the respondents' (engineers and technicians) view on TVET and include categories such as general information about organisation and personal details then it guide consists of eight categories Table 4.3 to obtain information as following:

Table 4.2: Component of Engineers and Technicians Questionnaire

Subject Areas Measured	No. of Items
Strategies and Policies	8
Education and Training before Employment	6
Delivery of Education and Training	6
Partnership with TVET Providers	6
Accreditation	2
Quality Assurance	9
Staff Development	2
Cultural Aspects	2
Space for Further Comments	1

The cover page of the questionnaire continued instruction notes to assist the respondents in completing the questionnaire. The questionnaire consisted of (44 and 42 questions for

students and engineers respectively and used closed questions) that elicited detailed information from the respondent selected for the survey. A covering letter addressed to the respondent (students and engineers) outline the importance of the study, the aim of the questionnaire and the value of participation.

4.4 Validation of the Research Tool

It is often very useful to conduct a pilot study before beginning the research study. Validation is a stage that enables the researcher to explore in advance any issues that might be problematic in the future. At the same time, it refines practice for the research before its final application. According to Teijlingen and Hundley (2004) who assured the importance of directive study and demand that it increases the possibility of achievement in the major study and provides advanced notice regarding the major research project may fail. The validation is most important in the current study because it intends to gather initial data and will help in the sorting the research questions and research plans.

The validation was important to discover any possible problems regarding design of the questionnaire in term of the accuracy and clearness of the questions, accuracy of interpretation, length of the questionnaire, and compliance of questions to the study investigation. So as to maximise positive results, a pilot study was rendered. Usually validation is used to discover weak points in the questionnaire design in terms of validity and reliability.

The following will explain the validity process. For the purpose of testing the validity, objectively and clarity of the questionnaires, the two pilots' studies were conducted. The following stages were carried out:

The first pilot study conducted in UK, in order to receive helpful and constructive feedback regarding the questionnaire, the draft copies of the two questionnaires (student and engineers) of the preliminary questionnaire were handed to the researcher supervision and colleagues (mainly PhD students) who have an adequate understanding and knowledge about HE issues in Libya. Subsequently a thorough and critical discussion was held with them. The feedback received provided several useful suggestions and insights that helped in enhancing the questionnaire at various points and some changes were made to the wording

of individual questions and the layout of the questionnaire, which were taken into consideration for the next piloting phase.

Before the questionnaires were administrated, the questionnaire was edited first in the English language and then translated into the Arabic language by the researcher himself (Appendixes C and D). The accuracy of the Arabic translation was checked and approved by a professor of English language and a professor of Arabic language at the University of El-Fatah, Libya. Next, the reliability and validity of the Arabic language questionnaire was obtained by requesting three professors in the Faculty of Arts and Education, the University of El-Fatah, Libya, who are experts in the field to review and comment on the questionnaire. The majority of feedback received was positive, and minor modifications were incorporated according to words of questionnaire.

The second part of the validation was conducted in Libya, where the researcher had meeting and interviews with some academic staff at Libyan universities and managers and engineers at GCCI complex, who are experts in the field to review and comment on the questionnaire, in order to determine what adjustments needed to be made in terms of the validity and reliability of the questionnaire regarding the nature of the questions, and scale measurement. As a result, certain modifications according to words of questionnaire were made according to these practitioners', managers and engineers and academic staff views to make questionnaire more understandable and valuable. The developed questionnaires were finally piloted and tested with a group of 30 students randomly selected from three HEIs (10 students from each institute), and for the engineers and technicians the questionnaire was piloted and tested with 10 engineers and technicians randomly selected, working in GCCI as well. Subsequently, minor changes were made to their wording.

Finally, a draft of questionnaire was prepared and printed with an appropriate covering letter explaining the aim and the important of study, encouraging participations to co-operate by providing accurate data, urging the return of the completed questionnaire, and assuring them of the confidentiality of the information. The typical response time to the questionnaire was 20-35 minutes complete. The questionnaire was subsequently widely distributed.

4.5 Summary

This chapter presented the research key indicators and the methodology employed to analyse and validate these indicators. The indicators were discussed in relation to: strategies and policies, curriculum design, curriculum delivery, partnership with industry, accreditation, quality assurance, staff development, and cultural aspects.

A quantitative approach was adopted to generate primary data. Questionnaires were used for this purpose to generate primary data from samples representing engineering students, and engineers and technicians. Two questionnaires were designed and formulated; one aimed at engineering students, and one at engineers and technicians employed by the GCCI. Questionnaires were first piloted (validated) across several stages are discussed, and the final draft of the questionnaires was first translated into Arabic, and further details on the various methodological issues related to the investigation, and how distributed to the respondent samples will discuss in next chapter.

Chapter Five

Data Collection

5.1 Introduction

The preceding chapter has discussed the methodology used to analyse the research indicators. This chapter explains the sampling, the protocol for carrying out the survey, and deployment of questionnaire.

5.2 Source of Data Used in this Study

This section examines probable types of available data which could be applied for this study. According to Collis and Hussey (2003, p.55) methods refer to "the various means by which data can be collected and/or analysed." Generally, there are two main sources of data which provide researchers with information that feed their studies. Namely, primary and secondary data; Primary data is the kind of data that in particular collected for the research project undertaken. A number of methods are employed to collect primary data. Such methods can classify as: observation, questionnaire, and interview (Saunders et al. 2007).

The term survey is generally adopted to gather primary data from particular population or a sample from that population. Surveys are used to get data from persons or about large social institutions and are broadly accepted in methodology of social science research, as a main instrument for collecting and analysing data from selected individuals (Oppenheim, 1992).

In this research the primary data were mainly acquired throughout self administered questionnaire. On the other hand the secondary data is the kind of data that has been gathered by others and readily available. Hence, there are a variety of sources of secondary data which as stated (Saunders, et al. 2007, p.249) can be classified into: *"documentary, multiple sources and survey."* Documentary data which can be in for example books, journals, administrative and public records, reports and non-written documents for example, films and television programmes. Secondary data is often used as a complement to primary data. Due to this, many documentary sources were used to develop a good

understanding about the investigated area. These include official publications, library sources and the internet.

Based on the utilising of various secondary data sources, the researcher has conducted an inclusive literature review to establish good and better understanding for the study area. Nevertheless, studies on the subject of HE in general and TVET in particular in Libya are very limited, and related published information is also, rarely. In general, the process of gathering data on HE or other social services in Libya as a developing country has witnessed difficult challenge (Elzalitni, 2008). Therefore, it is important to say that most of the secondary data/information used in this study has been obtained throughout direct communication with diverse sources through the fieldwork time in Libya.

The nature of this study requires the collection of primary data at HEIs and organisation. In studding TVET programmes the researcher has to cover aspects such as existing practices and factors affecting TVET activities within Libyan organisation which is the demand side and the supply side of the HEIs. After assigning the type of data or information needed and from where, the next step in the research process is to consider the most appropriate method for data collection.

In accordance with the regulations for the organisation in Libya the author had to obtain permission to conduct the field survey for this research. The copy of the proposal and questionnaire was submitted to the manager of the organisation in which the investigation was carried out. The researcher has a good personal relationship with the manager of the organisation which was investigated, and has good contact with this people directly or indirectly.

5.3 Sampling

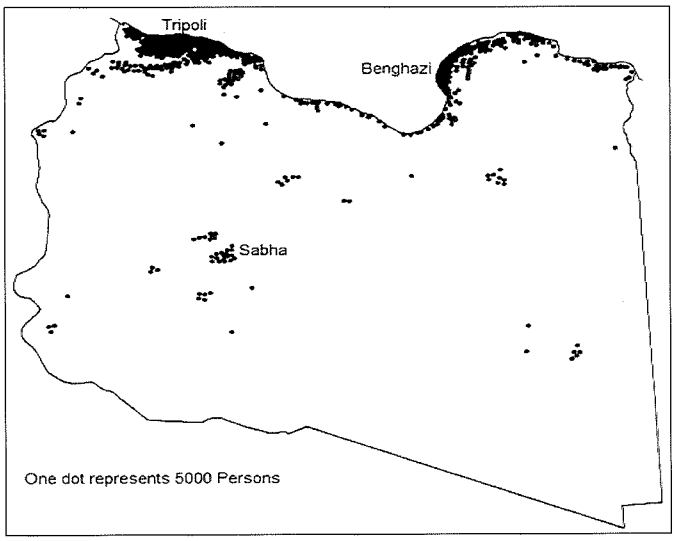
Generalisation constitutes an essential part of any research process; it indicates the extent to which the results are represented in the relevant population (Nachmias and Nachmias, 1996). When data are partial and used to make generalisation on the whole, the whole called a population and the subset is called a sample. A sample contains some members selected from the population; studying which, the researcher would be able to take conclusions that would be generalisable to the population of concern (Sekaran, 2000).

McDaniel and Gates (2001) stated that the sampling can be defined as the process of gaining information from a subset and a sample of a large group.

Mendenhall et al. (1971) has defined a population as people about whom the researcher needs to get information. A population seems to be complete a group of people that comprise a community, a society, an organisation, or any body that have some shared properties or standards. Hence the word population means the whole group of people; things or events that the researcher wants to examine pertained to a certain study.

The investigation was carried out across two sectors (HEIs and manufacturing sector). These sectors were selected which might provide a reasonably full picture of current practice and experiences. As mentioned earlier in (chapter three), Libya is the fourth in area among the Arab countries and third among the African countries, and its area cover 1,760,000 Km^2, and the population approximately 5.6 million in 2006. In fact, it has a large size area in relation to the population number the desert covers about 90% of the mainland along with the concentration of about 85% of the population in the narrow coast strip in the north (Figure 5.1) (Weir, et al. 2006; Bulugma and Kezeiri, 1995).

Figure 5.1: Distribution of Population in Libya



Source: El-Kikhiya, (1995, p.218)

Before samples selection, the researcher has divided the study area to four main areas where most of Libyan citizens concentrated, northwest represented by Tripoli and El-Zawya; middle and northeast represented by Sirt and Benghazi respectively, and Jabal

Gharbi in southwest. In addition to their population, these cities were selected according to (universities/institutions) for the following reasons:

- They present valuable research opportunities since they have fairly high concentration of institutions in each city which can easily be targeted than those in other parts of the country.
- Since the institutions as a public educational service throughout the country is highly centralised an operated under the Secretariat of Education, they have to large extent similar characteristics. Therefore, selecting these cities should not affect the sample representation of Libyan at large.

In this research the population from which the subjects were selected was 4,425 first and second year students at nine HEIs registered for the academic year of 2007-08 in Libya as shown in (Table 5.1). This selection was based on the fact that the participations have not experienced a considerable time as first and second year students at these institutions and therefore are in a position to assess the efficiency of the provided programmes and consequently can ascertain the impact of these programmes on themselves.

Determining sample size is a very important issue because samples that are too large may waste time, resources and money, while samples that are too small may lead to inaccurate results (Han et al. 2008). The total sample size of students was determined based on the table developed by Krejcie and Morgan (1970) and shown in Appendix H. The table is applicable to any population of a defined (finite) size. As was indicated earlier, the total population of students at the nine selected HEIs was 4,425 students. This gives a representative sample of 352 using Krejcie & Morgan's table. However, the larger the sample, the more likely it is to represent the population from which it comes (Fraenkel and Wallen, 1990 cited in Smith and Hall 1999), and for explorative research using the largest sample possible is recommended (Gay, 1987; Gall, et al. 1996 cited in Smith and Hall 1999), therefore, it was decided to double this sample size to 704 for students. To ensure sufficient representative from the target population, proportional stratified sampling was employed[3]. The benefit of this sampling method is that it guarantees representation of the

[3]- Based on the total sample size, the required sample size for each university/institution was calculated using the following equation adopted from (Moser and Kalton, 1979, pp. 86-88):

Proportional Sample Size of a institution = Total Sample Size * Total Students of Institution / Total Population

defined strata (universities/institutions) in the target population (Moser and Kalton 1979). The student sample was drawn from nine HEIs. In Each institute the student population was stratified into males and females, and from each group a sample was drawn. Then, the samples from all these institutions were pooled together. Proportional stratified sample was used to determine the number of samples needed for each (University/Institutes). Therefore, it was decided to double this sample size to 704 for students as mentioned above. On the bases of the subjects were then randomly selected from a lists provided by each university/institution.

The manufacturing industry plays most important and vital role in the Libyan economy. Increased economic activity, such as in oil exploration and export, and increasing public spending on social and economic development have led to increases in the number of organisations that operate such processes. It was also important that the selected organisation must have structured training systems. Another consideration is that it was an organisation that is considered a significant to the economy of Libya and is also vital parts of the Libyan economy as contributors to gross national income, the amounts of invested capital and its role in creating new jobs to the economy from dependence on oil. Moreover, with respect to the manufacturing industry, the distribution of human resources according to economic activities in 1995 showed that the manufacturing sector absorbs about 30% of total human resources in Libya (Twati and Gammack, 2006; Antipolis, 2002).

Though there have been a few increases in the number of private companies operating in the manufacturing sector over the past ten years in Libya, this study has been performed only in organisations in the social (public) sector. This is because the public sector in developing countries is dominated by the activities, guidelines, content and methods of development in these countries (Todaro, 1989).

Table 5.1: Details of Universities/Institutions

Name of the University/ Institution (Address)	Name of the School	Number of Students in the School	Number of Students in the First and Second Year	Number of Academic Staff in the School	Qualifications Offered	Entry Requirement	Qualifications Accredited by Professional Bodies(if any)
Al-Fatah University (Tripoli)	Engineering	10150	2030	309	BSc. and MSc	Secondary certificate and equivalent	National Authority to Equalisation Certificates
Garyounis University (Benghazi)	Engineering	4696	939	105	BSc. and MSc	Secondary certificate and equivalent	National Authority to Equalisation Certificates
Seventh of April University (El-Zawya)	Engineering	1810	362	93	BSc.	Secondary certificate and equivalent	National Authority to Equalisation Certificates
Al-Tahady University (Sirt)	Engineering	864	196	47	BSc.	Secondary certificate and equivalent	National Authority to Equalisation Certificates
Higher Institute of Occupations Overall El-(Zawya)	Engineering	1283	278	62	Higher Diploma	Secondary certificate and equivalent	National Authority to Equalisation Certificates
Higher Institute of Occupations Overall (Nalowt)	Engineering	693	183	33	Higher Diploma	Secondary certificate and equivalent	National Authority to Equalisation Certificates
Higher Institute of Mechanical and Electrical Occupations (Zawara)	Engineering	769	153	41	Higher Diploma	Secondary certificate and equivalent	National Authority to Equalisation Certificates
Higher Institute for the preparation of trainers (Regdalin)	Engineering	677	138	29	Higher Diploma	Secondary certificate and equivalent	National Authority to Equalisation Certificates
Higher Institute for the preparation of trainers (Al-Zantan)	Engineering	617	146	24	Higher Diploma	Secondary certificate and equivalent	National Authority to Equalisation Certificates

The Table was developed by the author according to the actual information of the field study in Libya 2007/08 (Source: Appendix A)

In this research the researcher had conducted an empirical study of important sector of Libyan manufacturing industry, namely the chemical industry. The chemical industry an important and influential part of the entire Libyan industrial economy. However, the time and resources available for carrying out the research were not sufficient to enable him to cover the whole of the Libyan economy, or all Libyan industrial and commercial enterprises. Those sectors that were not covered (private companies are an obvious example) are likely to differ from the one that was covered in many important ways relevant to modernisation and efficiency. Furthermore, the study deliberately focused on the larger enterprise within the sector and excluded the smaller enterprises. This was partly because the larger enterprises account for the largest share of total economic activity in the manufacturing sector, and partly because insufficient time and resources were available to cover smaller enterprises. It is likely that smaller enterprises differ from larger enterprises in terms of the technology used, their level of modernisation, and the training and attitudes of engineers and technicians, plus the fact that the smaller enterprises were under evaluation during the survey period and that most of them ceased because of the reforming and privatisation programmes imposed by the government. Private organisations were excluded because they were all small and newly established (private businesses had not been allowed in county for about twenty years). However, the General Company for Chemical Industries (GCCI) was selected as a case study in this research for the following reason:

- Organisation selected should be large enough in terms of size and number of workers employed to ensure that the firm has an organisational structure and structured system of training.
- Organisation was selected from public sector which dominates all activities in the Libyan economy.
- GCCI is well known in Libya and has almost 1,150 employees, and it is strategically important, and one of the largest industrial projects carried out in Libya's industrial sector, and according to financial situation.
- The choice of organisation was made to cover fairly varied industrial activities. This is to allow the generalisability of the research results.

- ❖ Organisation selected is considered to be important for the Libyan economy. Therefore, it was seen as necessary to establish the effectiveness of current training practice in such industries.
- ❖ The chemical complex was granted the sixth European award for quality as well as it was also granted the American International Golden award for production quality and it was also granted the certificate of quality system ISO 9001/2000.

Having determined the reasons for selecting the organisation and similar to the student method for selecting the sample size, the engineers and technicians at the GCCI, 515 were selected and (the company has almost 1,150 employees in total) in Libya. The engineers and technicians, the population was 515 which correspond to a number of sample members equal to 222 by using (Krejcie & Morgan's table). This number was not doubled because the population size is relatively small.

5.4 Protocol for Carrying Out the Surveys

5.4.1 Preliminary Contacts

The method used was either directly, where the researcher took the initiative of speaking to managers, or by pre-arranged appointment in organisation and HE institutions studied. This was so as to build trust between the researcher and the respondents, and to ensure their response and commitment to accurate answers before distributing the questionnaire.

The researcher believes that the big company should have TVET activities according to their size, number of employees and financial situation. Moreover, to facilitate his mission and to get direct contact with the persons in charge of TVET programmes, the researcher visited one the biggest organisation to collect details of targeted persons in Government Company which was GCCI in Libya, and obtained very useful information, as well as the researcher also visited the nine (university/institutes) and obtained very useful information.

5.5 Deployment of Questionnaires

The distribution of the questionnaires took place in early March and late June 2008. According to Nwana (1982, quoted in Mussmary, 2002), there are three different ways of distributing research questionnaires:

1- The investigator may deliver the form in person to the respondents, stay with them, complete it and collect it thereafter.

2- The investigator may deliver the form in person to the respondent, go away for a while (a few hours, a day, a week, a month) and repeat the visit to pick up the completed form.

3- The investigator may post the form to the respondents and wait in his station for the forms to be returned through the post.

Due to the large numbers of students and engineers and technician participating in the study it was difficult to deliver the questionnaire to them in person. Alternatively, the researcher delivered the questionnaire to the heads of department and managers of the company who were requested to distribute the questionnaire to students and engineers. Completed questionnaires were returned to the heads of department and mangers which were then collected by the researcher, which mean that, the researcher used the first approach.

This distribution method, where they are handed out in person rather than through the post, has been generally accepted as a more effective and efficient way. The advantages of this method, as Nwana (1982, quoted in Mussmary, 2002), are:

1- The investigator is certain that the questionnaire has reached its destination, i.e. the respondents.

2- The investigator is in full control of how long data collection exercise will last;

3- The respondent will be able to have access to records which he may need to make reference to for completing the form.

4- The respondent is at ease and responds to the questions at his own pace in a relaxed atmosphere.

In the HEIs, the represents a high response rate is 89%, where 625 out of 704 questionnaires were completed and collected as shown in (Table 5.2). On the other hand, a total of 222 questionnaires were distributed to manufacturing industry (GCCI) and 137 were completed and collected, and the response rate is 62% of the questionnaires.

Table 5.2: Distribution of the Sample Population of University/ Institution in Libya in the Academic Year 2007/2008

Name of the University/ Institution	Address of the University/ Institution	Total No. of Students in First and Second Year	Proportionate Sample Size Distributed	No. of Responses Received	No. of Responses Not Received
El-Fatah University	Tripoli	2030	323	289	34
Garyounis University	Benghazi	939	150	137	13
Seventh of April University	El-Zawya	362	58	43	15
Al-Tahady University	Sirt	196	31	27	4
Higher Institute of Overall Occupations	El-Zawya	278	44	41	3
Higher Institute of Overall Occupations	Nalowt	183	29	28	1
Higher Institute of Mechanical and Electrical Occupations	Zawara	153	24	19	5
Higher Institute for the preparation of trainers	Regdalin	138	22	22	0
Higher Institute for the preparation of trainers	Al-Zantan	146	23	19	4
Total	**9**	**4425**	**704**	**625**	**79**

The Table was developed by the author according to the actual figures of selected sample in each university/institution

The total 926 of these questionnaires were distributed to both sectors, and 762 of these questionnaires were usable. The total number of completed questionnaires was received represents response rate of 82% for the both sectors as shown in (Table 5.3). These questionnaires were collected by researcher and installed in the computer using data manipulation through the SPSS statistical package social science programme.

Table 5.3: Distributed Questionnaires and Response Rate for both Sectors

Sector	Distributed	Completed	Incomplete	Response Rate
Manufacturing Industry	222	137	85	62%
HE Institutions	704	625	79	89%
Total	926	762	164	82%

5.6 Data Analysis Tool

After the data collecting of the study, the Software Statistical Package for Social Science (SPSS) for windows was used to create database and render statistical analysis quantitative data. Mainly descriptive statistics and tables based the frequencies and percentages are used

to describe the data where appropriate. Frequencies enable researcher to describe the characteristics of the studied sample and to know the frequency distributions of the variables under investigations. Differences between male and female students were tested statistically using ANOVA test according to the genders of the respondent's students. It was possibly not possible to undertaken ANOVA test for engineers and technicians because while the sample consist 137 respondents of whom only two female.

5.7 Ethics Consideration

One of the important matters in any research is ethics, therefore, it have to be considered in any research design. During the administration of the survey two steps were to be done to protect the participations' secrecy. Firstly, a cover letter has been attached with the questionnaire explaining the importance and purpose of the research, and secure respondents confidentiality and anonymity and secondly, so as to protect the participations' secrecy.

5.8 Summary

This chapter dealt with issues relating to sampling methods, protocol for undertaking the survey and distribution of the questionnaires. Conducting interviews in Libya is not an easy task, as the interview needs to be preceded by some social engagements before the interview is conducted in order to establish trust.

Primary data were collected at the organisational level (GCCI) and at HEIs. Questionnaires were used as the source of primary data. A literature relating to TVET in other countries and in Libya was reviewed and analysed and used as the source for secondary data. Proportionate stratified sampling technique was employed to identify the study samples. Data were derived from two samples, students and engineers and technicians working for the GCCI. Questionnaires were distributed personally by the researcher to members of both samples. A high response rate was obtained for both samples. Data were analysed statistically using SPSS and ethical considerations were observed throughout the study.

Chapter Six

Data Analysis

6.1 Introduction

In the preceding chapter, issues relating to research methodology have been addressed. Data generated for the purposes of the present study were both primary and secondary. Primary data were collected using self-administered questionnaires to two samples; one sample includes students in engineering and TVET institutions, and one sample includes engineers and technicians from one of the largest chemical manufacturing company in Libya. The secondary data were generated from the literature relating to the research topic and themes.

This chapter presents an analysis of the quantitative data collected through surveying TVET providers and the GCCI in Libya. The analysis is divided into eight themes that correspond with the research indicators discussed in Chapter Four.

6.2 Quantitative Data Analysis

The methodology used to conduct the quantitative survey was discussed in details in Chapter Five. Out of 926 questionnaires circulated, 762 have been returned (625 for students and 137 for engineers). This means that the return rate is 82%, which is both acceptable and very good return. The literature informs that response rates of 60% and over is necessary to ensure that respondents' replies provide an accurate picture of the population from which such samples are drawn (Armstrong and Ashworth 2000). This response rate is also considered very good; according to Babbie (1990, p.182), who argues that:

> *"A response rate of at least 50 percent is generally considered adequate for analysis and reporting. A response rate of at least 60 percent is considered good, and a response of 70 percent or more is very good."*

Accordingly, data and information generated by responses to the questionnaire items can be generalised to the study whole population. Analysis of the different themes of the surveys is presented below.

6.2.1 General Information

A. Gender

Students

Data presented in Table 6.1 indicate that the numbers of male and female students were almost equal [males, 317 (50.7%), and females, 308 (49.3%)]. This is close to the gender ratio at the national level, which, according to DGHVECs (2000), the gender ratio of the total population at national level was 47% for females and 53% for males in 2000. It is also the right balance within the Libyan demographic structure according to gender, which is estimated at 107 males for every 100 female, according to UN's 2003 estimates (Encylopedia of Nations, 2009).

Engineers and Technicians

Nonetheless, when it comes to the distribution of engineers and technicians according to gender, this balance is tipped towards the male population. Table 6.1 indicates that the sample consisted of 135 male engineers and technicians (98.5% of the sample), and only 2 (1.5% of the sample) were females. Hence, it can be said that the balance in the numbers of males and females is about right during study but after graduation there is a clear indication of significant gender imbalance. Although the population structure according to gender was characterised by its balanced pattern, the low contribution of females in economic activities creates problems. This has been attributed to the traditional customs and beliefs, attitudes and value systems, which cannot be measured precisely, are the main planning difficulty in this area.

Table: 6.1. Distribution of Respondents according to Gender

	Students		Engineers and Technicians	
Gender	Male	Female	Male	Female
% (actual)	50.7% (317)	49.3% (308)	98.5% (135)	1.5% (2)

B. Age Profile

Students

In terms of age profiles, data presented in Table 6.2, indicate that the absolute majority of students (92.5%) were younger than 26 years old. The proportion of students aged 26 and over is only 7.5%.

Table: 6.2. Distribution of Respondent Students, according to Age

Age	No.	%
Less than 20 years	80	12.8
From 20 to less than 23 years	292	46.7
From 23 to less than 26 years	206	33.0
From 26 to less than 29 years	44	7.0
More than 29 years	3	0.5
Total	**625**	**100.0**

Engineers and Technicians

For the engineers and technicians, the age profile (Table 6.3) centred on the age groups 30-50 years old (85.4% of the respondent sample).

Table: 6.3. Distribution of Respondent Engineers and Technicians, according to Age Group

Age	No.	%
Less than 30 years	4	2.9
From 30 to less than 40 years	58	42.3
From 40 to less than 50 years	59	43.1
More than 50 years	16	11.7
Total	**137**	**100.0**

The percentage of engineers and technicians that are under 30 is only 2.9% while the percentage of those over 50 years is 11.7%. This is a worrying sign that the numbers of young engineers and technicians finishing their degrees are much less thaN the numbers in this age group entering the job market, and points to the discontinuity of recruitment in this field, especially that the retirement age in Libya is 60 year old. This raises a concern about the continuity of recruiting engineers and technicians. Possible reasons for the decline in new engineering recruit could be attributed to:

- Poor incentives for new recruits.
- Concerns about the safety of chemical industry.
- Concerns about the future of chemical manufacturing industry.
- The organisations prefer to recruit engineers and technicians with some experience, and young engineers lack such work experience.
- Majority of recruited engineers and technicians are young or have many years of employment ahead until they reach 60 years, the age of retirement.

Moreover, the structure of the labour force is overwhelmingly young in the economy as a whole. In the firms also, the same phenomenon has been observed regarding the limited role of females in the economic activities, but with the predominance of males in their 30s and 50s. The imbalance in gender and age in firms and in the economy as a whole

constitutes another obstacle to such planning particularly when it was considered that age and gender were important factors in the recruitment process and the selection of employees for internal training programmes. There are also other possible reasons, for example, the quality of engineering graduates and the lack of conformity of engineers' number and training with the requirements of social and economic development and the labour market (Rafik et al. 2008). This lag in recruiting young engineers and technicians is due to the weak link between engineering education and national development. According to Rafik et al. (2008, p.2), some researchers attributed this weak link to the following cause factors:

- *"A shortage of qualified personal who are capable of using modern technologies;*
- *An insufficient number of specialised institutions which foster research activities and the required updating of technical skills;*
- *A shortage of information and expertise to facilitate the understanding of what is needed in the technological field to meet national priorities;*
- *A shortage of expertise in applied field and in the merging of science and technology in the developmental areas of education and industry;*
- *Insufficient coordination and collaboration between universities and their respective research centres and between governmental institutions and industries;*
- *Lack of collective work between Libya and other countries, especially Arab countries, with regard to coordinating and managing the process of transferring and using knowledge and technology."*

C. Qualification

Students

Data presented in Table 6.4 concerning the degrees for which students were studying indicated that about three-fifths of students (60.8%) were preparing for their Bachelor Degree, and the remaining two-fifths (39.2%) were preparing for their 'Technical Diploma'. According to Al-Said, (1990), college attendees are considered as students of lower academic ability. Within this circuit of specialisation everybody wants to study engineering and many students do not wish to study in higher TVET institutes, which are associated with industry and practical technology, etc. This is almost a social tradition inherited from the past, that is, university educated person is a doctor, a lawyer or an engineer, not manual workers in a factory, farm or workshop. This is a challenge in any

case that is still listed among the major challenges in Libyan education policy, and facing the concept of inclusive education posed by the Educational Forum at its most recent session in Geneva(GPCE, 2008).

This means that most Libyan students want to become engineers with a 'Bachelor Degree' rather than graduating with a technical degree. Despite the fact that TVET is perceived by the majority of countries as required for their development given that it is linked to economic achievement, job creation and overall nation's prosperity (Elzalitni and Lees, 2007; Elzalitni and Lees, 2006b; Misko, 2006; Rena and Biniam, 2006; Minnis, 2000; Qureshi, 1996), and as they form an important part of the nations' HRD strategy (Rakif et al. 2008). The findings of the present study (Table 6.4) did not point to this direction, since the numbers of students preparing for their technical degrees still represent half of those preparing for their 'Bachelor Degree'. This is in spite of the fact that there has been major progress in developing the Libyan TVET systems to meet the sharply growing needs for engineers and technicians, possibly because of the majority of such developments lacks a strategic direction and very little has been done to study and analyse the effectiveness in supplying the skills needed by local industries (Rafik et al. 2008). Mussmari (2002) points out, therefore, the most important factors in encouraging students to join TVET institutions are:

- Giving some financial aids to vocational students and attract the high achieving students.
- The certificate of TVET after secondary school should be equivalent to the university certificate.
- An effective role of mass media.
- An effective regional policy to make the distribution of TEVT adequate in various areas.

Table: 6.4. Distribution of Respondent Students according to Degree Studied

Qualification	No.	%
Bachelor	380	60.8
Technical Diploma	245	39.2
Total	**625**	**100.0**

Engineers and Technicians

The data regarding the education level of engineers and technicians (Table 6.5) indicate that the highest proportion acquired "Technical Diploma" certificate (56.2%). Engineers and

technicians with bachelor degree represented 20.4% and those with secondary school certificate represented 23.4% of the sample. This result shows that there is large number of workers practicing technical activities without formal technical qualifications. These workers are relatively old and have gained their skills from working in the industry for a very long time. Employees with a Bachelor degree can be referred to as the 'engineers', whereas the other two groups (Table 6.5) can be referred to as 'technicians'. Data relating to experience at work, analysed later, show that around 45% of the engineers and technicians participating in the survey had between 15 and more than 20 years of employment.

Table: 6.5. Distribution of Engineers and Technicians, according to Degrees Held

Qualification	No.	%
Secondary School	32	23.4
Technical Diploma	77	56.2
Bachelor	28	20.4
Total	**137**	**100.0**

D. Time of Study

Students

In terms of their study, the majority of students (86.7% of the sample) were full time students and the remaining 13.3% of the sample were in part-time education (Table 6.6). This is expected given that the majority of students were young, as indicated earlier and possibly that most of the remaining older students were those in part-time education. Part-time students might include those students older than 26 years, possibly those who are at work and had the opportunity to pursue their higher studies.

Table: 6.6. Distribution of Students according to Time of Study

Time of Study	No.	%
Full Time	542	86.7
Part Time	83	13.3
Total	**625**	**100.0**

E. Parents' Profession

Students

Firstly- Father Profession

In order to assess the students' socio-economic status, they were asked to provide information relating to their parents' professions. As regards the fathers' professions (Table 6.7), the greater majority (82.5%) were either working for the public sector (59.5%) or for

the private sector (23.0). This is not surprising given that the public sector in Libya is still the major and largest employer, and the private sector has only started recently to play a larger role in the labour market due to the recent privatisation moves in Libya and the encourage of the private sector to play its role in the national economy after decades being prevented from participating effectively in the national economy. Only a tiny minority of fathers (0.8%) was unemployed, which is again not surprising given the millions of employment opportunities available to Libyan citizens. However, there is a large minority (16.6%) who seem to be over the retirement age, possibly the father of the older students in the sample.

Table: 6.7. Distribution of Fathers according to their Profession

Profession	No	%
Public Sector	372	59.5
Private Sector	144	23.0
Unemployed	5	0.8
Retired	104	16.6
Total	**625**	**100.0**

Secondly- Mother Profession

The situation is different concerning the employment record of the mothers. The majority (62%) were housewives or unemployed (Table 6.8). This is again a feature of the Libyan society where the employment is dominated by male. As indicated earlier, many female graduates are secluded from the labour market and end up as housewives as their main and only job. This is very common in the majority of Middle Eastern countries and North African countries. Nonetheless, a large number of mothers (38%) had public sector jobs, but only one mother worked for the private sector. This is not surprising given that the Libyan society is still a male-dominated society, especially in the private-sector world. Three were retired, possibly the mothers of older students.

Table: 6.8 Distribution of Mothers according to their Profession

Profession	No	%
Public Sector	236	37.7
Private Sector	1	0.2
Housewife or unemployed	385	61.6
Retired	3	0.5
Total	**625**	**100.0**

F. Work Experience

Engineers and Technicians

Data presented in Table 6.9 indicate that the majority of respondents (69.4%) had between 5 and 20 years of work experience, whereas 21.9% had more than 20 years of experience and 8.8% of them had less than 5 years of experience. This raises an important issue of aging workforce. Possible reasons for the decline in new engineering recruit have been indicated earlier.

Table: 6.9. Distribution of Engineers and Technicians according to Work Experience

Experience	No.	%
Less than 5 years	12	8.8
From 5 to less than 10 years	30	21.9
From 10 to less than 15 years	33	24.1
From 15 to less than 20 years	32	23.4
More than 20 years	30	21.9
Total	**137**	**100.0**

G. First Job after Graduation

Engineers and Technicians

Data in Table 6.10 shows that the majority of engineers and technicians (69.3% of the respondents) indicated that their current jobs are their first job after graduation. This could be an important reason that many new graduates cannot find employment, since the rate of leaving the company is low; consequently, denying the opportunity for new graduate to be recruited by the company. However, having said this, the pattern of responses to this item does not fit in with the pattern of responses to work experience, whereby the majority of respondents had between 5 and more than 20 years of experience. It is probable that respondents were somewhat confused in their responses and their response as to being their first job might be a reference to pointing to their current job with the organisation, while they have been working before that for other organisations.

Table: 6.10. Distribution of Engineers and Technicians according to whether that their Jobs were their First ones or not

First job	No.	%
No	42	30.7
Yes	95	69.3
Total	**137**	**100.0**

H. Nationality

Engineers and Technicians

The result shows that 97.1% of the respondents were Libyans and the remaining 3% were Arabs and African engineers and technicians working at the company (Table 6.11). This clearly indicated that almost all jobs have been libyanised. This is in line with GPEC (2008) finding which indicated that the Libyan workforce in 2006 represented around 89% of the total population.

Table: 6.11. Distribution of Engineers and Technicians According to their Nationality

Nationality	No.	%
Libyan	133	97.1
Arabs	3	2.2
African	1	0.7
Total	**137**	**100.0**

6.2.2 Theme One: Strategies and Policies

6.2.2.1 Students' Perceptions

The literature clearly indicates that the interest in students' perception of their university/institute experiences has received substantial attention over the past few decades (Grant et al., 2009; Walker, 2008; Amenkhienan and Kogan 2004; Velde and Cooper 2000; Astin, 1997; Mogassbi, 1984). Students' deliberation of their experiences of the learning situation of paramount significance to officials engaged in education planning, as prudently pointed out by Astin (1997, p.164):

> *"Given the considerable investment of time and energy that most students make in attending college, the student's perception of value should be given substantial weight. Indeed, it is difficult to argue that student satisfaction can be legitimately subordinated to any other education outcome."*

(a). Information about the institution

Most responding students (61.3% of the sample) indicated that they have received information concerning the institution, yet a large number of them (38.7%) maintained that they neither received any information nor the information was adequate or poor (Figure 6.1). This raises a major concern in relation to many students making their decision to join their institutions without having full knowledge about what are the strategies, policies and procedures that the institute adopts. This pattern of responses also indicates an

inconsistency of passing information to future students, such that some HEIs provide information for potential students, whereas others do not or convey trivial.

Difficulty in obtaining information and a lack of institution strategic approach to marketing and its effectiveness is another factor. This also indicates that some of the universities have not developed adequate policies and strategies to convey their message to their prospective student to help them know what they will expect to study and how much their study is linked to industry and the labour market. Furthermore, it might be attributed to the difficulty in obtaining information (e.g., due to summer vacation and lack of staff to advise prospective students) and a lack of institutions' strategic approach to marketing and its effectiveness. In short, many HEIs in Libya have failed to communicate their missions, goals and vital information to students to help them decide upon the course and the institution to enrol with. This clearly indicates that these HEIs failed to achieve their objectives to reach their potential students and community at large. This also indicates that a working strategy that is helpful to introduce many of the Libyan HEIs to potential students and also to community at large is lacking.

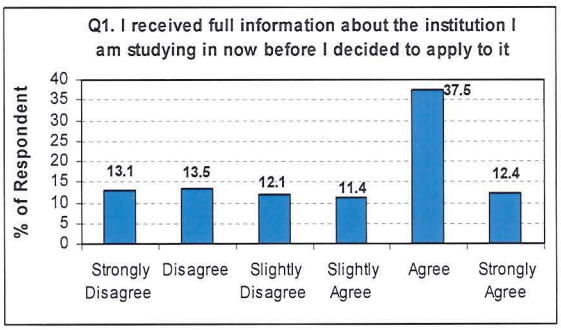


Figure 6.1: Students' perceptions about the institution's information
Source: Appendix E

(b). Information about the programme of study and potential job market

The majority 62.3% indicated that they have received some information regarding their intended programme of study and the potential job market after graduation (Figure 6.2). Furthermore, information provided to potential students in this respect might be trivial and does not guide the student into the right direction. This pattern of responses ties up with that explained for the previous statement above (Q.1).

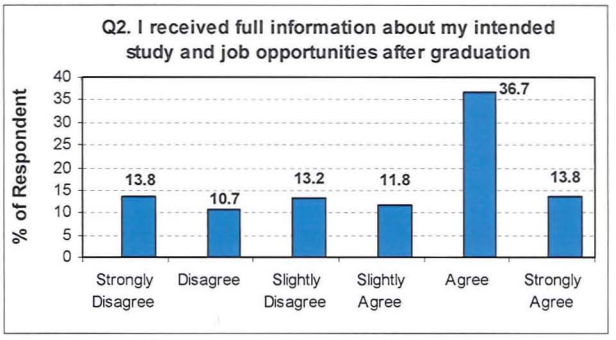


Figure 6.2: Students' perceptions about job opportunities after graduation
Source: Appendix E

(c). Reasons for applying to the institution

Results show that the 'programme of study' is the most important reason for applying to the institution (30.1%, Figure 6.3). This is possibly due to the perception of the Libyan society which considers engineering as a prestigious profession. The culture of the Libyan society, like many Middle Eastern societies, thinks high of certain professions, including engineering and medicine.

The second most important reason was that of good employability as engineering is among the highest paid profession in Libya. It also indicates that engineering has good employability and there is growing needs for qualified engineers and technicians.

The third most important was the institution's reputation. Students in Libya, as well as in other Middle Eastern countries, seek to join an established university with a very good reputation for its high standards of staff and programmes. This will enable students to find a job easily after their graduation. However, this issue needs to be investigated further to find out what are the factors that constitute a "good" institution.

The other reasons were not as important or not important for the students when they decided to apply for their institutions such as, (proximity to home, pressure from parents, pressure from friends/relatives and others).

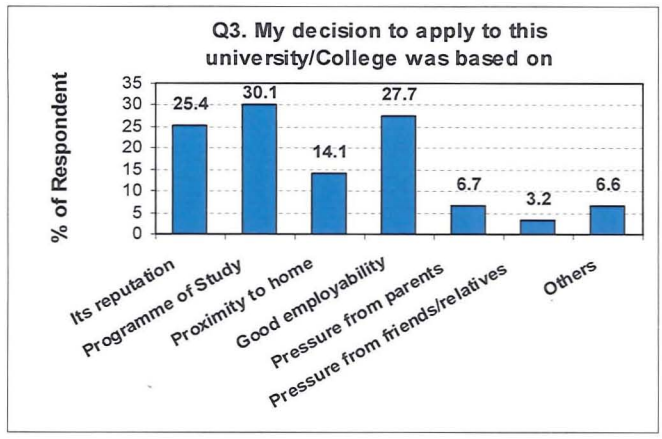


Figure 6.3: Reasons for applying to University/College
Source: Appendix E

(d). Reasons for studying engineering

In response to (Q.4) in relation to students' decision to study engineering, the most important factor was their personal interest to study engineering (45%, Figure 6.4). This pattern of response poses great concerns in that nearly 55% of the respondents have chosen 'engineering' for reasons other than their personal interest. This will certainly affect their professional quality as engineers and technicians. It is somewhat surprising that such high proportions of students elect to pursue studies which specialise in the engineering. However, this might simply reflect the nature of potential future jobs in Libya.

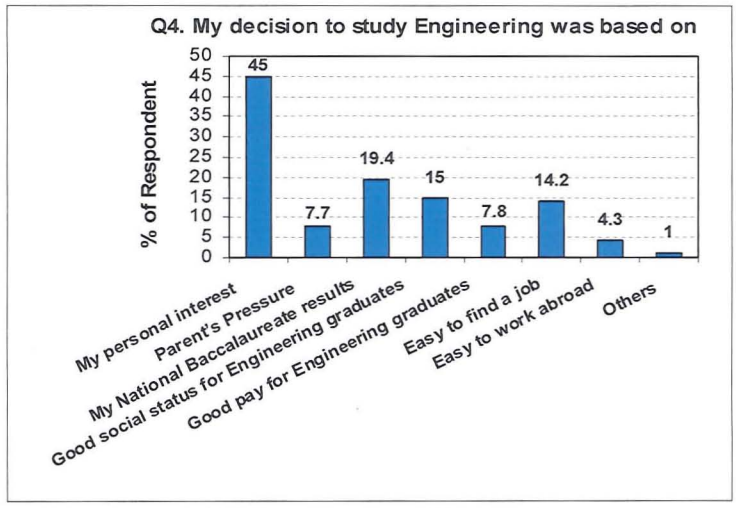


Figure 6.4: Reasons for studying engineering
Source: Appendix E

(e). Playing an active role in universities' committees

Students were also asked if they are interested in playing an active role in the university's committees and participate in shaping the policies and strategies of the

university/institution (Q.5). (40.7% of the sample) show their willingness to take part, whereas the remaining (59.3% of the sample) were not interested (Figure 6.5).

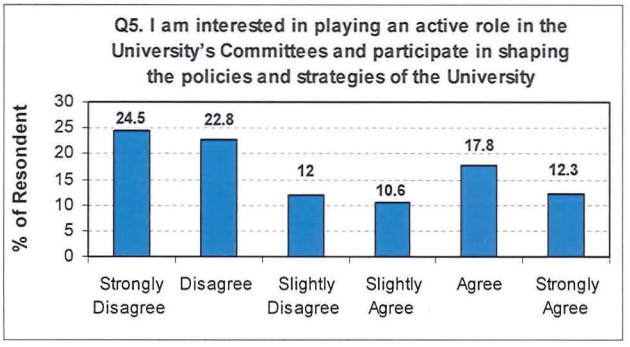


Figure 6.5: Students' perceptions about playing an active role in the institute's committees
Source: Appendix E

(f). Voice of students

With regard to their voice being listened to and considered respectable by the university management (Q.6), less than one-third of students (31.2% of the sample) agreed with the statement (Figure 6.6), whereas the remaining majority 68.8% disagreed with the statement. This raises an important alarm as one of the main stakeholders in the learning process is not listened to. This trend of responses is alarming given that students, the major stakeholder in the learning process, are not listened to, or overlooked, possibly due to the centralised organisations of the Libyan university in which decision-making is up-down and policies and strategies are formulated and implemented by the management. This is further evidence of the bureaucratic nature of the Libyan university management. This pattern of responses seems to tie up with responses to Q.5. Possible reasons could be:

- The institution management do not allow the students to participate;
- Lack of structure to support students' participation;
- Students' reluctance to make their voice heard.

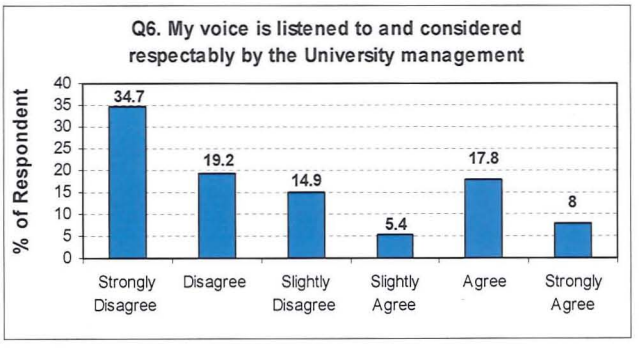


Figure 6.6: Students' perceptions about their voice
Source: Appendix E

6.2.2.2 Engineers and Technicians Perception

(a). Organisation's aims, objectives and priorities

When engineers and technicians were asked whether the organisation's aims, priorities and goals are clear and communicated well to them (Q.1), 56.2% answered positively (slightly agree to strongly agree) (Figure 6.7), in contrast to 43.8% of them who indicated their disagreement with this statement (strongly disagree to slightly disagree).

Figure 6.7: Engineers' perceptions about the aims and priorities for the company
Source: Appendix F

This is an issue for concern as nearly half the respondents are not clear about their organisations' aims, objectives and priorities that such large proportion of the sample was not clear about their organisations' aims, objectives and priorities. The range of responses was scattered and the reason could be that although the organisation has aims, objectives, strategic priorities but these are not communicated to staff effectively.

(b). Role of the department/section within the organisation

In terms of the role of their department/section being very clear in the organisation structure (Q.2, Figure 6.8), the majority of respondents engineers and technicians (73% of the sample) showed their agreement that the role is clearly defined. This positive attitude by the respondents is possibly due to the direct contact of employees with their departments and sections and they know the reasons for including their departments within the organisation. Furthermore, policies and strategies formulated by the senior management are implemented at the level of departments and sections; hence, the role of department/section becomes very clear within the organisation structure. However, in contrast, 27% of the engineers and technicians indicated that the role is not clearly defined. This indicates that more than quarter of engineers and technicians are not so clear about their role in the organisation

which is a major concern. These might be junior engineering and technical staff who are not concerned with the role of their departments and sections and they only do jobs asked by their superiors within the departments and sections.

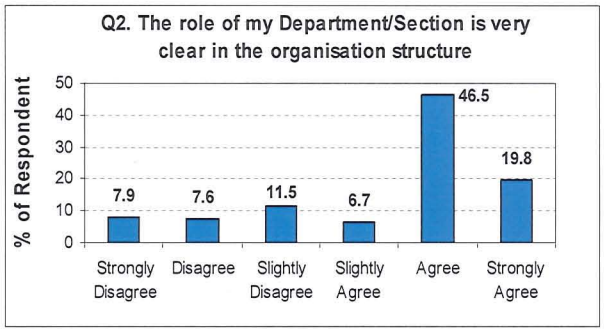


Figure 6.8: Engineers' perceptions about the role of the Section within the Organisation
Source: Appendix F

(c). Duties and responsibilities

With regard to their roles, duties and responsibilities (Q.3), the majority of the respondent engineers and technicians 78% indicated that their role, duties and responsibilities are well defined (Figure 6.9). In contrast, a small minority 22% disagreed with the statement. This is evidence that engineers and technicians know their roles, duties and responsibilities.

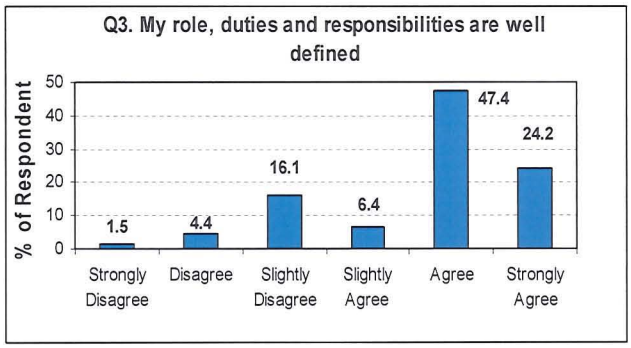


Figure 6.9: Engineers' perceptions about their role and duties in the company
Source: Appendix F

It is possible to say that those who did not know their roles, duties and responsibilities might be those who do all sorts of technical work within the organisation; hence, they have no specific role, duties and responsibilities to assume; their work within the organisation is general rather than specific. Furthermore, when these responses are linked to the issue of organisation's aims, priorities and goals being clear and communicated well to them (Q.1 above), it can be argued that engineers and technicians know well their duties and

responsibilities, but they do not have a full understanding of the whole picture and their roles in achieving the organisation's aims and objectives.

(d). Information about the company

When it comes to receiving regular information about the company and its performance (Q.4), 46.5% of the respondents showed negative response (Figure 6.10). Data also indicate that many engineers and technicians (27.9% of the sample) were indecisive in their response, either slightly disagreeing or slightly agreeing with the statement. This is an indication that the company does not communicate efficiently with staff, and substantiates the finding that many of them who indicated that the organisation's aims, priorities and goals are not clear and not communicated well to them.

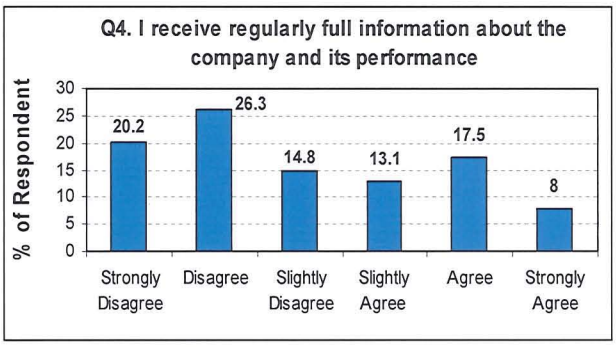


Figure 6.10: Engineers' perceptions about the company and its performance
Source: Appendix F

(e). Communication of organisation's policies

With regard to the company communicating its policies to its engineers and technicians (Q.5), again more respondents show negative response (44.3%; strongly disagree to disagree) that (Figure 6.11). Nonetheless 24.1% of them agreed with the statement and a large percentage of them (31.6%) who were not sure about their views (slightly disagree/slightly agree). Responses to this item tie up with those indicated for the previous statement, and indicate that the company does not communicate well with all its engineers and technicians. This means that in general the internal communication between the management and their engineers and technicians are rather poor and it was difficult to initiate discussion or debate or to have a channel for their views about any work or training-related issues at all.

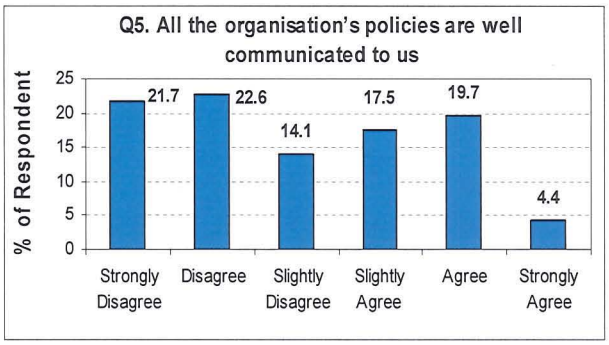


Figure 6.11: Engineers' perceptions about communication of organisation's policies
Source: Appendix F

(f). Decision to apply to the company

With regard to respondents' decision to apply to their company (Q.6), 54% indicated that proximity to home was the main reason, followed by availability of professional development 38% and company's reputation 16.8%. Other reasons, indicated in (Figure 6.12) were not very important for respondents to make their decision about joining the company, such as (good promotion and incentives opportunities, good salary and others). This pattern of response indicates that working nearer to home is of great importance to the respondents, and this supports the argument that workforce mobility is very poor in Libya as the majority prefers to work in organisations close to home.

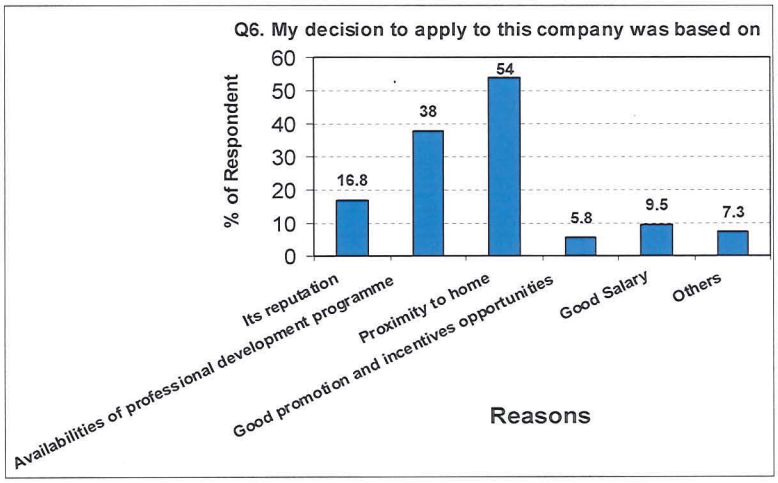


Figure 6.12: Reasons for work in the company
Source: Appendix F

(g). Playing active role in the organisation's committees

When asked if they are interested in playing an active role in the company's committees and participating in shaping its policies and strategies (Q.7), 71.5% disagreed with this

statement (Figure 6.13). Such disinterest can be related to the fact that the company is centrally controlled and staffs are not empowered to facilitate contributing to decision-making processes and playing any role in company's committees and shaping its policies and strategies, whereby decisions are made at and policies are formulated by the top management and staff have the duty to implement these decisions and policies.

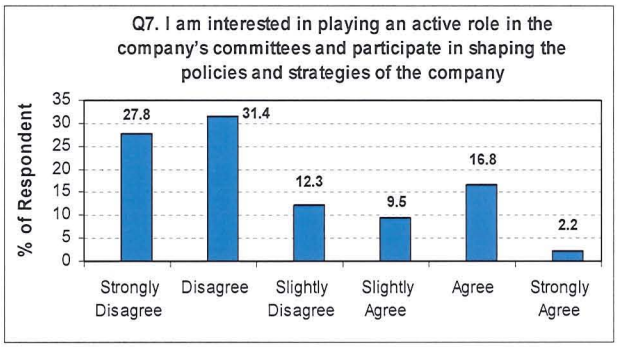


Figure 6.13: Engineers' perceptions about the policies and strategies in the company
Source: Appendix F

(h). Voices of engineers and technicians

When asked (Q.8) if their voices are listened to and considered respectably by the company management, the majority of respondents 78% disagreed with the statement (Figure 6.14). The pattern of the responses to this statement ties up with those reported for the previous statement. This is further evidence of the centralisation of decision-making process and employees are not empowered to be part of such a process, and such a response ties up with those reported for the previous statement. This is also evidence of the bureaucratic nature of the company's hierarchy, and that the relationship between management and employees is that of a superior and his subordinates, rather than leader and his followers.

Figure 6.14: Engineers' perceptions about their voice in the company
Source: Appendix F

6.2.3 Theme Two: Curriculum Design

6.2.3.1 Students' Perceptions

(a). Subjects studied are relevant for future profession as engineers

Data presented in (Q.7 Figure 6.15) show that 53.6% of the sample agreed or strongly agreed with the statement indicating that subjects they were studying relate to their future profession as engineers. In contrast, about 14.3% of these students either strongly disagreed or disagreed with the statement. However, (32.1%) of respondent students were not decisive in their responses, either slightly disagreeing/slightly agreeing with the statement. This pattern of response reveals that more than half of respondent students perceived these subjects as relevant to their study and would qualify them after graduation to work as engineers. On the other hand, this raises a major concern that a relatively large number of students were not decisive or do not agree with this statement. The possible reason is that these students have not decided to study engineering as their personal interest, as explained in question 4 (d) in the previous section (strategies and policies–students perception).

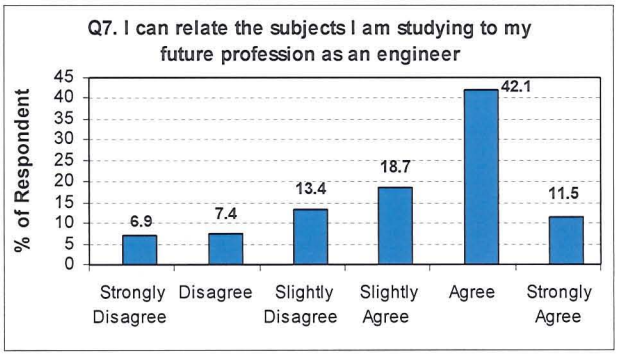


Figure 6.15: Students' perceptions about the subjects being related to future profession
Source: Appendix E

There is also a considerable minority (14% of the sample) who thought that the subjects they were studying did not relate to their future profession as engineers, possibly due to the rigidity of the curriculum, which seems to be highly isolated and centred curriculum. However, the education curriculum is outdated and has not yet been fully updated to include recent developments in basic and applied sciences, as well as computer and language training (Porter and Yergin, 2006). Furthermore, the UNESCO Report (1988, p.9) reported that there were several criticisms of the curriculum and methods of TVET used in Libya stating that:

"The whole curriculum structure and content of technical and vocational institutions must be thoroughly investigated if Libya is to be provided with highly trained and well qualified technicians."

This seems still the case so far, despite the developments that have taken place in recent years.

(b). Subjects studied prepare students to be engineers

Nearly (60%) of respondents students agreed to strongly agreed that the subjects they are studying prepare them well to be engineers (Q.8) (Figure 6.16). This statement links up with that of Q.7 above, given that 53.6% of students agreed/strongly agreed. This pattern of response clearly indicates that 30.6% of the sample did not express their views decisively (slightly disagree/slightly agree), and some of them (11.7%) did not perceive these subjects as relevant to their study to qualify them after graduation to work as engineers. This pattern of responses ties up with that expressed concerning Q.7. This substantiates the researcher view that subjects taught lack adequate practical experience to help students qualify as engineers after their graduation; hence, requiring further practical training to qualify them in their career in the future.

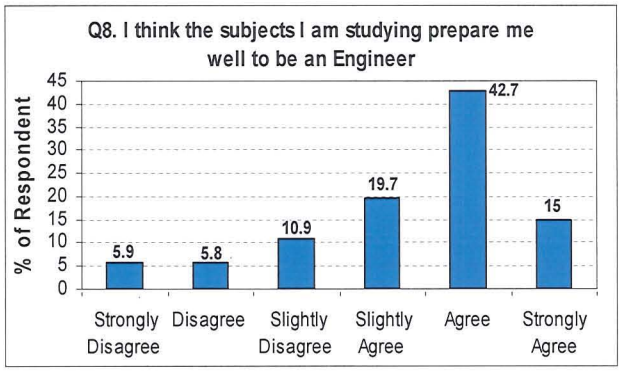


Figure 6.16: Students' perceptions about subjects studied prepare students to be engineers
Source: Appendix E

The statistics above clearly indicate that a substantial number of responding students were either undecided or did not perceive these subjects as relevant to their study to qualify them after graduation to work as engineers.

(c). Extent of knowledge and skills offered by the course studied

Responses to Q.9 clearly indicate that 47.3% of respondent students expressed their agreement with its statement, in contrast to a large percentage of them (37.4%) who were

not sure about their views (slightly disagree/slightly agree), and some of them (11.7%) did not agree with it (Figure 6.17). This pattern of responses ties, though to some extent, with those expressed concerning (Q.7 and Q.8). It clearly shows that many students did not think that the breadth of knowledge and skills offered by their course qualify them to be successful engineers.

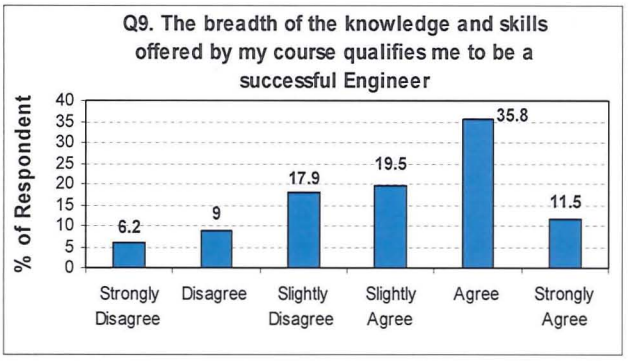


Figure 6.17: Students' perceptions about extent of knowledge and skills
Source: Appendix E

The finding above clearly indicates that a large number of the respondent students were undecided about the extent of knowledge and skills offered to them, and many disagreed with them, possibly that the curriculum was not designed adequately and may include some courses that are irrelevant to their study.

(d). Depth of knowledge and skills offered to students

Students were also asked (Q.10) to indicate their perception of the depth of knowledge and skills offered by course of study. About 45.0% of the sample agreed with this statement indicating that the depth of knowledge and skills offered by the course qualify them to be successful engineers. Nonetheless, 39.4% of the sample did not express their views decisively (slightly disagree/slightly agree), and some of them (15.6%) did not agree with it (Figure 6.18). This pattern of responses ties up with that explained for the previous statement (Q.9). This means that many engineering students did not believe that the depth of knowledge and skills offered by the course qualify them to be successful engineers.

The large number of students who were undecided or negative in their response to this item is a serious issue that HEIs need to address adequately to include more practical work in their curricula, as it seems there are flaws in the curriculum design, and that there is more dependence on theory than on practice. Elamru (2007) indicated that around two-thirds of

his sample of Saudi engineering students agreed that training during their study raised their competence, and that cooperative training is very important to close the gap between HE outputs and the requirements of the labour market.

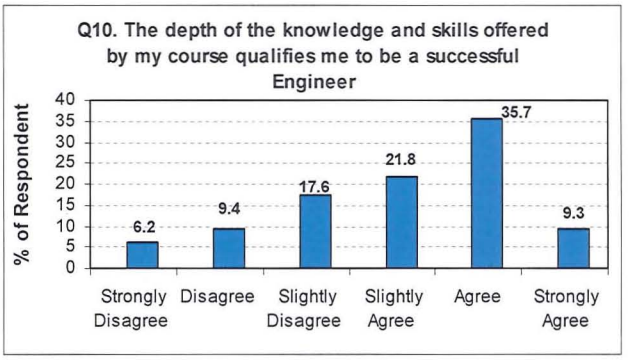


Figure 6.18: Students' perceptions about depth of knowledge and skills
Source: Appendix E

(e). Balance between theoretical and practical sessions

When students were asked about their perception to whether the balance between the theoretical and practical sessions is appropriate (Q.11), only 41.4% of the respondent students expressed their agreement with the statement (Figure 6.19), whereas 27.2% of them disagreed with it and 31.3% of them did not express their views decisively (slightly disagree/slightly agree). This is a high percentage of respondents who either disagreed or were not sure about it and is further evidence and ties up with that explained for the previous statement (Q.7and Q. 8).

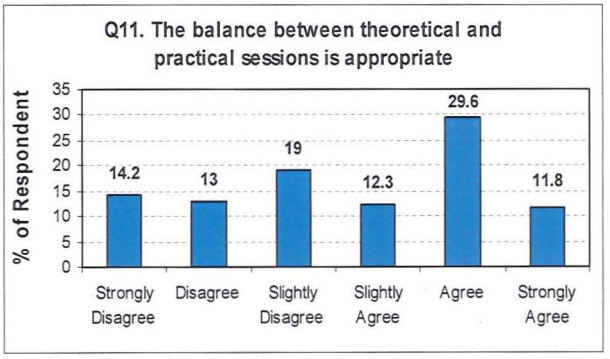


Figure 6.19: Students' perceptions of the balance between theoretical and practical
Source: Appendix E

(f). Appropriateness of course assessment strategy

In response to the statement whether the course assessment strategy is adequate (Q.12), 37.1% of respondents agreed with this statement (Figure 6.20), whereas more (38.1%) did

not agree or disagree with it in a decisive way (slightly disagree/slightly agree). Nonetheless, almost (24.8%) of them disagreed with the statement. This pattern of response clearly indicates that the majority of students did not perceive course assessment as appropriate. This, in the researcher's view, is due to the heavy reliance on theoretical examination as the major strategy for the assessment of students, and not much on laboratory-based (practical) assessment strategy has led most students such perceptions, and this is evidence for the imbalance between theoretical and practical sessions. This ties up with responses to Q.11, in terms of the unbalance between theoretical and practical sessions.

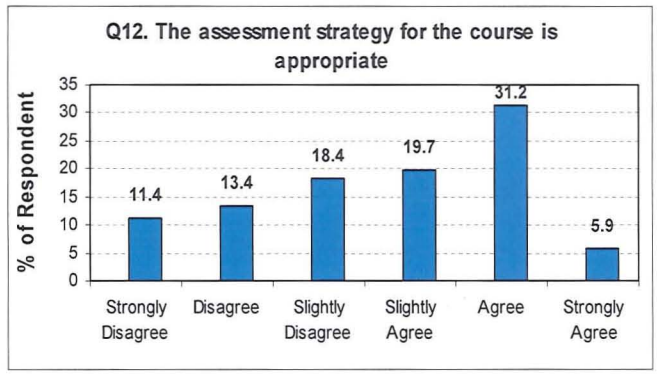


Figure 6.20: Students' perception of the appropriateness of course assessment strategy
Source: Appendix E

(g). Link of study modules from one level to another

When asked whether the modules of study are linked from one level to another, slightly less than half of the students (47.3%) agreed with the statement (Figure 6.21), whereas nearly (36.2% of the sample) were not decisive in their response (slightly disagree/slightly agree), and (16.5%) of them disagreed with it. This pattern of response may indicate that a large percentage of the respondent sample did not think that their modules of study are satisfactorily linked and appropriately progress from one level to another. This is further evidence that the curriculum is not adequately designed; hence, it needs redesigning and development so that modules given in one level tie up with those given at the following higher level.

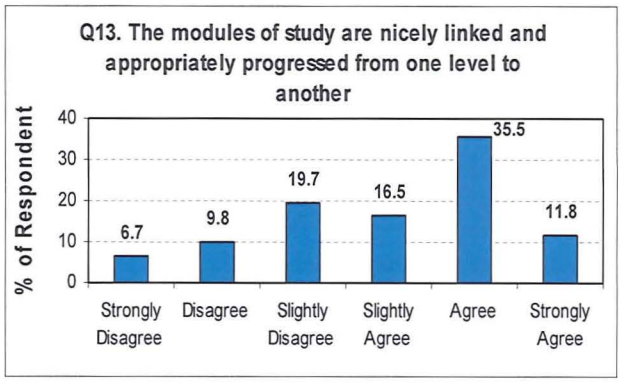


Figure 6.21: Students' perceptions about the link of study modules from one level to another
Source: Appendix E

(h). Curriculum covers employability issues and career advice

When asked to indicate their perception whether the curriculum covers the employability issues and career advices (Q.14) (Figure 6.22), 32.4% of respondent students agreed with the statement, whereas the remaining 41.8% of them expressed their non-decision approach (slightly disagree/slightly agree). Furthermore, 25.7% of them disagreed with it. This pattern of responses ties up with those concerning Q.7 and Q.8 above.

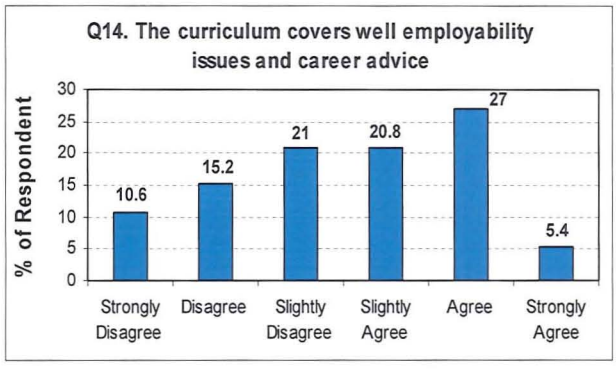


Figure 6.22: Students' perceptions about curriculum covers employability issues and career advice
Source: Appendix E

6.2.3.2 Engineers and Technicians Perception about Education and Training before Employment

(a). Relevance of study to jobs

Figure 6.23 illustrates the results of analysing responses to Q.9 of the questionnaire. Almost 52% of engineers and technicians expressed their agreement with the statement, whereas the remaining respondents were either not decisive in their responses (32.9%), or disagreed with it (15.3%). This is almost identical to the pattern of responses of students relating to

Q.7 whether subjects they are studying can relate to their future profession as engineers, whereby 53% of the student sample agreed with this statement.

The researcher's view is that technicians' study may have equipped them well with knowledge and skills relevant to their job, possibly the method of training them in TVET institutes is more geared to practice than theory; hence, they found their study as relevant to their jobs or which required by the engineering profession. This might have tilted the balance towards more agreement than disagreement with the statement. As for engineers, analysis of responses in the statements above clearly indicates that their study was more theory than practice.

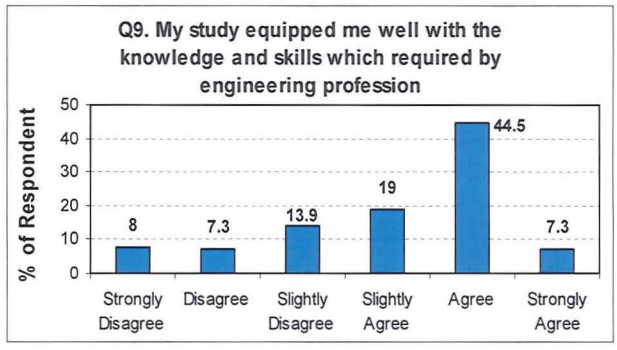


Figure 6.23: Engineers' perceptions about relevance of study to jobs
Source: Appendix F

Those who disagreed and some of those who were undecided might possibly be those holding secondary school education (23.4% of the sample, Table 6.5) whose secondary education have not equipped them well with knowledge and skills relevant to their jobs.

(b). Knowledge and skills acquired during study

When engineers and technicians were asked about knowledge and skills they acquired during period of their study (Q.10), 51.1% of them agreed with the statement (Figure 6.24), in contrast to 36.5% of them who were not decisive. This indicates that not all engineers and technicians gained the knowledge and skills during their study. This pattern of responses ties up with that presented for the previous questions (Q.9).

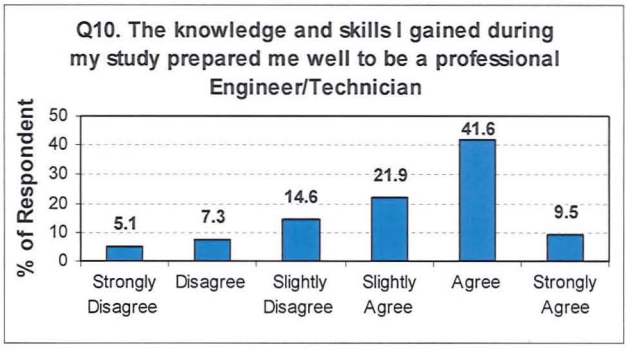


Figure 6.24: Engineers' perceptions of Knowledge and skills acquired during study
Source: Appendix F

This pattern of responses also ties, though to some extent, with those expressed concerning (Q.7, Q.8 and Q.9) in students' perception. It clearly demonstrates that many engineers and technicians did not think that the knowledge and skills offered by their course qualify them to be successful in their jobs, which is further evidence that the courses they have attended is based on traditional teaching methods rather than courses based on providing them with adequate knowledge and practice to qualify them for future career. This is also further evidence that the courses they have attended need further knowledge and practice to qualify them for future career, and that engineers and technicians need further training on the jobs they are doing as well as on other tasks that the company take on as it might expand its operations and processes and need well-trained staff to operate these jobs.

(c). Learning knowledge and skills independently

With regard to the respondents' perception of acquiring knowledge and skills independently (Q.11), most of them agreed (62.1%) with the statement (Figure 6.25); thus, indicating that they can acquire knowledge and skills independently. However, a large percentage of them (36.5%) were not decisive in expressing their views. This, as the researcher sees it, is the ability of some people to acquire knowledge and skills independently, by reading more about new developments in their fields, in contrast to some others who are not keen to improve and develop their knowledge and skills outside the domain of their study. It is these people who need further training to motivate them develop their knowledge and skills independently.

Figure 6.25: Engineers' perceptions of learning knowledge and skills independently
Source: Appendix F

(d). Effectiveness of on-the-job training

Results on Q.12 show that the majority (70.8%) of engineers and technicians expressed their agreement with the statement (Figure 6.26), indicating that on-the-job training is much more effective than learning through academic institutions. This pattern of responses indicates the importance of on-the-job training to develop their knowledge and skills. This type of training is the most extensively used technique by organisations (DeCenzo and Robbins 1999). It is employed to approach the primary skills training, in view of the fact that it is very effective. On-the-job training is the principle method used in developing and training the national employees of the Libyan manufacturing industry. This is supported by seminars and theoretical and practical symposia (Zubi, 1994).

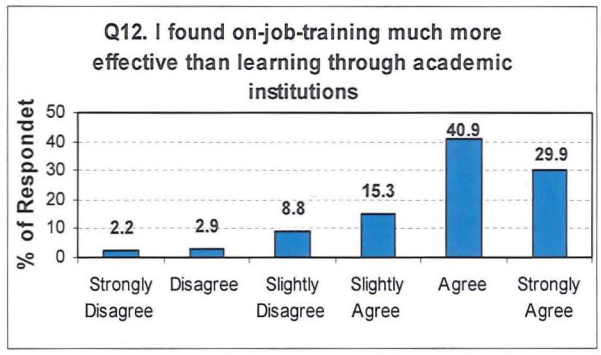


Figure 6.26: Engineers' perceptions of the effectiveness of on-the-job training
Source: Appendix F

(e). Subjects studied and current job

When asked to indicate their perception as to whether the materials they studied relate to their current jobs (Q.13) (Figure 6.27). 44.5% of respondents agreed with the statement, whereas more of them (45.3%) were not decisive (slightly disagree/slightly agree). This

clearly indicates that many respondents could not relate most of the material they studied to their current practices. In the researcher's view, this is further substantiation that the curriculum is not sufficiently designed; therefore, it needs redesigning and development for required by the engineering profession. However, more students than engineers and technicians agreed that subjects taught are relevant to their future profession as engineers (see section 6.2.3.1a).

Figure 6.27: Engineers' perceptions of subjects studied and current practice
Source: Appendix F

(f). Study issues in relation to globalisation

Engineers and technicians were also asked to indicate their perception of whether their study issues prepared them well to globalisation and international businesses (Q.14) (Figure 6.28) either agreed (31.3%) or disagreed (30.6%) with the statement. However, 38.0% of them were indecisive in their approach to responding to the statement (slightly disagree/slightly agree). This may indicate that academic curricula do not address the globalisation agenda. Furthermore, Libya had been isolated from the international community for decades and curricula seemed to have been designed to address local or, possibly, limited regional agenda.

It can be argued that the role of engineers in Libya has not changed due to globalisation as is the case in advanced societies. The role of the future engineer in technically developed modern societies has become more challenging as a consequence of the globalisation of industry and engineering practice (Nor et al., 2008). To resolve future problems, engineers should acquire much more advanced core knowledge and technical skills as well as soft skills to acquire the growing share or engineering employment in non-traditional, less-technical engineering work and knowledge-based "services" economy (National Science Foundation, 2007; Nor et al., 2008). This is not the case in the Libyan context.

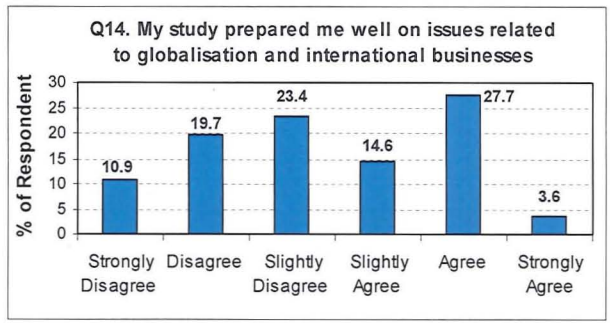


Figure 6.28: Engineers' perceptions of study issues related to globalisation
Source: Appendix F

6.2.4. Theme Three: Curriculum Delivery

6.2.4.1 Student Perception

(a). Timetable design in relation to accommodating students needs

Students were asked whether the timetable's design accommodates their needs (Q.15). The researcher believes that this question is considered an important factor to students since curricula are central to the process of their education. Appropriately designed timetable would serve students' best interest and accommodate their needs in terms of hours of attendance at the course. Furthermore, appropriately designed timetable can lead to increasing students' satisfaction, and also helps sustain high academic and quality standards, as it ensures full attendance by students and motivate them to approach their studies proactively rather than reactively. However, (58.1%) of them expressed their disagreement with the statement (Figure 6.29); whereas 41.9% of them agreed with the statement.

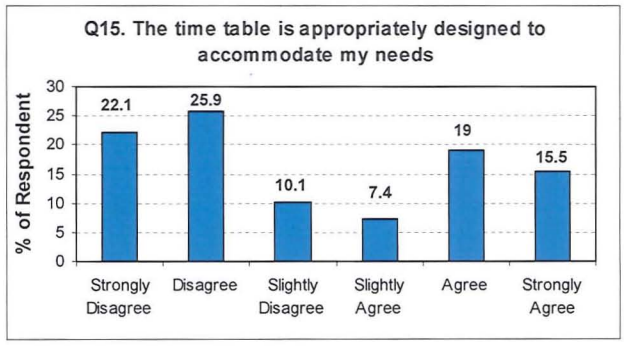


Figure 6.29: Students' perceptions about timetable design to accommodate their needs
Source: Appendix E

(b). Availability of tutors to help students

Students were also asked (Q.16) whether their tutors are available to help them. The majority of the students (68.2%) agreed with the statement (Figure 6.30). It can be argued

that tutors are available to most students when they need them. Those who disagreed with the statement might, for one reason or another, have not interacted with their tutors, possibly due to inappropriate design of the timetable, or even some of them failing to regularly attend their lectures or tutorial sessions. The researcher, from his experience as a student, believes that students require continual tutor support to keep them involved in their studies as well as to help motivate them, which eventually leads to students' satisfaction with the course they study and become more active in classroom discussions and tutorial sessions. The availability of tutors is important in that students can maintain contact with them and ask questions during that contact, whether during a lecture or during tutorial sessions.

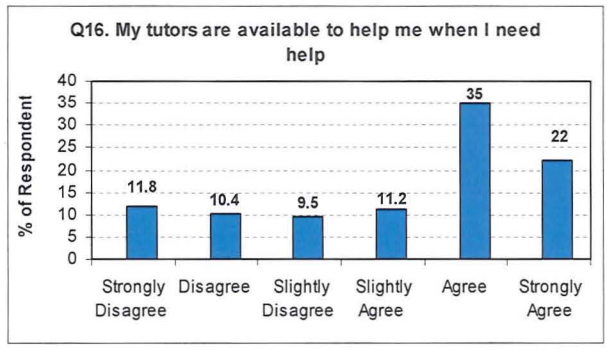


Figure 6.30: Students' perceptions about availability of tutors to help students
Source: Appendix E

(c). Appropriate allocation of tutorial sessions

Respondent students were asked (Q.17) whether their tutorial sessions are appropriately allocated. This is an important issue, as it related to timetable design. More students disagreed (37.6%) than agreed (27.7%) with the statement (Figure 6.31). Students were also more inclined to strongly disagree than strongly agree with the statement. Data illustrated in (Figure 6.31) also indicate that more students (34.7% of the sample) were indecisive in their response, either slightly agreeing or slightly disagreeing with the statement. This indicates that tutorial sessions have not been appropriately allocated. This pattern of response is consistent with that relating to improper timetable design (see Q.15 above); whereby more students also indicated their disagreement with proper timetable design to accommodate their needs than those agreeing with that statement. This finding and that analysed in 'a' above, clearly indicate that it is necessary to involve students in designing timetables to accommodate their needs.

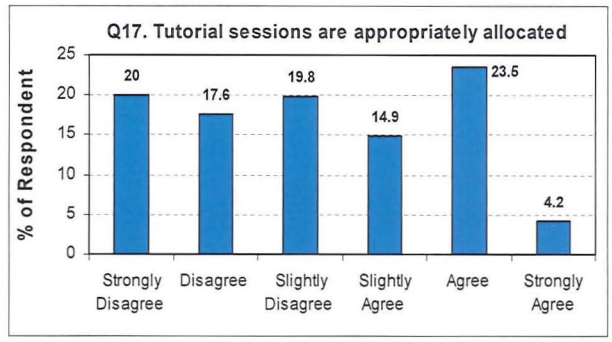


Figure 6.31: Students' perceptions about appropriate allocation of tutorial sessions
Source: Appendix E

(d). Availability of study materials

Students were also asked whether or not study materials are available in the library (Q.18). The majority (61.9%) of them expressed their disagreement with the statement (Figure 6.32). This is an important issue for university students to have text-books, academic and professional journals and other materials relevant to their study available for them. They are required by students to read about the lectures delivered, as well as by academic staff members to prepare their notes and lectures. The pattern of responses clearly indicates that such study materials are not available in quantities that students can have access to them. This is evidence that the library cannot meet the academic needs of most students. It may also point to poor access to the Internet and academic websites to obtain study material needed.

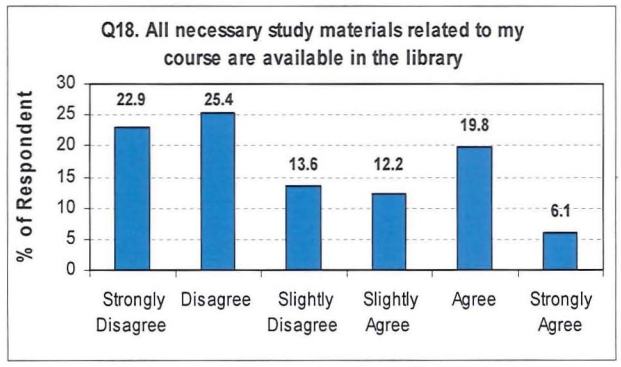


Figure 6.32: Students' perceptions about study materials available in the library
Source: Appendix E

(e). Use of modern technologies by lecturers to deliver their modules

With regard to their lecturers using modern technologies in the delivery of their modules (Q.19), more than half of students (52.8% of the sample) agreed with the statement,

whereas 47.2% of them disagreed with the statement (Figure 6.33). This may indicate that not all lecturers have access to modern technologies (computers, the Internet, etc.) to help them prepare their lectures and deliver their module, and possibly that lecturers in some of the institutions involved in the study have access to modern technology, whereas others in other institutions may have a limited access, or very poor access to such modern technologies. This might be a factor in lectures not delivered to students up to the standard required; hence not including recent developments concerning some courses.

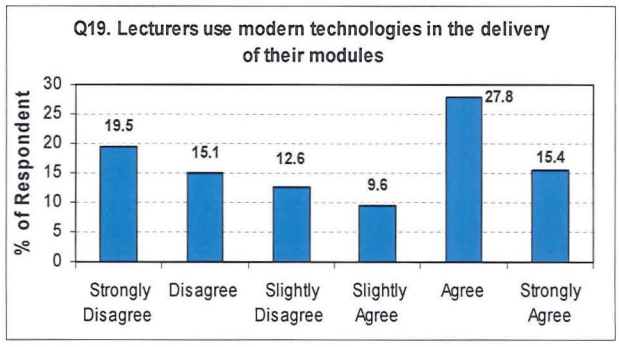


Figure 6.33: Students' perceptions about use of modern technologies by lecturers to deliver their modules
Source: Appendix E

(f). Promoting student-centred learning

Students were also asked (Q.20) whether the delivery strategy gives them enough confidence to manage their study. Nearly the third of students (31%) agreed with the statement (Figure 6.34). A slightly more (39.4%), however, were not decisive in their responses, being either slightly disagreeing or slightly agreeing with the statement, and almost one-third of them (29.6%) expressed their disagreement. This indicates that a large percentage of students were not sure whether or not the delivery strategy has given them enough confidence to manage their study. This is a serious problem that should be tackled by the departments concerned to boost the confidence of a large number of students to help them manage their studies. The researcher, from his experience, believes that the delivery strategy depends basically on dictating lectures by their tutors, mainly due to the shortage in the availability of study materials, as explained in Section 'c' above. This means that students depend on their tutors in providing lecture notes, and the delivery strategy is far from being a student-centred learning strategy. Again, this pattern is consistent with the limited or poor access of students to modern technologies and that many of their lecturers experience such limited or poor access to such technologies, as explained in Section 'e' (Q.19) above. Alhmali, (2007) argue that the idea of independent learning or student-

centred learning has little place in the Libyan system. In the context of life-long learning, this is a matter of concern and reflects the 'spoon-feeding' approach where students merely memorise the information provided by the teachers.

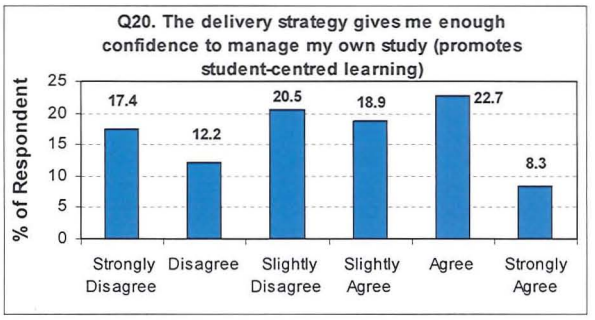


Figure 6.34: Students' perceptions about promoting student-centred learning
Source: Appendix E

(g). Delivery of practical (laboratory) classes

Respondent students were also asked (Q.21) whether the laboratories are well equipped to deliver the practical part of the course. Practical (laboratory) work is vital for engineering students where students can apply theory in practice and prepare them for their future career. It seems that there had been more disagreement (39.4%) than agreement (30.0%) with this statement. It is also evident that almost one-quarter of the students strongly disagreed with the statement, in contrast to 8.2% of the sample who strongly agreed with the statement. Data illustrated in (Figure 6.35) also indicate that more students (30.7% of the sample) were indecisive in their response, being either slightly agreeing or slightly disagreeing with the statement. This is evidence that the laboratories are poorly equipped and do not meet students' needs and requirements of practical lessons. This poor delivery of practical lessons does not help students develop their practical skills and adequately qualify for future work.

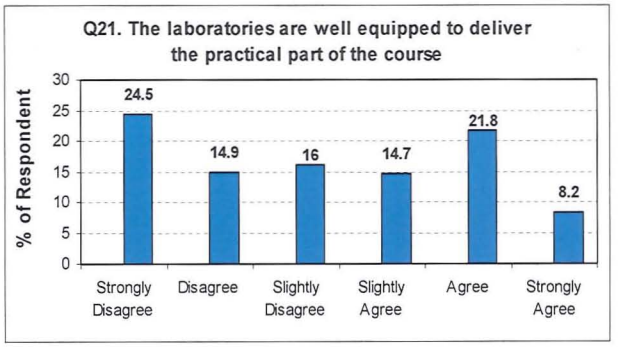


Figure 6.35: Students' perceptions of the delivery of practical (laboratory) classes
Source: Appendix E

(h). Availability of suitably and appropriately equipped lecture theatres/room

When asked whether their lecture theatres/rooms are suitable and appropriately equipped (Q.22), most students (44.0% of the sample) disagreed with the statement (Figure 6.36), whereas one-quarter of them agreed with it. A slightly more (30.4%), however, were not decisive in their responses, being either slightly disagreeing or slightly agreeing with the statement. Here again, there had been more strong disagreement than strong agreement. This statement ties up with the statement above (Section g). It seems that HEIs involved in the study are poorly equipped with lecture theatres/rooms, as well as poorly equipped with laboratories. This poor availability of such vital facilities would reflect negatively on students' attainment and preparation for employment. Lecture theatres/rooms, for example, are not properly equipped with overhead projectors (OHPs), or linked to the Internet; simply put, they are not fitted with the basic modern technologies to facilitate the delivery of lectures to students.

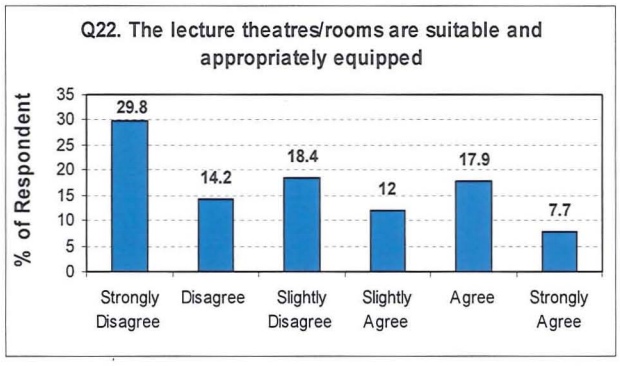


Figure 6.36: Students' perceptions of lecture theatres/rooms are suitable and appropriately equipped
Source: Appendix E

(i). School support to learners with diverse backgrounds

Students were finally asked (Q.23) whether their school provides support to learners with diverse background. Most respondent student (62.1%) expressed their disagreement with the statement (Figure 6.37). This is a clear indication that schools failed to support learners with diverse backgrounds. This pattern is consistent with previous questions that expressed concerning Q.20, whereby the delivery strategy did not give many students enough confidence to manage their study. For example, there are no special arrangements for disabled students to use the school facilities, or the library; this would discourage people with certain physical disability to join HE. Schools also seem not to cater for students' differences in learning abilities and which subjects they like most or not. Various subjects

are taught to all students rather than allowing students to choose the subjects they want to study, such as the case in the UK, where students can pick the subjects they want to study in the General Certificate of Secondary Education (GCSE) and 'A'-Level stages.

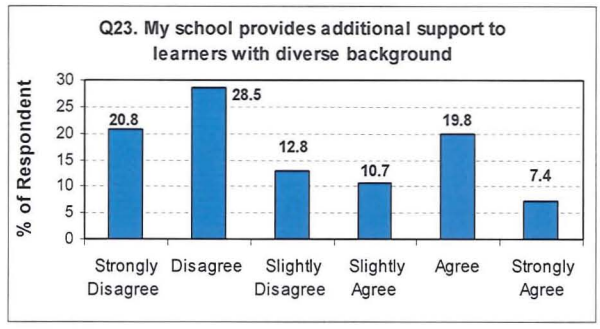


Figure 6.37: Students' perceptions about school support to learners with diverse backgrounds
Source: Appendix E

6.2.4.2. Engineers and Technicians Perception about the Delivery of Education and Training

(a). Delivery methods of curriculum studies

Engineers were asked whether the delivery methods of the curriculum they studied helped them to be independent learners, 46% of them agreed with this statement (Q.15, Figure 6.38). A slightly more (34.2%), however, were not decisive in their responses, being either slightly disagreeing or slightly agreeing with the statement. This is in contrast to respondents' responses to Q.11 above (*Learning knowledge and skills independently*), whereby most of them agreed with this statement. This might be attributed to the fact that lectures as 'spoon-fed' to students rather than leaving it to students to study and investigate on their own, mainly due to the lack of adequate and enough teaching materials, such as text-books, journals, etc. in libraries and learning centres, as explained earlier in this chapter.

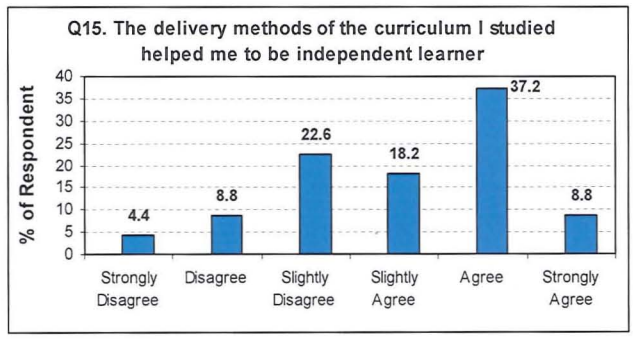


Figure 6.38: Engineers' perceptions about the delivery methods of curriculum studies
Source: Appendix F

(b). Part-time study and flexible delivery

With regard to whether part-time study and flexible delivery will encourage staff to continue studying, the majority of respondent engineers (76.6%) agreed that their part time study and flexible delivery will encourage more staff to continue studying to gain new knowledge and skills (Q.16, Figure 6.39). Offering staff the opportunity to embark on part-time study will certainly motivate them to study further, broaden their knowledge of recent developments in their field of work and enhance their career and promotion. The researcher thinks that offering staff flexible work arrangement can help them join HEIs on a part-time study basis and encourage staff to further their knowledge and skills. Without such arrangements it is very difficult to reconcile work with staff aspiration to study further.

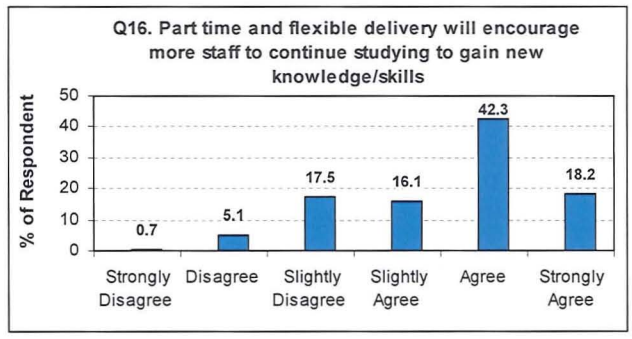


Figure 6.39: Engineers' perceptions about the part-time study and flexible delivery
Source: Appendix F

(c). Distance learning or e-learning over the internet

When asked whether distance learning or e-learning over the Internet could be used to acquire the knowledge and skills required for the manufacturing industry (Q.17), the majority of respondent engineers (78.1%) agreed with the statement (Figure 6.40). E-learning can increase the efficacy and quality of education, including job-based education and training.

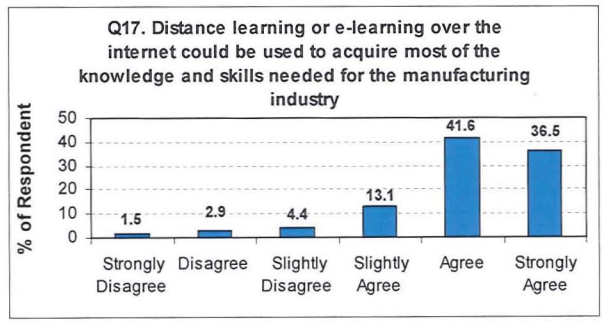


Figure 6.40: Engineers' perceptions about distance learning or e-learning over the internet
Source: Appendix F

(d). Work-based learning

When asked whether WBL is an effective way of acquiring the knowledge and skills relevant to their job (Q.18), the majority of respondent engineers (71.5%) agreed with the statement (Figure 6.41). The pattern of these responses to this statement is consistent with those reported for the previous statement, since distance learning and e-learning are also effective ways of acquiring skills and knowledge relevant to the respondents' job. On-the-job training or learning is a major way to improve the quality of knowledge and skills of staff while they remain at work. The researcher believes that this type of learning is most effective and beneficial both for the organisation and the staff members concerned.

Richardson and Hynes (2008) argue that, industry is increasingly looking to recruit graduates with practical work experience and commercial understanding. Consequently, students with strong technical abilities but little practical experience are losing out on potential jobs. Education courses should promote adaptability, flexibility, and innovation skills that should become integral to the education system at all levels if the needs of a changing workforce are to be met. For example, the introduction and expansion of project-based learning will help to provide these skills. By moving in this direction, there is significant scope to improve both the quality of learning and the development of soft skills relevant to the workplace without compromising the intellectual content of courses.

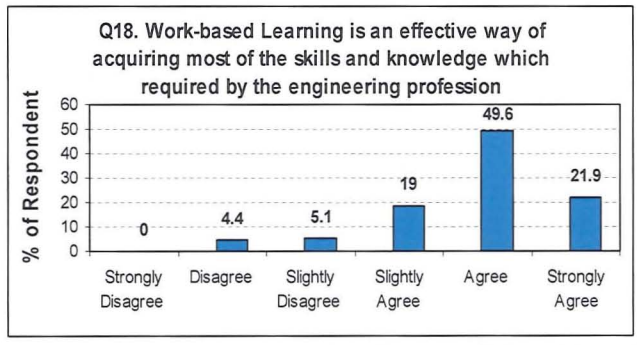


Figure 6.41: Engineers' perception about work-based learning
Source: Appendix F

(e). Usefulness of industrial placement for acquiring employability skills

In terms of whether their industrial placement is very useful for acquiring the employability skills (Q.19), the majority of respondent engineers (84.7%) agreed with the statement (Figure 6.42). The remaining 3.6% of them only slightly disagreed. Interestingly, none of the respondent engineers strongly disagreed and slightly disagreed with the statement. Industrial placement helps engineers to acquire further knowledge and skills relating to the

nature of their jobs, and hence those who have industrial placement would be more productive and more efficient in carrying out their jobs upon return to their places of work. Off-the-job learning is vital for the staff as it takes them away from their workplace and places them into a learning place where facilities are available to be provided for them. This type of learning, according to Beardwell and Holden (1997, p.389), "*enables the trainee to study theoretical information or be exposed to new and innovative ideas.*"

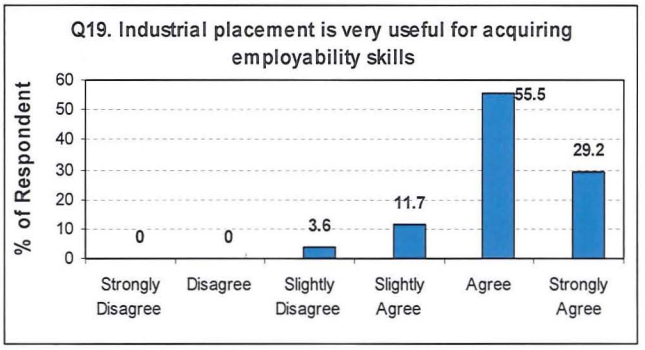


Figure 6.42: Engineers' perceptions about usefulness of industrial placement
Source: Appendix F

(f). Short courses offered by HEIs

When engineers were asked whether the short courses offered by HEIs are very useful in updating their knowledge and skills (Q.20), the majority of respondent engineers (73.7%) agreed with the statement (Figure 6.43). Short courses offered by HEIs provide engineers with more recent developments in their field and boost their knowledge and enhance their skills, since such institutions have the equipment and teaching materials required for updating staff knowledge and improving their skills. These institutions have the professional personnel who can cater for the needs of the learners and can design courses match the needs of the organisations concerned. This type of learning can also be considered as a type of off-the-job-training or learning.

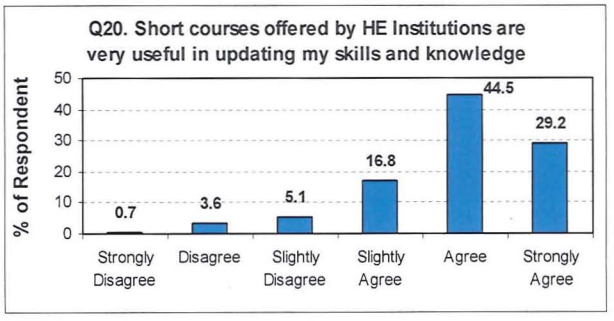


Figure 6.43: Engineers' perceptions about the short courses offered by HEIs
Source: Appendix F

6.2.5 Theme Four: Partnership with Industry

6.2.5.1 Students' Perceptions

(a). Linkage of course studied to the relevant industry

Students were asked whether the course their study is well linked to the relevant industry (Q.24, Figure 6.44). Only a minority of 17.7% of the students involved agreed that their course is linked to the relevant industry. In contrast, 45.0% of them disagreed, and more than one-third of them (37.5%) either slightly agree or slightly disagree. This clearly indicates that the curriculum delivered is not well designed and that there is a rather poor link between course design by the HEIs and the relevant industry. This pattern of responses contradicts that provided by students (see section 6.2.3.1 'a') for which more than half of respondent students perceived their subjects as relevant to their study and would qualify them after graduation to work as engineers. However, this also substantiates the major concern that a relatively large number of students were not decisive, possibly these students have not decided to study engineering as their personal interest (see section 6.2.2.1'd').

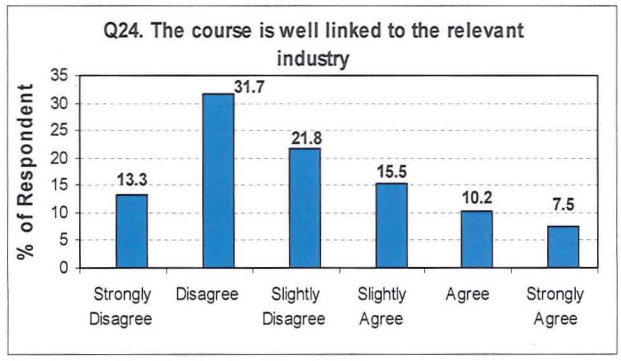


Figure 6.44: Students' perceptions of linkage between course studied and relevant industry
Source Appendix E

This pattern of responses also substantiates the researcher's view that the curriculum and subjects taught to students might need extra practice, and require further training to help them respond to the aspirations and requirements of their jobs in the future (see section 6.2.3.1 'a'). In a recent study in Libya, Zginin and Isawi (2007), the authors indicated that 85% of their sample agreed that one of the objectives current vocational and technical education aspire to achieve is linking specialisms with labour market. Nonetheless, these authors asked this question: is there any mechanism to implement this? Unfortunately, they did not provide any answer.

(b). Lectures presenting case studies from industry

Students were also asked whether lectures delivered to them present case studies from industry (Q.25, Figure 6.45). While 28.7% of the respondent students agreed that lectures delivered during the delivery of the course to them present case studies, 43.4% of them disagreed and more than one-quarter of them (27.9%) were undecided. This pattern of responses might suggest that more lectures have not presented case studies from relevant industries than those presenting case studies. This pattern also clearly demonstrates the poor or inadequate practical application of theory and the poor design of the curriculum. Furthermore, it demonstrates the poor linkage between HEIs and the relevant industry which will recruit these students when they graduate. This raises the concern that HEIs need to liaise with the industry to help design and deliver an adequate curriculum that helps students in their future career.

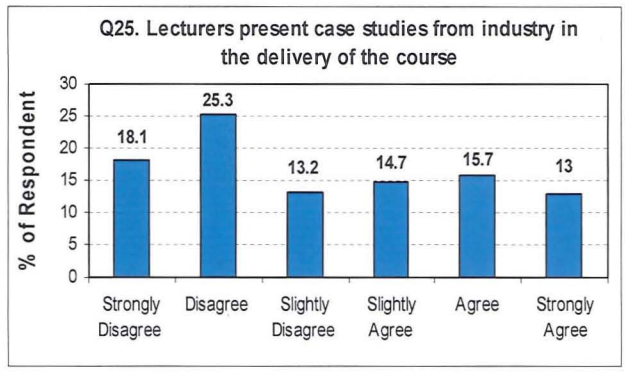


Figure 6.45: Students' perceptions about lectures presenting case study from industry
Source Appendix E

Responses presented in (Figure 6.45) may also reflect on the imbalance between theory and practice in the delivered curriculum. This is in agreement with students' responses that the more than half of respondent students disagreed that a balance between the theoretical and practical sessions is appropriate (see section 6.2.3.1 'e'). Furthermore, lectures delivered by invited professionals from industries facilitate contact between students and potential employers, since students can identify through such lectures job opportunities in the labour market.

(c). Visiting industrial sites relevant to their study

When asked whether they enjoy visiting industrial sites that are relevant to their study (Q.26), more than half of respondent students indicated their agreement with this issue, in

contrast to around one-quarter of them (25.6%) who indicated that they did not enjoy visiting such sites (Figure 6.46). A minority of 16.0% of students were either slightly agreeing or slightly disagreeing. On the whole, it can be said that most students enjoyed such visits, possibly they felt that such visits would give them an idea of the nature and type of work carried out in these sites, and also give them some practical insight of the job that they might have after graduation. Such visits would increase students' knowledge and can prepare them for their future career.

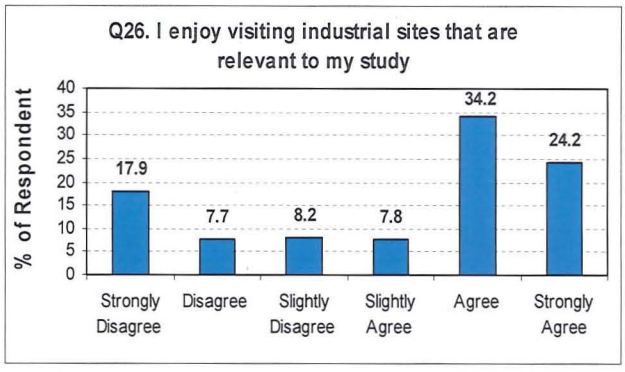


Figure 6.46: Students' perceptions about visiting industrial sites relevant to their study
Source Appendix E

(d). Students' training in relevant industry as part of their study

Students were also asked whether they like to spend time on training in relevant industry to their study (Q.27), most of the respondent students (71.2% of the sample) indicated their agreement with this item, in contrast to a minority of 11.0% of them who disagreed with this statement and 18.5% of them who were either slightly agreeing or slightly disagreeing with this statement. Overall, the majority agreed with this issue. Spending time on training in relevant industry is very important for engineering students in order to see at hand how they are expected to do their jobs after graduation and recruitment by the industry. The majority of engineers agreed that their industrial placement was very useful for acquiring the employability skills (see section 6.2.4.2 'e').

Gradwell (2004, p.15) summarises the benefits of industrial placement as follows: a year of full-time employment; acquiring many practical skills, obtaining valuable transferable skills, and realising personal development. Waryszak (1999) stated that, it is important, to both HEIs and industry, that students have realistic expectations from their prospective entry to these organisations. If employers know what students expect from their organisational environment, they can better prepare the students and organisational processes for

successful entry to the labour force. The placement of students in various organisations as trainees is an academic requirement to foster the work experience so the students will attain the necessary skills to supplement their theoretical training.

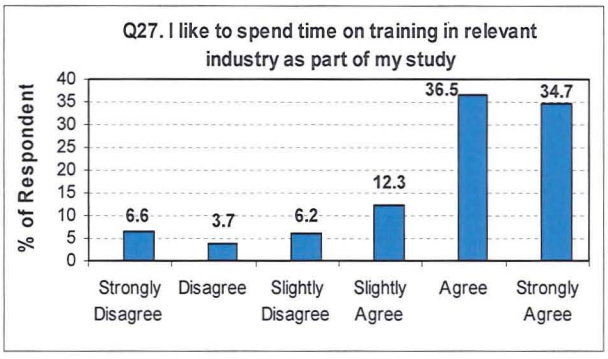


Figure 6.47: Students' perceptions about their training in industry as part of their study
Source Appendix E

6.2.5.2. Engineers and Technicians Perceptions

(a). TVET institutions' role in updating and enhancing their skills

Engineers and technicians were asked whether TVET institutions play a key role in updating and enhancing their skills (Q.21). About 42.0% of respondents agreed that TVET institutions play a key role in updating and enhancing their skills, whereas many of them (37.9% of the sample) slightly agreed or slightly disagreed. Around 20.0% of these indicated their disagreement with the statement. Given that the sample consists of both engineers (possibly with Bachelor Degree, 20.4% of the sample) and technicians (possibly with secondary school qualifications or Higher Diploma, 79.6% of the sample) (see section 6.2.1. General Information), this pattern of agreement more than disagreement can be expected, since those with a Bachelor Degree are expected to have graduated from universities as engineers whereas most of the other group have attended TVET colleges.

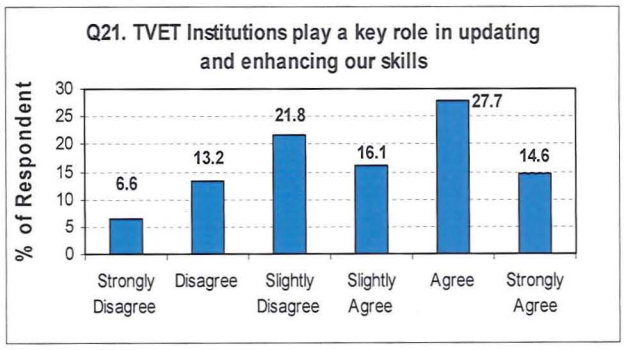


Figure 6.48: Engineers' perceptions about the TVET Institutions' role in updating and enhancing their skills
Source: Appendix F

(b). Hosting engineering and technical students in organisations

In response to Q.22, whether hosting engineering and technician students in organisations will prepare them better for their future professional career, most engineers and technicians (69.4%, Figure 6.49) agreed that placing students at their organisations will prepare them better for their professional career, and only an insignificant minority (5.8%) disagreed, and the remaining 24.8% of them slightly agreed or slightly disagreed. This pattern of responses might be due to engineers and technicians' experience and perception of the usefulness of industrial placement for acquiring employability skills, as the majority indicated so (see section 6.2.4.2, 'e' usefulness of industrial placement for acquiring employability skills). Industrial placement will help students to acquire further knowledge and skills relating to the nature of their future jobs and would become more productive and more efficient in carrying out their jobs upon after graduation and recruitment. The benefits of industrial placement were reported earlier in this chapter.

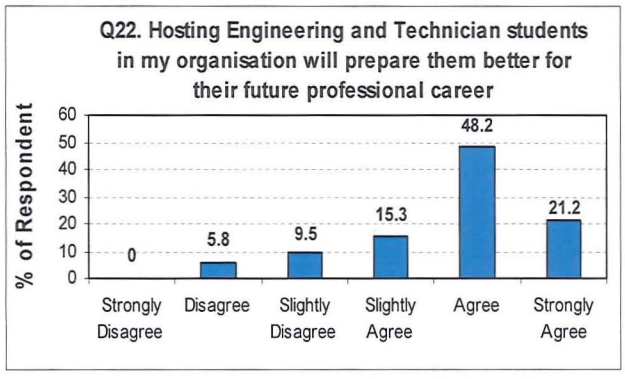


Figure 6.49: Engineers' perceptions about hosting engineering and technician students in organisation
Source: Appendix F

(c). Consultation with TVET institutions

When engineers and technicians were asked whether they consult TVET institutions to solve technical problem, develop new product or to enhance performance (Q.23), most engineers and technician (56.2% of the sample) disagreed that they do so (Figure 6.50), in contrast to 22.6% of them who agreed, and 21.1% who either slightly disagree (10.9%) and slightly agree (10.2%). Overall, it can be said that more than two-thirds of engineers and technicians disagreed with this statement. This pattern of responses clearly reveals the poor linkage between TVET institutions and the relevant industry.

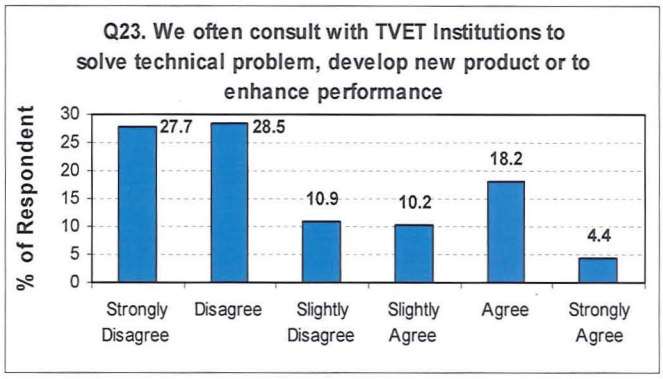


Figure 6.50: Engineers' perceptions about consulting with TVET institutions
Source: Appendix F

(d). Keeping contact with university /college after graduation

Engineers and technicians were asked whether they have kept their contacts with their college or university after their graduation (Q.24 Figure 6.51). The majority of respondents (70.1% of the sample) disagreed with the statement, indicating that they have no contacts after graduation; only 10.9% of them agreed that they have kept contacts after graduation and 18.9% of them either slightly disagree (13.1%) or slightly agree (5.8%). Generally, it can be argued that the majority of respondents (including those slightly disagreeing) have not contacted their colleges or universities since graduation. This pattern of response may also tie up somewhat with the pattern of responses to Q.23 above, and also indicates the poor linkage between TVET institutions and industry. This pattern of response, however, is not surprising in Libya, as is the case in most Arab universities and colleges, in which HEIs do not run programmes such as 'alumni' programme, as is the case in the UK, hence, contacts stopped as soon as the students graduate and nothing is known about them by their colleges and universities.

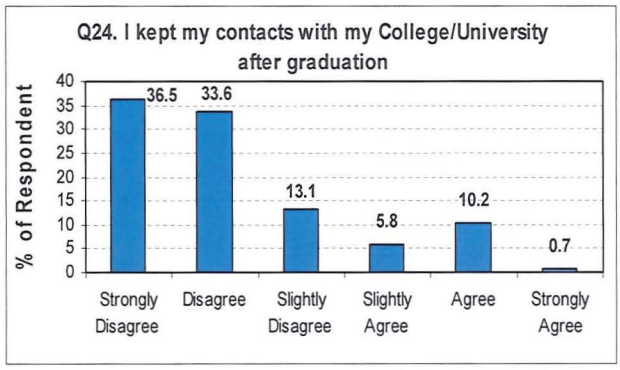


Figure 6.51: Engineers' perceptions about their contact with TVET college/university after graduation
Source: Appendix F

(e). Placement of lecturers in manufacturing organisations

When asked whether placing lecturers in manufacturing organisations will improve their awareness of employers' requirements (Q.25 Figure 6.52), the majority of respondents agreed with the statement; only a small minority (9.4%) disagreed and 18.9% either slightly agree (10.9%) or slightly disagree (8.0%). Placing academic staff in manufacturing organisation will provide them with the opportunity to see at hand what these organisations make or produce and what sort of engineers and technicians required by them so that they can suggest to their institutions of the programmes needed that would help improve the design and delivery of curricula to make more geared to the requirements of these organisation and supply them with staff that can succeed in their jobs. This will also help strengthen the ties and linkages between HEIs and the manufacturing organisations.

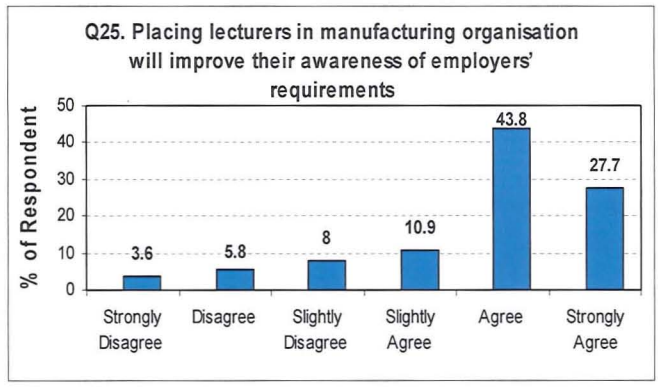


Figure 6.52: Engineers' perceptions about placing lecturers in manufacturing organisation
Source: Appendix F

(f). Studying for a higher qualification if an opportunity arises

When asked whether they will go back to college or university to study for a higher degree should an opportunity arises (Q.26 Figure 6.52), more than half of respondent engineers and technicians (54.7%) agreed that they will do so; only 16.7% of them disagreed, and 28.4% of them either slightly agree (10.9%) or slightly disagree (17.5%). This pattern of responses indicates that most of the respondents want to pursue their studies if they have the chance to do so. Those agreeing with the statement are motivated individuals who want to improve and further their career by obtaining higher qualifications that help their promotion within their organisations.

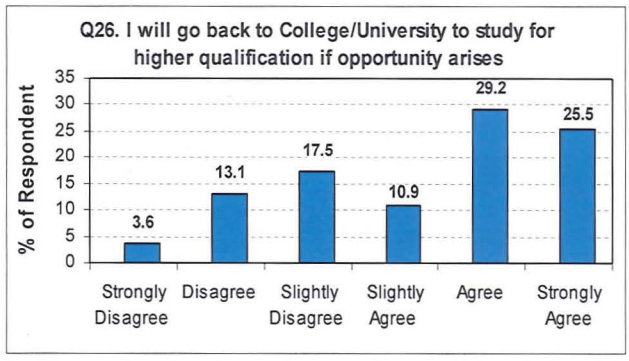


Figure 6.53: Engineers' perceptions about studying for a higher qualification
Source: Appendix F

6.2.6 Theme Five: Accreditation

6.2.6.1 Students' Perceptions

(a). Accredited courses

When respondent students were asked whether accredited courses increase the employability of graduates (Q.28 Figure 6.54), about half of them (49.1%) agreed with this statement, in contrast to 17.2% of them who disagreed with this statement. The remaining respondents (33.6% of the sample) either slightly (17.0%) or slightly agree (16.6%). This clearly indicates the importance of accreditation of courses in delivering high quality accredited curriculum that will help students obtain employment.

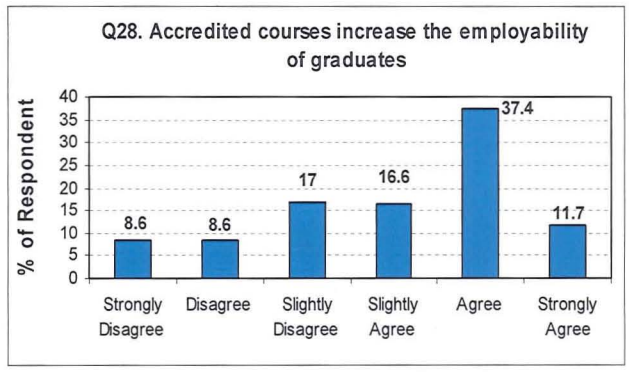


Figure 6.54: Students' perceptions about accredited courses increasing employability of graduates
Source Appendix E

6.2.6.2 Engineers and Technicians Perceptions

(a). Graduates from accredited programmes have better employability chances

When respondent engineers and technicians were asked (Q.27) whether graduates from accredited programmes have better employability chances, more than half of the respondents (53.3%) agreed with this statement, and 17.5% of them agreed with it. A very

small minority of respondents (8.0%) disagreed and 17.0% of them slightly disagreed (Figure 6.55). This pattern of response substantiates that reported by students in Section 6.2.6.1 'a', and confirms the importance of accreditation for obtaining future work.

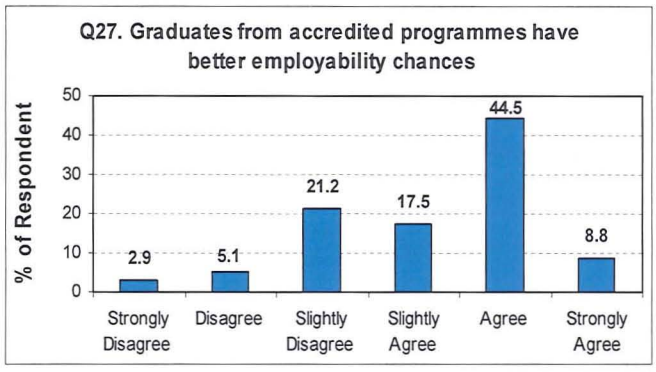


Figure 6.55: Engineers' perceptions about graduates from accredited programmes have better employability chances
Source: Appendix F

(b). Graduates from accredited programmes having better pay/position

With regard to graduates from accredited programmes having better pay/position (Q.28); overall, more than half of respondents (54.7%) indicated their disagreement with this statement (Figure 6.56), and the remaining respondents (45.3% of the sample) agreed with this statement. This pattern of responses does not tie up with that explained for the previous statement (Q.27). It can be argued that accreditation only result in good employability chances rather than leading to a better pay or a better job.

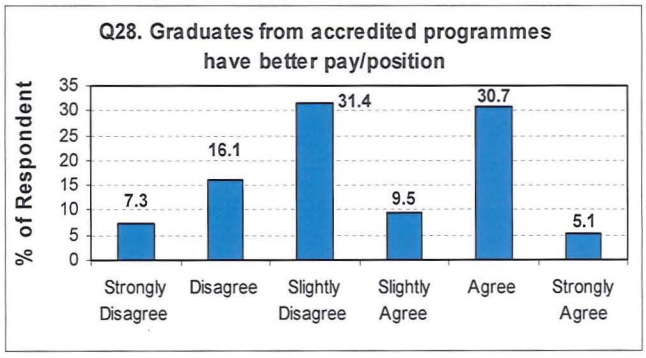


Figure 6.56: Engineers' perceptions about graduates from accredited programmes have better pay/position
Source: Appendix F

6.2.7 Theme Six: Quality Assurance

6.2.7.1 Students' Perceptions

(a). Fitness for purpose of service received

Respondent students were asked (Q.29) whether or not the services they receive from their university/college is fit for purpose. Around one-third of respondents (34.6%) strongly agreed or agreed and (27.7% of them strongly disagreed or disagreed). However, the remaining 37.7% either slightly disagreed or slightly agreed with the statement (Figure 6.57). This pattern of responses indicates that services received by students were not as fit for the purpose as required. It may reflect on low standards of teaching and heavy dependence on theory-based instruction, and the content of the courses offered are not up to the desired standards.

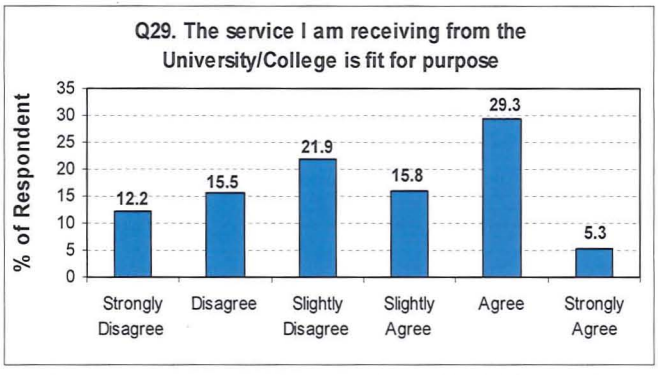


Figure 6.57: Students' perceptions about the service they receive from their university/college
Source Appendix E

(b). Accuracy and prevalence of information relating to courses offered

Students were also asked (Q.30) if the published information about the university/college and courses are accurate (Figure 6.58). 28.5% of respondent students agreed with this statement or disagreed with it (28%). Nevertheless, almost (44%) did not agree or disagree with it in a decisive way (slightly disagree/slightly agree). This pattern of response clearly indicates that the curriculum is not well designed. Issues relating to curriculum design have been analysed and discussed earlier in this chapter.

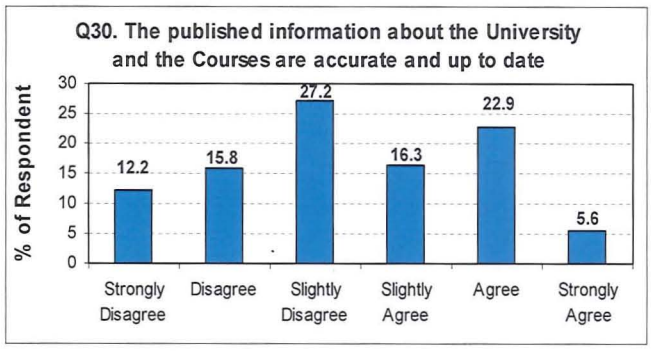


Figure 6.58: Students' perceptions about publishing information of university/college and course
Source Appendix E

(c). Usefulness of published information in choosing courses/modules

When asked whether the published information about the University and the course is very useful to decide to choose the course/modules to study (Q.31), slightly more than one-third of respondent students agreed with the statement, whereas more than one-quarter of them disagreed, and almost one-third of them either slightly disagreed or slightly agreed with the statement (Figure 6.59). This patterns of responses ties up with that reported for Q.30, and indicates that information provided are either not adequate to help students decide upon the courses/modules to choose, or even inaccurate to help them chose such courses/modules. This shows that students are fed with irrelevant information to their desired courses/modules.

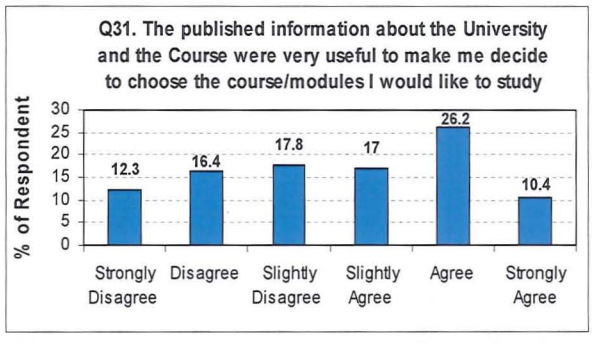


Figure 6.59: Students' perceptions about choosing the course/modules
Source Appendix E

(d). Accessibility of information regarding regulations and processes

Respondent students were also asked (Q.32) whether all relevant information regarding the university/college regulation and processes is easily accessible, slightly less than two-fifth of them (39.2%) agreed that information is easily accessible, in contrast to 24% of them who indicated their disagreement with this statement (strongly disagree to disagree), and

more than one-third of them either slightly disagreeing (22.2%) or slightly agreeing (14.6%) with the statement (Figure 6.60). This indicates that students cannot have access to all relevant information about the university/college regulations and processes. This is not surprising, since all such information is not available to students throughout the Libyan HEIs.

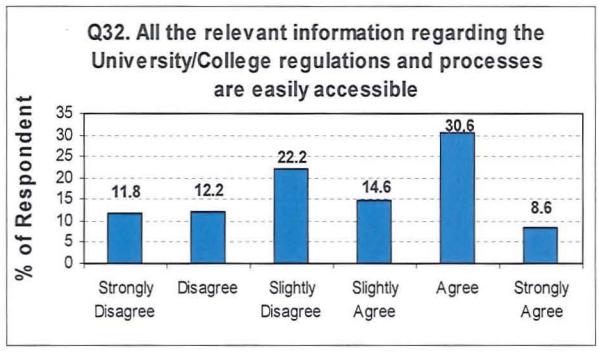


Figure 6.60: Students' perceptions of the university/college regulation and processes are easily accessible
Source Appendix E

(e). Dealing with problems

Students were also asked if they know 'where to go and what to do' when they have a problem (Q.33). About two-fifths (50.5%) of students knew definitely where to go and what to do when having a problem; whereas 25.6% of them did not know where to go and what to do. However, while 13.6% of them slightly agree with the statement, more (10.2%) slightly disagreed with it. Overall, more students knew were to go and what to do when facing a problem that those who do not (Figure 6.61). This might indicate that there are the facilities and services in place to help students with their problems during the study. Examples of such facilities are popular committees within the colleges or universities who cater for students' welfare.

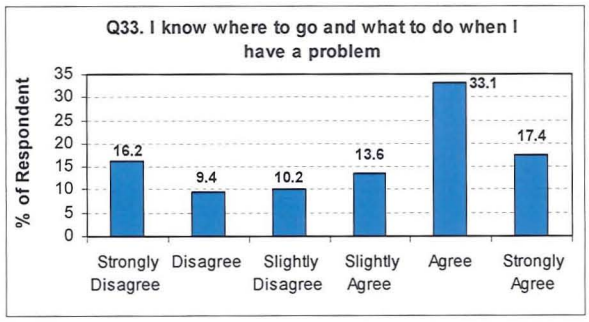


Figure 6.61: Students' perceptions about 'where to go and what to do' when they have a problem
Source Appendix E

(f). Timely feedback of students' progress

Students were also asked (Q.34) whether or not they receive useful and timely feedback on their progress. Nearly two-fifths of respondent students (37.8%) agreed with the statement, whereas 28.4% of them disagreed. Nonetheless, 21% of them slightly disagreed and 12.8% slightly agreed with the statement. This means that overall, nearly two-fifth of students agreed, which indicates that not all HE institutions, departments, or modules involved in the study provide their students with useful and timely feedback concerning their progress (Figure 6.62).

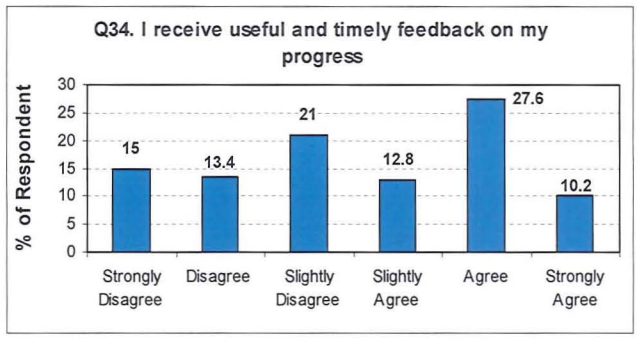


Figure 6.62: Students' perceptions about receiving timely feedback on their progress
Source Appendix E

(g). Lecturers' knowledge of their subjects

With regard to their lecturers are knowledgeable in their subject areas (Q.35, Figure 6.63). The majority of respondent students (60.8% of the sample) express their agreement with statement. Data also illustrated that more students (29.9% of the sample) were indecisive in their response, either slightly agreeing or slightly disagreeing with the statement, whereas the remaining 21.6% of them disagreed with this statement. Overall, respondent students agreed more than disagreed with the statement. This reflects on students' satisfaction with their lecturers and with their knowledge in their subjects.

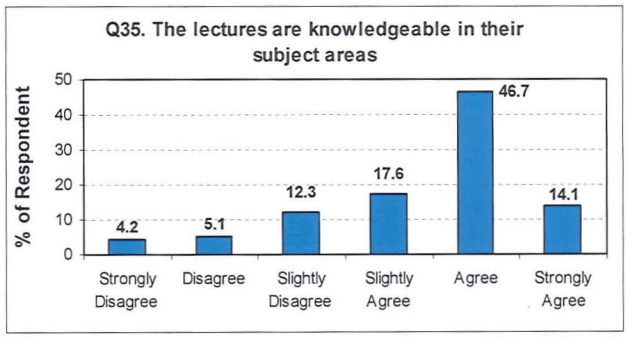


Figure 6.63: Students' perceptions about their lectures' knowledgeable in their subjects
Source Appendix E

(h). Appropriateness of teaching methods

With regard to their lecturers' teaching methods are appropriate to the subject area (Q.36), slightly less than half of the students (45.6%) agreed with the statement (Figure 6.64). A slightly more (38.4%), however, were not decisive in their responses, being either slightly disagreeing or slightly agreeing with the statement, whereas the remaining 16% of them expressed their disagreement. This pattern of responses might reflect on the variability of teaching methods offered to students in various modules or departments.

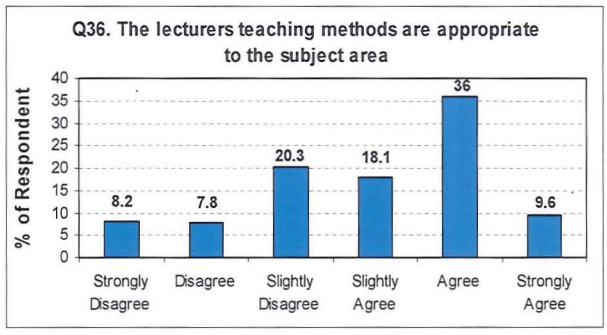


Figure 6.64: Students' perceptions about appropriateness of teaching methods
Source Appendix E

(i). Structure and organisation of lectures

When students were also asked whether the lectures are well structured and organised, 36.1% indicated their agreement (7.5% strongly agree and 28.6% agree) with this statement (Q.37, Figure 6.65). However, 27.7% of the sample indicated their disagreement with the statement and a large percentage of them 36.2% who were not sure about their views (slightly disagree/slightly agree). This pattern of responses might reflect on the different approaches to structuring and organising of lectures by the various modules taught.

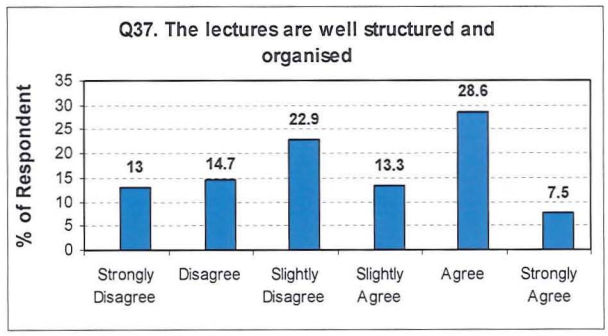


Figure 6.65: Students' perceptions about the lectures are well structured and organised
Source Appendix E

(j). Expressing views about lectures

With regard to expressing of their views to the lecturers easily (Q.38), almost two-fifth of respondent students (39.4% of the sample) answered positively (31.2% agree and strongly agree 8.2%) with the statement, whereas the remaining 24.1% of them disagreed with this statement (Figure 6.66). Data also indicate that many students (36.5%) were indecisive in their response, either slightly disagreeing or slightly agreeing with the statement. This clearly indicates that many students still fear expressing their views easily; possibly they think that they might be subject to repercussions if they say something their lecturers do not like to hear.

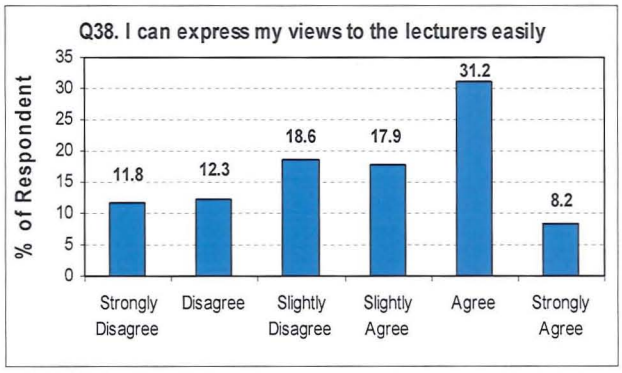


Figure 6.66: Students' perceptions about expressing their views to the lecturers easily
Source Appendix E

6.2.7.2 Engineers and Technicians Perceptions

(a) Documentation of quality assurance and enhancement processes

Engineers were asked (Q.29) whether quality assurance and enhancement processes well documented. The majority of respondent engineers (77.4%) indicate their agreement (slightly agree, 19.7; agree, 51.1% and strongly agree 6.6%) (Figure 6.67), in contrast to 22.6% of them who indicated their disagreement with this statement (strongly disagree to slightly disagree). This indicates that most of organisations have documents relating to quality assurance and enhancement processes that can be referred to by staff.

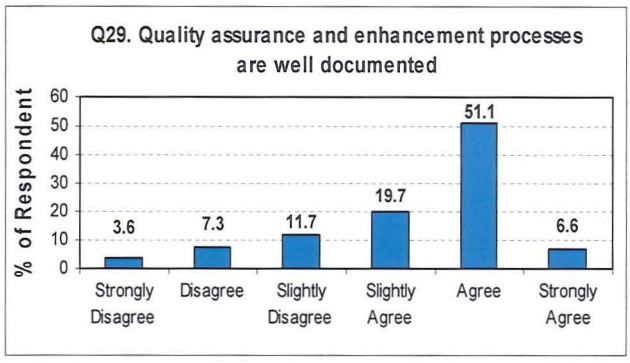


Figure 6.67: Engineers' perceptions about documentation of quality assurance and enhancement processes
Source: Appendix F

(b). Implementation of quality assurance and enhancement processes

When engineers were also asked (Q.30) whether quality assurance and enhancement processes are implemented well, only 45.9% of the respondent expressed their agreement with the statement (Figure 6.68), whereas 11.6% of them disagreed with it and more than two-fifth 42.3% of them did not express their views decisively (slightly disagree/slightly agree). This pattern of responses ties up with responses to Q.29 above.

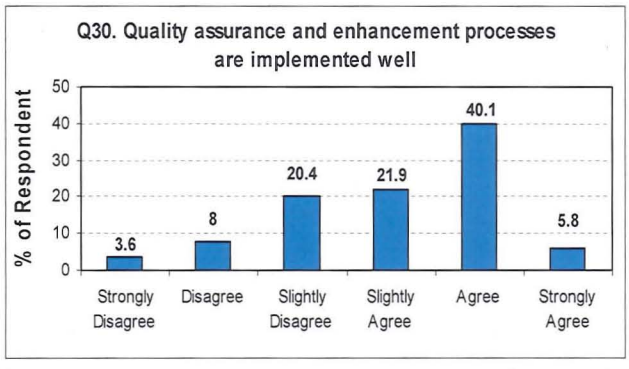


Figure 6.68: Engineers' perceptions about implementation of quality assurance and enhancement processes
Source: Appendix F

(c). Satisfaction with work

With regard to their satisfaction with their work in the organisation (Q.31), more than half of the respondent engineers and technicians (53.3%) expressed their disagreed with the statement, while more than two-fifth of the respondent engineers (46.7%) indicate their agreement (Figure 6.69) with the statement. This clearly indicated that a large number of respondents were dissatisfied with their job, possibly due to lack of promotion opportunities, their efforts are not recognised or appreciated, or salary is not high enough.

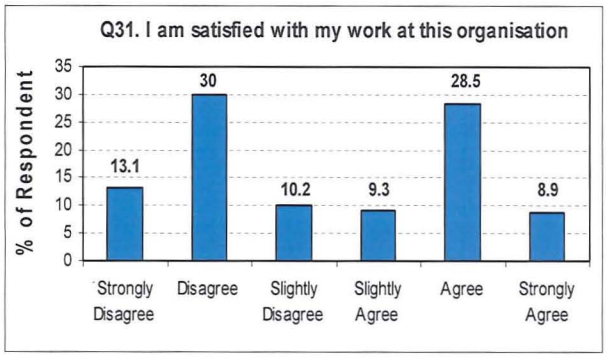


Figure 6.69: Engineers' perceptions of their satisfaction with their work
Source: Appendix F

(d). Regular feedback relating to performance

Engineers and technicians were also asked (Q.32) if they have received regular feedback about their performance. Slightly less than (37.7%) of engineers disagreed, and the remaining 34.8% agreed with the statement. Data illustrated in (Figure 6.70) also indicate that (27.5% of the sample) was indecisive in their response, being either slightly agreeing or slightly disagreeing with the statement. This indicates that a large number of engineers do not receive such feedback, and could possibly one further reason for their dissatisfaction with their jobs, as indicated in response to Q31.

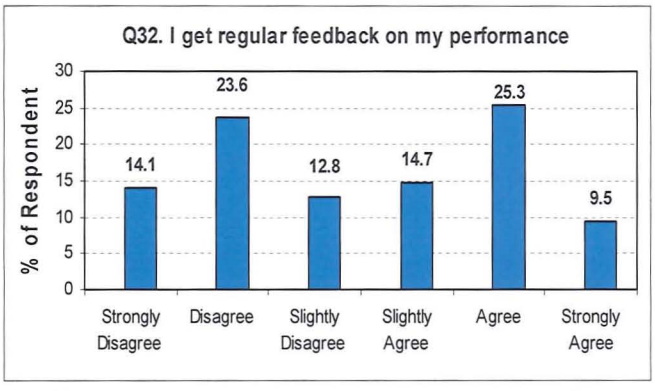


Figure 6.70: Engineers' perceptions about regular feedback relating to Performance
Source: Appendix F

(e). Motivation and encouragement by managers

When it comes to receiving regular motivation and encouragement from their managers (Q.33), respondents indicated their disagreement with the statement; 49.6% of the sample disagreed to strongly disagree with the statement in contrast to 20.4% of them who indicated their agreement with the statement (Figure 6.71). However, 29.9% of them were

indecisive in their approach to responding to the statement (slightly disagree/slightly agree). This is an indication that the managers do not communicate fully with all engineers and more of them do not receive regular motivation and encouragement than those receiving it. This might also be another factor for engineers' dissatisfaction with their jobs and due to breakdown of relations between managers and workers (see sections 6.2.6.2 'a, d, e').

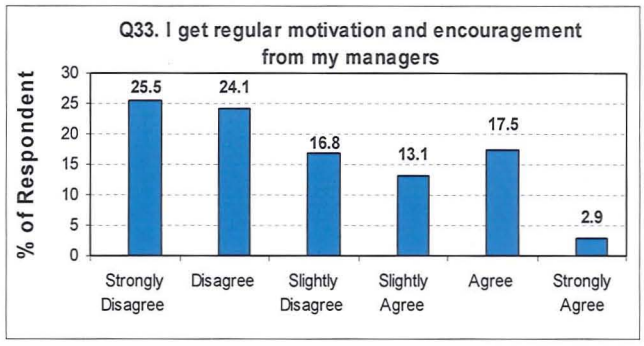


Figure 6.71: Engineers' perceptions about motivation and encouragement by managers
Source: Appendix F

(f). Communicating procedures and processes

With regard to whether all the procedures and processes are communicated well to staff (Q.34); the majority of the respondent engineers (47.4%) indicate their disagreement (disagree, 32.1% and strongly disagree 15.3%), (Figure 6.72) with the statement, in contrast to a minority (15.3%) of them who agreed with the statement. Nonetheless, 37.2% of them did not express their views decisively (slightly disagree/slightly agree). On the other hand, this raises a major concern that a relatively large number of engineers were not decisive or do not agree with this statement. This is further evidence that managers do not communicate fully with engineers as well as to the breakdown of communication between management and employees, which can be regarded as a factor for their dissatisfaction with their job and not being motivated to assume their tasks to the required standard.

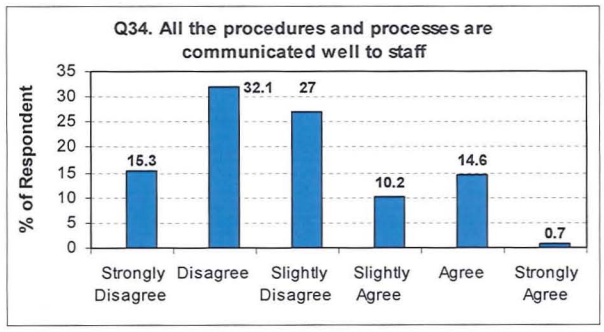


Figure 6.72: Engineers' perceptions about procedures is communicated to staff
Source: Appendix F

(g). Decision-making process

With regard to the company's decision-making process (Q.35), the majority of the respondent engineers (54%) indicated that the decision-making process is not transparent (Figure 6.73), in contrast to 19% of them who indicated their agreement with this statement (strongly agree to slightly agree). Data also indicate that many engineers and technicians (27% of the sample) who were not sure about their views, either slightly disagreeing or slightly agreeing with the statement. This is evidence that staff play no role in decision-making process to help them formulate and define their jobs, tasks, duties and responsibilities, and that decisions are made at the top without consultation with the staff. This also reflects the highly centralised and bureaucratised nature of organisations involved.

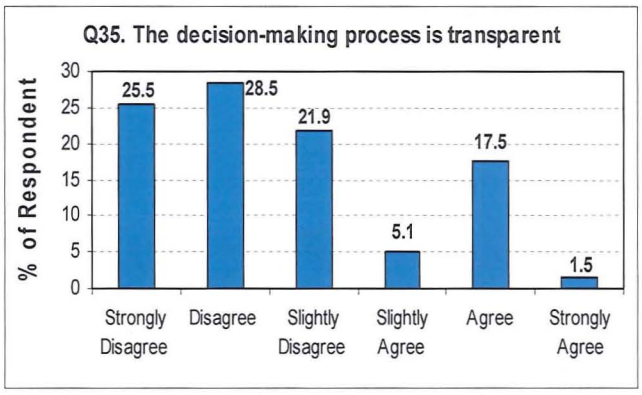


Figure 6.73: Engineers' perceptions about decision-making process is transparent
Source: Appendix F

(h). Dealing with problems

When engineers were also asked if they know 'where to go and what to do' when they have a problem (Q.36), the majority of respondent engineers (56.9%) agreed with this statement (agree, 42.3%; and strongly agree, 14.6%), whereas the remaining (25.6% of the sample) expressed their non-decision approach (slightly disagree/slightly agree). Moreover, 17.5% of them disagreed with this statement, (Figure 6.74). This pattern of responses is in agreement with what the students had in mind, whereby 50.5% of the students indicated their agreement with a similar statement (Section 'e' Q.33 in students' perception).

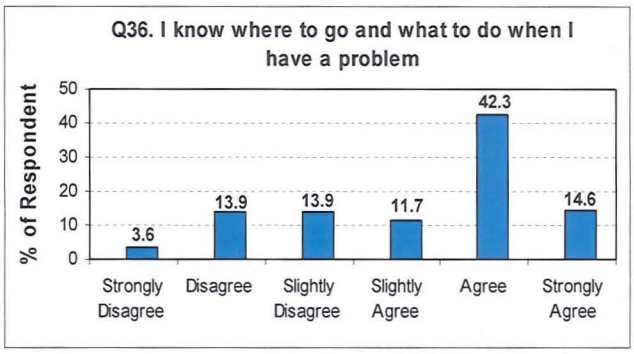


Figure 6.74: Engineers' perceptions about dealing with problems
Source: Appendix F

(i). Expressing views about management

With regard to expressing their views to the management freely (Q.37), less than two-fifths of respondent engineers (40.9 of the sample) indicate their disagreement (disagree, to strongly disagree) with the statement, whereas the remaining 35.1% of them agreed with this statement (Figure 6.75). 24.1% of them who were not decisive. This pattern of responses is in contrast with what the students had in mind, whereby 39.4% of the students indicated their agreement with a similar statement, though mostly agreement (30.7% of the sample). It is possible that if such views are embarrassing or criticising management staff might face severe repercussions, for example, harsh discipline, or even demotion, since it is not allowed to dismiss employees in Libya.

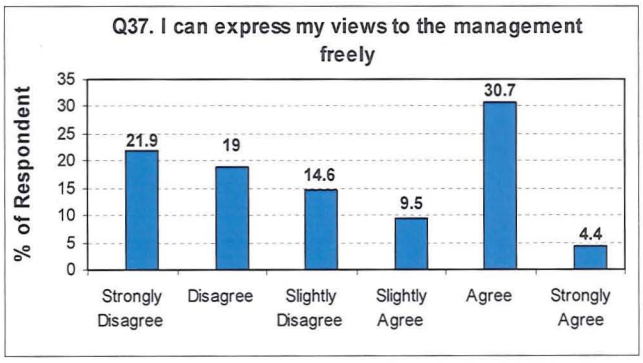


Figure 6.75: Engineers' perceptions about expressing their views to the management freely
Source: Appendix F

6.2.8 Theme Seven: Staff Development

6.2.8.1 Students' Perceptions

(a). Advanced lecturers' knowledge and skills

Students were asked if their lecturers' knowledge and skills are up to date (Q.39). Three-fifths of respondents' students 60% agreed that the knowledge and skills of their lecturers are up to (Figure 6.76). The remaining 40% of the students disagreed (strongly disagree to slightly disagree) with the statement. This is quite a high percentage of students which might indicate that the standard of many lecturers are not up to the required level. This clearly indicates that many lecturers are not using modern teaching methods. Responses to this item tie up with those reported for Q.35. This pattern of responses also indicates that many lecturers are still following the traditional methods of teaching, that is, lectures are dictated to the students.

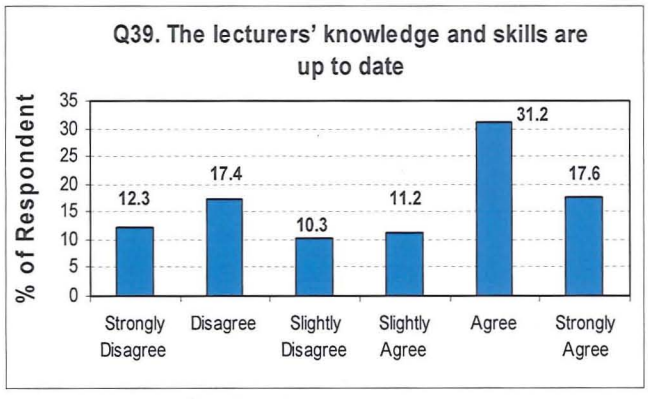


Figure 6.76: Students' perceptions about lecturers' knowledge and skills are up to date
Source: Appendix E

(b). Usage of modern teaching methods by lecturers

Students were also asked whether their lecturers used modern teaching methods (Q.40). More than half of students 51.7% agreed with this statement, whereas the remaining 48.3% of them disagreed with it (Figure 6.77).

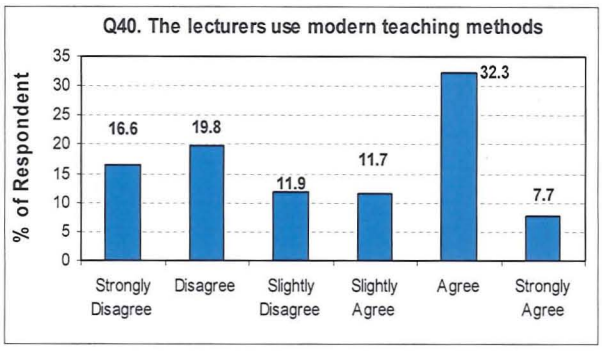


Figure 6.77: Students' perceptions about lecturers using modern teaching methods
Source: Appendix E

(c). Essentiality of CPD

When asked whether continuous professional development and life-long learning are essential in the 21st century (Q.41), the greater majority (91.5%) of respondent students agreed with this statement (Figure 6.78). This pattern of responses clearly indicates the awareness of students of the significance of training, CPD and life-long learning in their development and also in their career after graduation.

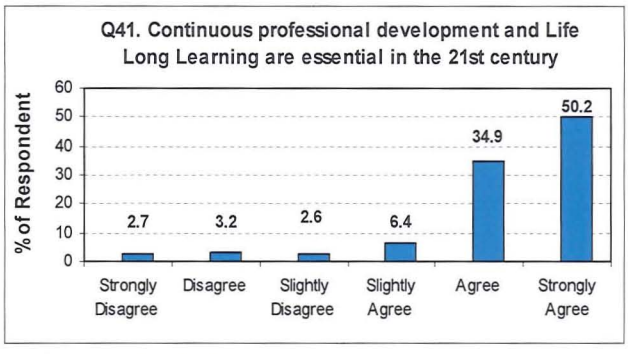


Figure 6.78: Students' perceptions about continuous professional development
Source: Appendix E

6.2.8.2 Engineers and Technicians Perceptions

(a). Effectiveness of staff development system in building up workforce skills

Engineers and technicians were asked whether staff development system is effective in building up workforce skills (Q.38), the majority of them (79.6%) agreed with the statement (Figure 6.79). This might indicate that staff development system in operation is effective in building up the skills of staff.

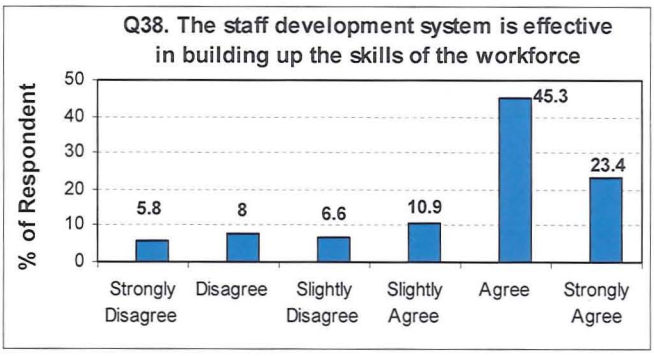


Figure 6.79: Engineers' perception about effectiveness of staff development system in building up workforce skills
Source: Appendix F

(b). Essentiality of CPD

When asked whether CPD and life-long learning are essential in the 21st century (Q.39), the greater majority of engineers and technician agreed with this statement (Figure 6.80). This pattern of responses ties up with that indicated by students (Q.41, Figure 6.78).

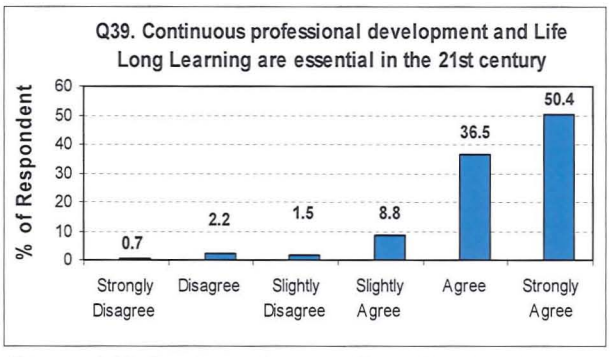


Figure 6.80: Engineers' perceptions about continuous professional development
Source: Appendix F

6.2.9 Theme Eight: Culture Aspects

6.2.9.1 Students' Perceptions

(a). Gender suitability to study engineering

Students were asked whether men are more suitable to study engineering than women (Q. 42). About 55% of the respondents agreed with the statement, whereas 45% of them disagreed with it (Figure 6.81). This pattern of responses is not at all surprising, given that 50.7% of respondent students were males and 49.3% of them were females (see Section 6.2.1). On this basis, it seems that some female students agreed with the statement, tipping the balance towards more agreement than disagreement.

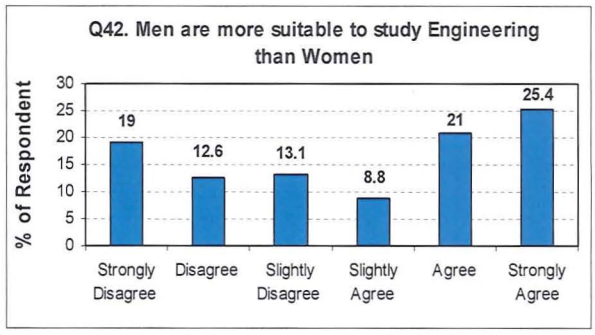


Figure 6.81: Students' perceptions about men are more suitable to study engineering than women
Source: Appendix E

(b). Following tutor's instruction

When asked whether they always do what their tutors asked them to do even if they think that tutors are wrong (Q.43), 43.8% of them disagreed with the statement, whereas the remaining (27.7% of the sample) expressed their non-decision approach (slightly disagree/slightly agree). Around 28.5% of respondents strongly agreed or agreed with it (Figure 6.82). This pattern of responses indicates that more students can identify wrong information fed to them by their tutors; hence, they would not do what their tutors asked them to do. In the researcher's view there are less than half of the respondents students expressing their view (strongly agree to slightly agree) about this statement which could be attributed to the absence of dialogue, so as not to allow the student to discuss the tutor's views and instructions, but to follow and adopt them even if such views and instructions are not satisfactory. Students are also exposed to problems or even to repercussions in the event they question such views and instructions, such as (failure, or not given the right marks for their examinations and course effort).

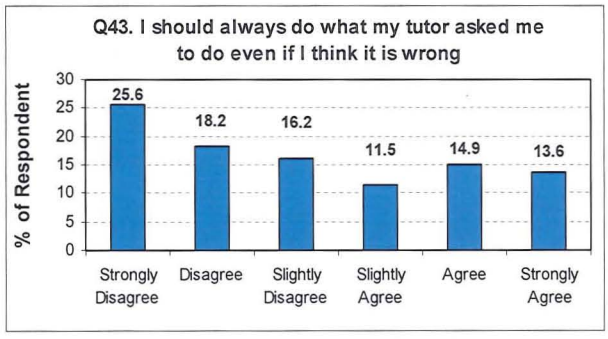


Figure 6.82: Students' perceptions about following tutor's instruction
Source: Appendix E

Q44. Respondents (students) were given the opportunity to express their views and add any further comments they felt necessary (Question No. 44). Examples of some respondents' views and suggestions are summarised as follows:

- ❖ The library does not modernise, need more text-books and some international journals
- ❖ Large lecture theatres to accommodate large number of students.
- ❖ Need for English language lessons for most of the courses.
- ❖ Modernising laboratory and workshops.

6.2.9.2 Engineers and Technicians Perceptions

(a). Gender suitability to work at manufacturing industry

Engineers and technicians were asked whether men are more suitable to work at manufacturing industry than women (Q.40). The majority of the respondents agreed with the statement, whereas 15% of them disagreed with it (Figure 6.83). This pattern of response is not surprising, given that the absolute majority (98.5%) of the respondent engineers and technicians were males (Section 6.2.1). However, based on this majority, it can be said that some male respondents disagreed with the statement.

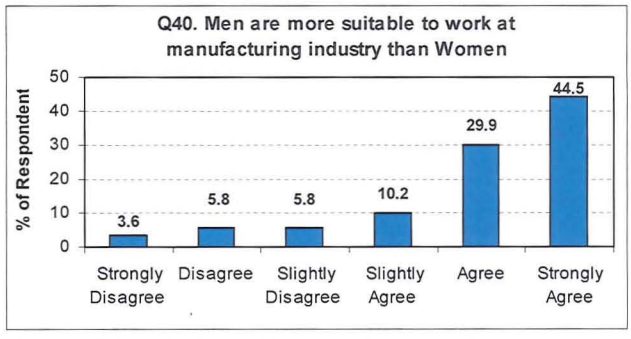


Figure 6.83: Engineers' perceptions about men are more suitable to work at manufacturing industry than women
Source: Appendix F

(b). Following supervisor's instruction

When asked whether they always do what their supervisors asked them to do even if they think that supervisors are wrong (Q.41), 54.7% of them disagreed with the statement, whereas the remaining (27.7% of the sample) expressed their non-decision approach (slightly disagree/slightly agree). Around 17.5% of respondents strongly agreed or agreed with it (Figure 6.84). This pattern of responses indicates that more engineers and

technicians can identify wrong information fed to them by their supervisors; hence, they would not do what their directors asked them to do. In the researcher's view there are about one-quarter of the respondents engineers and technicians expressing their view (strongly agree to slightly agree) about this statement, possibly due to the absence of dialogue so as not to allow the engineer to discuss the supervisor's views and instructions, but to follow and implement them even if such views and instructions are not satisfactory. In the event they oppose or not taking these instructions on board that would lose all the privileges granted to them, such as (a car, an office, incentives, etc.).

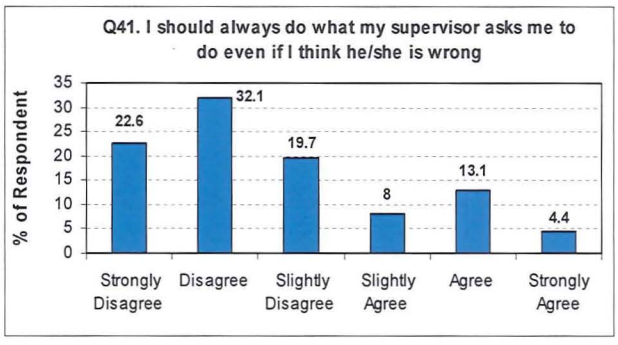


Figure 6.84: Engineers' perceptions about always following supervisor's instruction
Source: Appendix F

Q42. Respondents (engineers and technicians) were given the opportunity to express their views and add any further comments they felt necessary (Question No. 42). Examples of some respondents' views and suggestions are summarised as follows:

- The training courses need further practical work, and the time is not sufficient for this sort of training.
- The time given for the training programme was not enough.
- More course material was needed to cover the whole study area.
- To some extent, I benefited from the training I received, but I would recommend that an effort be made to improve it.
- The course of training, it would be better if conducted abroad such as the UK or the USA, where the methods of teaching are more effective.

6.3 Statistical Analysis with Respect to the Effect of Gender

ANOVA was employed to determine whether or not there is a difference in the responses to a number of questionnaire items according to the gender of students. Table demonstrates a sample of ANOVA statistics generated by SPSS with regard to gender.

6.3.1 Students Perceptions

Q.3. The decision to apply to the University/College

To identify differences among students' gender, an analysis of variance (ANOVA) was carried out at the 5% significance level. The results (Table 6.12) demonstrate that there were significant statistical differences in the students' gender (the F ratio is 33.0 and the observed significance level is 0.000). This indicates that were differences in responses to the decisions to apply to their universities/colleges according to their gender. This may also indicate that while some of these decisions were more important to male students, they were less so concerning female students.

Table 6.12: The decision to apply to the University/College

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	37.627	6	6.271	33.000	0.000
Within Groups	140.817	741	0.190		
Total	178.444	747			

Figure 6.85 shows that proximity to home was the main decision for females to apply to their institutions. This is possibly due to the fact that females have not much mobility like males and prefer their institutions to be as near as possible to home. In contrast, proximity to home for male students was an insignificant factor to apply to their institutions; only 2.9% of them referred to this factor. Second and third important factors for female students to apply to their institutions are institution reputation and programme of study, respectively.

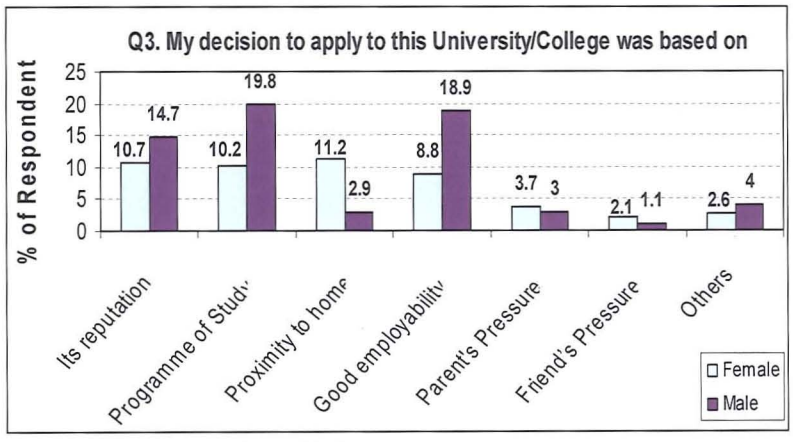


Figure 6. 85: Student (Male-Female) perceptions about reasons for applying to University/College
Source: Appendix G

Q4. Reasons for studying engineering

Table 6.13 shows that there were significant statistical differences in the students' gender (the F ratio is 6.6 and the observed significance level is 0.000) with regard to reasons to study engineering.

Table 6.13: Reasons for studying engineering

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	10.486	7	1.498	6.607	0.000
Within Groups	160.292	707	0.227		
Total	170.778	714			

Figure 6.86 clearly indicates that personal interest to study engineering was more important for male students than female students. Data also show that pressure from parents was more important for female students to study engineering than male students. The possible reason is that parents want their daughters to study engineering given the reputation of this profession in society and the possibility of guaranteeing a career after their graduation.

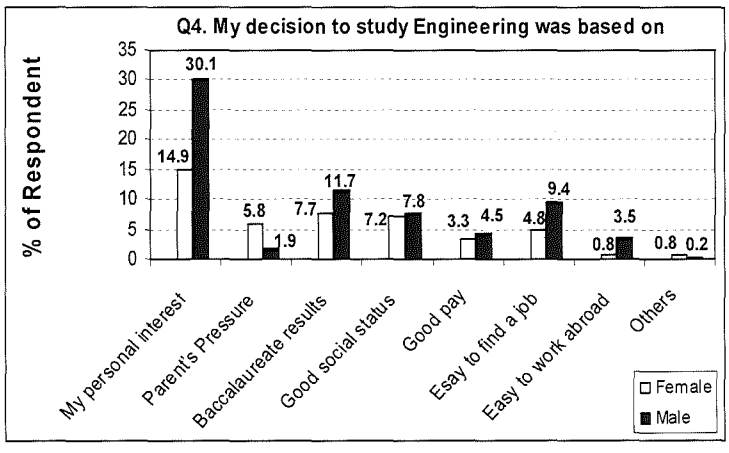


Figure 6.86: Students (Male-Female) perceptions about reasons for studying engineering
Source: Appendix G

Q5. Playing an active role in the institute's committees

Statistical analysis shows significant differences in the students' gender (the F ratio is 13.8 and the observed significance level is 0.000) concerning students' interest in playing an active role in the institute's committees (Table 6.14).

Table 6.14: Playing an active role in the institute's committees

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	15.178	5	3.036	13.802	0.000
Within Groups	136.144	619	0.220		
Total	151.322	624			

When female student's responses were separated from overall responses to this item, as illustrated in Figure 6.5, results, as indicated in Figure 6.87 shows that more female students disagreeing with this statement than male students. The reason could be that female students spend more time at home and have their limited time to get involved with external activities, such as representation in committees. Another reason might be due to society traditional culture which does not appreciate females mixing with males, and the majority of committees' members are males.

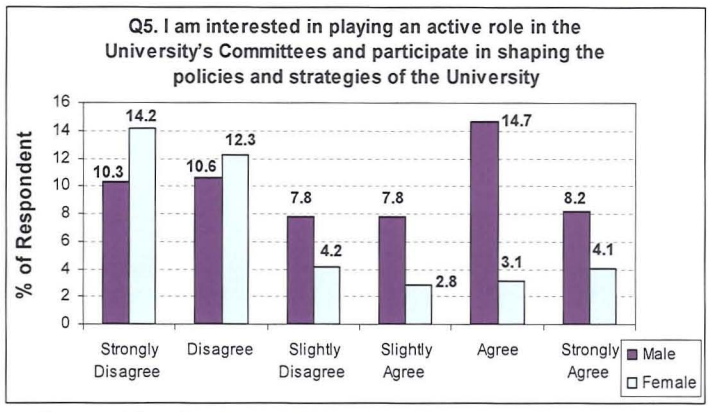


Figure 6.87: Students (Male-Female) perceptions about playing an active role in the institute's committees
Source: Appendix G

Q27. Training in industry as part of their study

ANOVA test shows significant differences in responses to spending time on training in relevant industry as part of the study (F=20.24, and significance level = 0.000) according to students' gender (Table 6.15).

Table 6.15: Training in industry as part of their study

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	19.263	5	3.853	20.244	0.000
Within Groups	117.802	619	0.190		
Total	137.066	624			

Data in Figure 6.88 clearly indicate that substantially more male students agreed with this item than female students, and also more female students disagreed that agreed with it. This might be due to the fact that female students do not want to take training outside their institutions. This might possibly be attributed to training outside the institutions is far from female students' homes, or possibly due to society culture which does not allow mixing between the two genders.

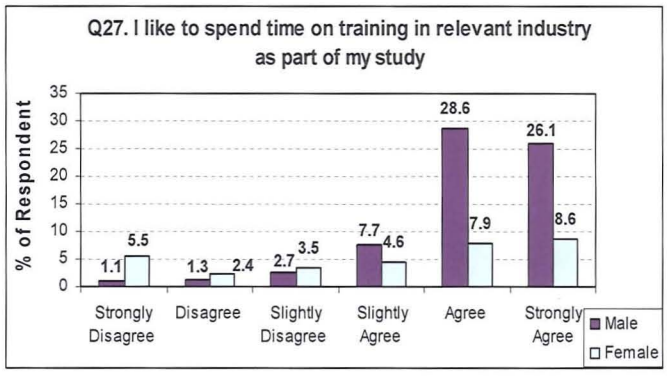


Figure 6.88: Students (Male-Female) perceptions about their training in industry as part of their study
Source: Appendix G

Q33. Dealing with problem

Statistical analysis, using ANOVA test, indicates significant differences in responses to 'where to go and what to do' when they have a problem Q.33 according to students' gender (F ratio is 2.25 and significance level is 0.05) (Table 6.16).

Table 6.16: Dealing with problem

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	2.677	5	0.535	2.249	0.05
Within Groups	147.323	619	0.238		
Total	150.000	624			

Figure 6.89 indicate that more male students than female students know where to go and what to do when they have a problem, possibly due to that male student have more access to facilities such as the popular committees, which are generally dominated by male students. However, more female students agreed than disagreed with this statement; hence, it can be said that many female students know where to go and what to do when they experience problems.

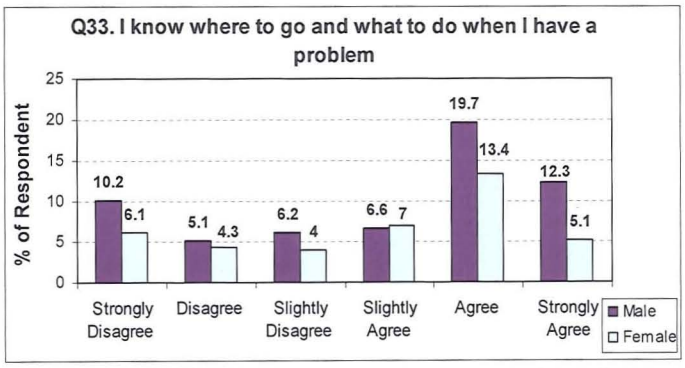


Figure 6.89: Students (Male-Female) perceptions about 'where to go and what to do' when they have a problem
Source: Appendix G

Q42. Men are more suitable to study engineering than women

The ANOV A test showed no significant statistical differences between respondents' gender concerning whether men are more suitable to study engineering than women (the F ratio is 0.78 and the observed significance level is 0.56) (Table 6.17).

Table 6.17: Men are more suitable to study engineering than women

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	0.956	5	0.191	0.784	0.562
Within Groups	151.050	619	0.244		
Total	152.006	624			

Accordingly, it can be argued that more male and female students agreed with the statement than disagreed, as indicated in Figure 6.90, and that engineering is more suitable for men than women. This might be due to the fact that many female students perceive engineering as a demanding and physical occupation. However, there are a significant percentage of female students who disagreed with the statement.

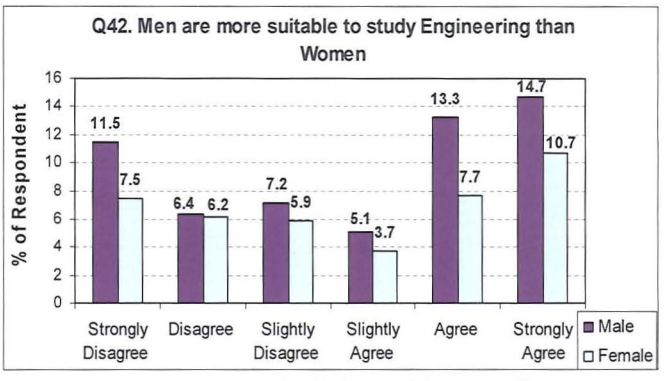


Figure 6.90: Students (Male-Female) perceptions about men are more suitable to study engineering than women
Source: Appendix G

Q43: Following tutor's instruction

ANOVA test showed no significant differences according to gender with regard to students' perceptions about following tutor's instruction (the F ratio is 0.64 and significance level of 0.67) (Table 6.18).

Table 6.18: Following tutor's instruction

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	0.805	5	0.161	0.642	0.667
Within Groups	155.195	619	0.251		
Total	156.000	624			

This shows that most students, both males and females, indicated that they do not always do what their tutors ask them to do (Figure 6.91). Nonetheless, there are many male and female students who agreed with the statement, indicating that they follow their tutors' instruction, even if such instruction is wrong.

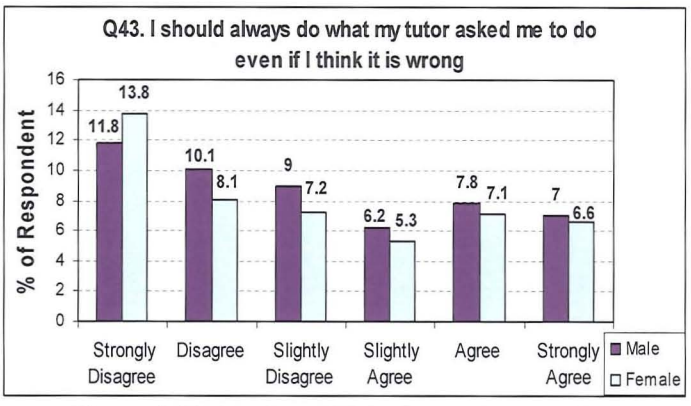


Figure 6. 91: Students (Male-Female) perceptions about following tutor's instruction
Source: Appendix G

6.3.2 Engineers and Technicians Perceptions

With regard to female engineers involved in the study, it can be said that their views are not significant and have no effect of the overall response rates. This is due to the fact that only two female engineers are employed by the company, and the number of male engineers and technicians was 135 involved in the questionnaire survey. This clearly demonstrates the scarcity of female engineers in chemical industry, due to social and cultural circumstances. This seems to be a common feature of other manufacturing industry in Libya. For example, in the construction industry, which is dominated by men, as indicated by Grifa (2006, p.170), women are scarcely represented in that industry. Grifa's sample was represented by 237 respondents, of whom three were women (Grifa, 2006, p.153). Accordingly, statistical analysis was not undertaken due to the insignificant participation of female engineers in the present study respondents.

6.4 Summary

This chapter provided an analysis of the quantitative data. The analysis is divided across eight themes corresponding to the eight research indicators discussed in the previous chapter. A high questionnaire return rate (82%) was achieved.

The student sample was almost half males and half females, whereas the engineers and technicians sample was predominantly males (98.5%). The majority of students were between 20 years old and less than 26 years old, whereas the engineers and technicians were mostly between 30 and less than 50 years old. Three-fifths of students were preparing for their Bachelor degree; the remaining for technical diploma. Engineers and technicians have qualifications ranging from secondary school certificate to Bachelor degree. Most students were in full-time courses and most of them have their fathers working for the public sector or private sector, and their mothers were mostly housewives, though many of them work for the public sector. The majority of engineers and technicians have work experience between 5 and more than 20 years, and most of them have their current jobs as their first after graduation. The greater majority were Libyan nationals.

Theme One: Strategies and Policies

From responses to the questionnaire items relating to strategies and policies, it can be argued from students' responses that the majority of students had received information about their institution and some information relating to their intended programme of study and the potential job market, and that the most important reason for applying to the institution was the programme of the study, followed by good employability as engineers, and institution's reputation. It can also be concluded that students' personal interest was the most important reason for studying engineering, the majority of students did not express their interest in playing an active role in university's committees, and most of them indicated that the University management does not listen to them.

From the engineers and technicians' perspectives concerning strategies and policies, it can also be deduced that engineers and technicians have the organisation's aims, priorities and goals clearly and well communicated to them, the role of their departments/section within the organisation structure is clearly defined, and their role, duties and responsibilities are well defined. However, it can be concluded that engineers and technicians did not receive regular information about the company and its performance and that the company had not communicated its policies to them. The engineers considered proximity to home, availability of professional development and company's reputation as their most important reasons for joining the company. Like students, engineers and technicians were not

interested in playing an active role in organisation's committees and that the Company management did not listen to them.

Theme Two: Curriculum Design

It can be inferred from students' responses to items relating to curriculum design that subjects studied are relevant for future profession as engineers and prepare them to be engineers. Around half of the students agreed with the extent of knowledge and skills offered by the course studied, and with the depth of knowledge and skills offered to them, though they indicated that the balance between the theoretical and practical sessions is inappropriate. It can also be concluded that the course assessment strategy is inadequate, the study modules not linked from one level to another and the curriculum does not cover the employability issues and career advice.

With regard to engineers and technicians' perception of education and training before employment, it can be concluded that their study was relevant to their jobs, the knowledge and skills they gained during their study prepared them well to be engineers and technicians, though they acquire knowledge and skills independently, and most of them agreed with the effectiveness of on-the-job-training. However, it can be concluded that the materials they studied did not related, though they were decided whether their study issues prepared them well to globalisation and international businesses.

Theme Three: Curriculum delivery

Students' responses to questionnaire items concerning curriculum delivery revealed that the timetable's design did not accommodating their needs, tutors were available to help students, though they indicated that their tutorial sessions are not appropriately allocated and study materials are not available in the library. However, slightly more than half of students agreed that lecturers use modern technologies in the delivery of their modules. It can be concluded that that the delivery strategy did not give the students enough confidence to manage their study, and that the laboratories are not well equipped to deliver the practical part of the course. It can be argued that the lecture theatres/rooms are not suitable and inappropriately equipped and that their school did not provide support the learners with diverse background.

With regards to the engineers and technicians' perceptions of the delivery of education and training, it can be argued that the delivery methods of the curriculum they studied did not helped them much to be independent learners, given that less than half of them agreed with this issue. Part-time study and flexible delivery are thought to encourage staff to continue studying. The findings also indicated that distance learning or e-learning over the Internet could be used to acquire the knowledge and skills required for the manufacturing industry, and work-based learning is an effective way of acquiring the knowledge and skills relevant to their job. Furthermore, industrial placement was found to very useful for acquiring the employability skills, and short courses offered by HEIs were reported to be very useful in updating engineers' and technician's knowledge and skills.

Theme Four: Partnership with Industry

It can be concluded from the analysis of data above that TVET centres in Libya is based on a weak foundation and that TVET education is still out of step with changes that have taken place in the national economy. This weakness should be remedied so that courses given at HEIs are linked positively with the industry. This weak linkage may reflect on poor coordination between the various sectors of industry and HEIs. This weak linkage is also substantiated by the fact that the students indicated that their lecturers have not presented them with case studies from the relevant industry. It can therefore be said that theory is not put into practice. However, it can also be concluded that students enjoyed their field trips to industrial site, and most of them spent some time on training in relevant industry as part of their study. This can be seen as an attempt by the educational institutions to put theory into practice.

From the engineers' and technicians' perspectives, it can be concluded that TVET institutions played an essential role in updating and enhancing their skills and placing engineering and technician students in organisations helps prepare them for future work. It can also be concluded that consultation with TVET institutions to resolve technical problems is not up to the required standard; this substantiates the poor linkages between TVET institutions and the relevant industries. This poor linkage is further substantiated by the fact that most participants did not keep contacts with their educational institutions after graduation. Placing lecturers in manufacturing organisation was perceived to improve their

awareness of the employers' requirements. It can also be concluded that many respondents wanted to study further should an opportunity to do so become available.

Theme Five: Accreditation

With regard to accreditation, it can be concluded that it was not perceived by many students as an opportunity to increase their employability, in contrast to engineers and technicians who indicated otherwise. Accreditation of a degree or a course by an officially appointed body is a sign of a recognised high standard. This means that graduates of accredited courses and degree will increase their employability chances. In Libya, all university courses and programmes are accredited by national and international accrediting bodies; hence, graduates will not find it difficult to find a job and start their career, as well as pursuing their postgraduate studies in European or American universities.

Theme Six: Quality Assurance

From students' perceptions, it can be concluded that services they receive are not fit for their purposes, and that information relating to courses offered are neither accurate not prevalent, as well as not adequate to help them decide upon choosing their courses/modules. It can also be concluded that students have no easy access to information relating to university/college regulations and processes. Students know where to go and what to do if they experience problems. More half of the students involved did not have timely feedback about their progress. Nonetheless, they thought highly of their lecturers' knowledge in their subject areas and that their teaching methods are appropriate. It seems that there are different approaches to structuring and organising lectures. It can further be concluded that many students decline to express their views about their lecturers.

As for engineers, it can be concluded that quality assurance and enhancement processes are well documented and implemented. A Large number of engineers seem to be dissatisfied with their jobs, for one reason or another, and many of them did not have regular feedback about their performance, as well as being not motivated or encouraged by their managers. It can also be concluded that procedures and processes are not well communicated to them. Engineers indicated that they know where to go and what to do if they experience problems. Finally, it can also be concluded that most engineers do not express their views freely about the management.

Theme Seven: Staff Development

From students' perceptions of staff development, it can be concluded that the knowledge and skills of their lecturers are up to date, though it seems to differ between the different HE institutions involved in the study, lecturers use modern teaching methods, though, again, not in all institutions, and continuous professional development and life-long learning are essential in the 21st century.

From the perspective of engineers and technicians concerning staff development, it can be concluded that staff development system is effective in building up workforce skills, and continuous professional development and life-long learning are essential in the 21st century.

Theme Eight: Culture Aspects

It can be concluded from students' perceptions of cultural aspects that gender was not an overriding issue as for men being more suitable than women to study engineering, students not always do what their tutors asked them to do, especially if they think that tutors are wrong.

However, with regard to the engineers and technicians, it can be concluded they think men are more suitable than women to work at manufacturing industry, and again they not always do what their tutors asked them to do, especially if they think that tutors are wrong.

According to statistical analysis with respect to the effect of gender, the ANOVA test indicated there are significant differences between male and female student concerning: the decision to apply to the University/College, reasons for studying engineering, playing an active role in the institute's committees, training in industry as part of their study and dealing with problem. The ANOV test also indicates no significant statistical differences between male and female with regard to men are more suitable to study engineering than women and following tutor's instruction.

Chapter Seven

Discussion of Research Findings

7.1 Introduction

In the preceding chapter, the questionnaires survey has been analysed. This chapter discusses the results of the quantitative data analysis from the questionnaires conducted in the Libyan HEIs and manufacturing industry. Engineering and technical education is one of the key means for preparing and qualifying human resources in engineering and technical fields; hence, it is the tool that helps developing countries to catch up with modern and developed culture. It is inevitable that engineering and technical education has to play its distinctive role and to achieve scientific and technical developments through its institutions, programmes, curricula and outputs that must be assessed and developed regularly and continuously in order to face the challenged and requirements of the twenty-first century.

The findings of the present study reveal that in Libya there are several loopholes in the engineering and technical education. The aim of this chapter is discuss research findings analysed in Chapter Six.

7.2 General Information

A total of 625 students at nine HEIs (universities/institutions) and 137 engineers and technicians in the manufacturing sector in Libya have been requested to answer a self-administered questionnaire. Their responses provided sufficient data set regarding their demographic details, strategies and policies, curriculum design, curriculum delivery, partnership with industry, accreditation, quality assurance, staff development and culture aspects concerning their institutions and organisation. On the basis of the results in the previous chapter, specific points are identified and discussed in the following paragraphs.

From the gender data it is clear that the balance of students entering HEIs is about right through study but after graduation there is clear sign of important gender imbalance. This could be attributed to the following reasons:

- ❖ Female graduates prefer soft engineering jobs (e.g., Electronics, Computer Engineering, Labs Engineers, Office-Type Engineering Jobs) rather than hard engineering jobs (e.g., Mechanical and Manufacturing);
- ❖ Large proportion of female graduates ends up as housewives.
- ❖ Some Libyan industries are perceived to be more suitable for males than females and visa versa. For example, field type engineering jobs like oil exploration are perceived to be more suitable for males than females while labs-based engineering jobs are perceived to be more suitable for females.

Furthermore, this low percentage of female at work reflects the shortcomings in employing female graduates. El-Magouri (2006) indicated that with the massive development in the numbers of females graduating from the Libyan HEIs, their presence in the labour market is low, and despite this low participation in the labour market, they are found in larger numbers in certain professions and some sectors, such as public services sector which recruited the majority of female graduates.

According to age profile, the absolute majority of students (92.5%) were younger than 26 years old. This might be because the HE in Libya is free encouraging more secondary school leavers to progress to HE. This age is expected in the Libyan HEIs, and also because of the provision of free education to all Libyan citizens at all educational levels, including HE, both at home and abroad, secondary school graduate are prompted to pursue their HE (GPCE, 2008; Hamde, 2007; Alhmaile, 2007; El-Hawat, 2003). On the other hand the proportion of students aged 26 and over indicates that life-long learning provision is insignificant, and the greater majority of university student graduate in their early to mid twenties.

Regarding engineers and technicians, the vast majority, are males, and a higher percentage of them are between 30 and 50 year old. This large proportion of engineers and technicians in this age implies that there are enormous opportunities to upgrade skills of such high number of engineering and technicians by engaging them in life-long learning activities, through attending training and re-training programmes and courses, or by joining postgraduate courses to obtain their Masters' or Doctorates' degrees. The State provides large numbers of sponsorships to Libyan citizens to study at home or abroad. In terms of their study, the vast majority of students were on full time study. Part-time students might

include those students older than 26 years, possibly those who are at work and had the opportunity to pursue their higher studies.

Concerning the father's profession, more than half are government employees. This reflects on the employment spectrum of Libya which is dominated by the public sector. As far as mother's profession is concerned most of the mothers are housewives. This is again a characteristic of the Libyan culture where the employment is dominated by males. In literature, however, a number of studies suggest that there is a strong relationship between the education level of parents and the field of study chosen by students. Students whose parents lack HE attainment are more likely to enrol to non-university programmes (Corak, et al. 2003; Knighton and Mirza 2002).

The majority of respondents' engineers and technicians had between 5 and 20 years of work experience while a few of them had more than 20 years of experience. This pattern of experience indicates that there is significant accumulated experience in the organisation. It also indicates that the percentage of highly experienced workers who are going to leave the organisation is more than the percentage of workers joining the organisation. This might lead to skill shortages. According to first job of engineers and technicians, the majority of the respondent indicated that this is their first job after graduation. This indicates that the mobility in the workforce is very poor and engineers and technicians spend long time in one single employment.

7.3 Strategies and Policies

Research findings analysed in chapter six (section 6.2.2) clearly show that most students have received information about their institutions and about the programme of study and potential job market. However, some of the institutions failed to convey any information concerning these issues and hence might have led to the dissatisfaction of many students who have not received this type of information. From the researcher's own investigation, it can be said that these HEIs do not have a prospectus like those in the UK, and their websites are rather poor and offer minimum information. This finding confirms the finding with regard to obtaining information about the institutions, and is consistent with finding of other researchers (Elzalitni, 2008; Mussmari, 2002; Mogassbi, 1984). It can be argued, based on these two findings, that there is little information concerning employment opportunities made available to students before they joined their programme of study.

According to the literature (Chao, 2005; Polach, 2004; Perrone and Vickers, 2003; Graham and McKenzie, 1995), obtaining a place for employment has become a mounting challenge and often a "stressful process" for new graduates. This lack of information regarding work opportunities, combined with a lack of previous work experience, has almost certainly led students to be exceptionally pessimistic about the probability of employment opportunities available to them after graduation. Mussmari (2002) reported a number of reasons behind the dissatisfaction with vocational education among sectors and respondents; one of which was the absence of a study concerning job descriptions and specifications in terms of analysing the skills needed for the graduates' occupations in the labour market leaving the graduates learning skills that are not necessarily relevant to the skills demanded in the labour market; hence, they require further training.

Mussmari (2002) argues that this has also resulted in making training institutions unaware of the skills required and the knowledge needed of the trainees in various organisations. Information provided might also be trivial and do not provide students with adequate information about the institutions, programme of study and potential job market. This might be due to the bureaucratic nature of these institutions that prevent them from conveying adequate information to their prospective students, who enter them without any good information about them and about the courses or programmes offered. To this effect, it can be argued that the Libyan HEIs should do more or do better in this important field. Large number of engineers and technicians also indicated that their company did not provide them with enough information about the company, and in both cases, students, and engineers and technicians, there seems a breakdown of communication between their institutions/company and themselves, mainly due to the bureaucratic systems adopted by the state-run institutions and organisations.

Programme of study, good employability and institution's reputation were the main factors for students to apply to their institutions. This is not surprising given that engineering for Libyan people is a prestigious and highly paid profession; and good reputation of the institution helps graduates to obtain a good job faster than those graduating from lees reputable HEIs. This is not only the case in the Libyan context, but also throughout North Africa and the Middle East, even in developed countries. Libya has for many years embarked on major development and industrial projects which have created substantial

employment opportunities for engineers and technicians. Employability is one key factor that has attracted Libyan students to study engineering and technical subjects.

The most single important reason for students to study engineering was their personal interest. This is a good indicator that points to the desire of these students to study engineering, possibly for some reasons such as the prestige of the engineering profession, and ease of finding a well paid job after graduation. There are more than half of the students who have chosen other reasons for studying engineering which was possibly due to some issues relating to the admission policy in the Libyan HEIs. Problems relating to the policy admission in the Libyan HE can be summed up as follows (Albadri, 2007):

- The admission policies in HEIs are not based on planning between what these universities and institutions prepare of human competencies and society's needs of such competencies.
- Admission policy is not based on the international standards in universities; that is, the student's actual desire, society needs, the accommodating capacity of these institutions, and the availability of necessary facilities for preparing students in various specialisations.
- Absence of guidance and educational and psychological directive programmes which help choose the appropriate specialism that benefits student and society in the future accordance to his actual competencies and preparedness.

Most students were either not interested in playing an active role in university committees or were indifferent about this issue. This might be due to the bureaucratic hierarchical system of the Libyan university which may prevent students from active participation in the university policies and strategies, or if there is some role for students to play it would be restricted to defending students if they have some trouble with the university management. This clearly indicates that students cannot play any role whatsoever in designing the university policies and strategies. Students are on the receiving end of this hierarchy. Possible reasons for this disinterest in playing an active role in university committees might include the following:

- The opportunities do not exist.
- The course they are studying is very demanding leaving very little time for such activity.

- They consider it as a waste of time as senior management is perceived as superior to students.
- Bad previous experience.
- They can't see the benefits.

It can also be argued that, given the bureaucratic nature of the Libyan HEIs and the fact that decisions are made at the highest management level would leave students not able to participate in the decision-making process. Even academic staff members do not participate in the decision-making process, cannot change the curriculum, or formulate policies and strategies. Accordingly, students are not part in the process of formulating strategies and policies; hence, their unwillingness to play an active role in shaping university policies and strategies.

Alhmali, (2007) has recently indicated that teachers in Libya do not usually influence curriculum change as this action is the responsibility of the government, and to teach effectively, teachers need to only understand the student's requirements, know the syllabus, and be capable of use appropriate teaching methods. This holds true for university staff as well. This also indicates that students' voices are not heeded or listened to by the management, an issue also raised by most of the students. In this connection, the majority of engineers and technicians also indicated that they were not interested in playing an active role in their company's committees, and also their voices are not listened to by the company management. Again, this is due to company's highly bureaucratic hierarchy (Rauner, 2007), in which engineers and technicians cannot influence the company's policies and strategies, unless they occupy a higher rank within the company.

Engineers and technicians' disinterest in playing an active role if their company's committees can be related to the fact that the company is centrally controlled and staffs are not empowered to facilitate contributing to decision-making processes and playing any role in company's committees and shaping its policies and strategies, whereby decisions are made at and policies are formulated by the top management and staff have the duty to implement these decisions and policies.

There is little opportunity for employees to make suggestions, for as has been seen there is no culture of participation in decision-making, and even where it is possible for workers to offer their views and ideas, there is no obligation upon management to accept them. In

Libya the organisational structure remains centralised, inhibiting any attempts by management to involve employees in decision-making. In this respect, Amar and Zain (2002) argued that in an Islamic country centralised decision-making function is inhibiting factor to the introduction of different management techniques, and certainly from feedback of the engineers and technicians at GCCI. The Complex, like many other Libyan firms, is still managed in a traditional style where every manager has major responsibilities. However, those who indicated they were interested in playing such a part might be in a position within the company hierarchy which enable them to play an active role in decision-making and policy formulation.

Findings revealed that most of the respondents have not obtained relevant information about the strategies, policies and procedures the institute adopts. Moreover, there seems to be a lack of information about employability. This might be attributed to the lack of strategic approach to marketing and communications. Despite significant improvements in Libyan TVET system, which is reflected through the sharp increase in the number of TVET institutions, the Libyan government has to place larger emphasis on TVET programmes to support the manufacturing sectors and a significant part of training needs has be delivered nationally by the universities and specialised institutions. In short, there is still a lack of strategic vision and alignment of HRD strategies to the national development plan.

The company's aims, priorities and goals seemed to be clear and conveyed to more than half of the engineers and technicians. However, the company failed to convey these aims, priorities and goals to many engineers and technicians, possibly due to the fact that many of them do not occupy senior or managerial posts to know what these aims, priorities and goals are. This is an indication of the breakdown of communication between the two parties; the company management, on the one hand, and the engineers and technicians, on the other hand, and also further evidence of the company's bureaucratic hierarchy in which the majority of engineers and technicians play the role of implementing the company's aims, priorities and goals. With regard to the clarity of roles of their departments/section, most engineers and technicians were positive in their responses, though many of them (more than one-quarter of the respondents) were negative in their response, which is further evidence of the company's bureaucratic. However, the majority of engineers and technicians knew their roles, duties and responsibilities.

The company has also failed to provide information about it and also failed to communicate its policies to the engineers and technicians. Again, as indicated above, this is due mainly to the breakdown of communications between them and the company.

Decision to apply to the company was in the main due to proximity to home, thus, reflecting on the poor mobility of the Libyan employees to work far from home. Libyan people like to work nearer to their places of residence rather than commuting for a long distance to work. This may be attributed to economical factors as well as transportation factors. From an economic perspective, commuting or driving from home to workplace is expensive and money spent on commuting or driving can be spent more effectively on family needs and requirements. Furthermore, there is no railway network infrastructure like that in the UK and other European countries that shuttle workers from and to home. Sánchez and Landwerlin (2006, p.138) argue that in the "*area of infrastructures as a whole, those relating to transport are of primary importance for mobility and for the development of any country.*" The availability of professional development programme was another factor, which is in line with the findings reported in the relevant literature (Rioux and Bernthel, 1999). Availability of professional development programme, that is, learning opportunities, was second most important reason for engineers and technicians to apply for a job at the company. In a recent publication, it is argued that one of the most important factors in a graduate choice of an organisation to work for is the organisation's reputation (The Sunday Times, 2007).

7.4 Curriculum Design

Research findings analysed in Chapter Six (Section 6.2.3) indicate that more than half of the respondent students thought the subjects studied related to future profession as engineers. This is a clear indication that subjects taught are in line with the labour market requirements. In a study undertaken in Saudi Arabia, 68% of the engineering students indicated that there is an integrative relationship between university study and professional qualifications (Elamru, 2007). However, there are many students who thought that the subjects studied were not relevant for future profession as engineers. These students might have perceived the curriculum as being rigid, highly isolated and centred curriculum, in other words, such a rigid curriculum lacks the provision of proper practical and professional training that qualify students after graduation to easily enter the labour market.

Although a high proportion of students included in the survey were apparently satisfied with their courses, they thought that TVET programmes needed more improvement. This improvement should cover: better guidance, physical facilities, human resources and an increase in practical courses. Along with these findings, a previous study conducted by Aldhaif et al. (2001) has mentioned that most TVET suffered a lack of physical and human resources which resulted in inappropriate functioning as HEIs. The curriculum needs to include subjects such as business and communication skills into the syllabus which would help to widen the appeal of engineering, and also produce more competent graduates (The Royal Academy of Engineering, 2003). Nor et al. (2008) argued that, the use of Information Communication Technology (ICT) in future engineering education programme, which has been suggested by undergraduate engineering students, according to Pomales-Garcia and Liu (2007). The ICT involves using all implements in the forms of software, on-line programme and resources to create new and better conditions for learning, for instance, using e-learning, e-mail, word processors, and web resources (Nor et al. 2008). Porter and Yergin (2006) maintain that the Libyan education system has failed to provide the skills required to drive the economy forward; the system suffers from inferior quality curricula, teachers and infrastructure, and curricula must be designed to match the needs of students and cater for their aspirations and requirements (Mbajiorgu and Reid, 2006).

The researcher thinks that the curriculum is based on a traditional discipline which does not involve much of adequately preparing engineering students for work after their graduation. The researcher also thinks that engineering students in the HEIs involved in the study are not provided with adequate knowledge and practice to qualify them for future career. Despite the fact that the task of HE is not limited to assessing knowledge only, but showing students how to learn and life long learning, and providing student with the knowledge and expertise that qualify him to be accepted in the labour market (Albadri, 2007). However, this goal is not achieved in the Libyan educational institutions to the required standard because the majority of educational institutions still use the dictation style of learning and this style makes the student concerned with examinations. This situation is a setback in HEIs due to their inability to undertake appropriate preparation of the human resources required by the labour market (Albadri, 2006 and 2007). This requires HEIs to develop their teaching styles include using modern technology which leads to increasing and developing student's skills so as to render the student interested in investigating and

searching for information; hence, becomes acceptable in the labour market (Albadri, 2007). This situation needs to change in order to graduate engineers with the knowledge and practical experience to qualify them better than at present for recruitment in the industry. The nature and operating environment of industry at present is founded on knowledge and human capital, according to Nor et al. (2008).

It can be argued that the curriculum for a large part of the respondent sample has not created the background such as the differences in students' learning attitudes, and differences in their interests in the different science subjects, whereby the current curriculum needs to be re-evaluated and change in order to meet the labour market demand of engineers and technicians. This is in line with Noll and Wilkins' (2002) view relating to IT workforce in the USA. These authors (p.144) concluded that the "*overwhelming responsibility of designing a curriculum that prepares future IS professionals for this dynamic field.*" This holds true for the Libyan context. To this effect, curriculum needs to be redesigned by the educational institutions and developed in cooperation with the corporate partners (relevant industries) (Srinivasan et al. 1999). Srinivasan et al. (1999) also suggested using the corporate partners as 'clinical, that is, faculty to help teach the courses.

A large number of students (40.0% of the sample, see Section 6.2.3.1.b) believed that subjects studied do not prepare them well to be engineers. Elamru (2007) reported in a Saudi Arabian context that the greater majority of engineering students indicated that for a student to become professionally qualified he should have adequate professional training prior to engagement in work. This large number of respondent students also indicates that students might be taught courses that are not relevant to their future work. Elamru (2007) also indicated that the majority of his engineering student sample reported that they are taught courses that are irrelevant to their specialisation. A similar finding is reported by Musmari (2002), who concluded that it is clear from his findings that the Libyan vocational training programme does not provide the trainees with the essential training skills and the professional knowledge required. Musmari (2002) adds that the perception of imbalance between the theoretical and practical elements of the training programme become more apparent, mainly after the sectors and respondents reflected their general dissatisfaction with the amount of practical training allocated during the training programme.

Many respondent students disagreed with the extent of knowledge and skills offered by the course studied (see section 6.2.3.1.c), and more than half of these respondents disagreed

with the depth of knowledge and skills offered to them. Elamru (2007) reported similar views, indicating that more than 80% of his sample agreed that the curriculum include courses that were not related to their study. To this effect, the researcher thinks that the curriculum needs to be redesigned, re-engineered and developed much further than it is in its current status to provide graduate with the depth of knowledge and skills that qualifies them to be successful engineers after their graduation. Nor et al. (2008) argue that the development of engineering education is essential for the formation of the skills and knowledge required, and as Nor et al. (2008) claim, this will also drive the expansion of industry academia linkages; hence, develop the linkages that are essential for the efficient operation of universities.

The research findings also indicate that many students with the balance between theoretical and practical sessions, indicating that their courses are more theory oriented than practical oriented. These issues are linked to each other. This means that the institutions where these students study have failed to provide or offer them with the appropriate curriculum to prepare them for their future work after graduation. According to article 14, Law 114 of 1994, which covers the regulations of TVET Colleges, 60% of curriculum instruction time should focus on practical training and 40% on theoretical knowledge (Elzalitni, 2008). However, it is clear from the findings that instruction in TVET Colleges tends to emphasise theoretical issues rather than practical applications. Similar findings have been previously reported by (Alrubei, 2004; Aldhaif et al. 2001). In this regard Alrubei (2004, p.2) has commented on the inadequate practical applications and the insufficient work experience of the graduates of applied and technical fields:

> *"Graduates of applied and technical fields are often facing challenges in securing placement in the labour market, particularly in the private sector. This is primarily because of the lack of work experience and insufficiency in areas related to specialisation and occupation during their college study. This also, is a result of the dominance of theoretical subjects at the expense of practical ones because of a lack of or non-existence of workshops, laboratories and equipments which are often needed for practical applications."*

This agrees with Porter and Yergin's (2006) views reported earlier, and also with Mbajiorgu and Reid's (2006) recommendation concerning curriculum design. It can possibly be argued that many students thought that there is an imbalance between theoretical and practical sessions. This is a serious matter that HEIs need to address

adequately to include more practical work in their curricula. This pattern of response may point to some fault in the curriculum design, and that there is more reliance on theory than on practice, and is further evidence for the traditional approach to teaching engineering students in Libya.

Mussmari (2002) attributed the dissatisfaction with vocational education among sectors and respondents to a number of reasons, one of which was that of the lack of balance in the content of the vocational training programme, indicating that more emphasis was placed on the theoretical element of the training programme; hence, the practical on-the-job training was overlooked. He argues that there is a clear lack of planning and organisation, and as a consequence unbalanced curriculum is created. Mussmari also indicated that notably cited was the imbalance between the practical and theoretical constituents of the course, which leaves the vocational graduates lacking practical skills as well as the level of technical knowledge necessary for their vocational professions at work. This also shows a mismatch between training and labour market skill demands (Afeti, 2007), due mainly the lack of links between industry and HEIs in Libya. Afeti (2007, p.5) argues that in almost African countries there is the "*lack of inputs from prospective employers into curriculum design and training delivery in universities and colleges is partly responsible for the mismatch.* This lack of links indicates that HEIs in Libya have not consulted the relevant industries in designing their curricula which would play substantial roles in the development of the programme and see the course as part of a whole.

Research findings also indicated that many students perceived course assessment strategy as inappropriate. This is due to the reliance on theoretical examination as the major strategy for the assessment of students, and not much on laboratory-based (practical) assessment strategy. Equipment and provisions in laboratories and workshops are old and are not upgraded or modernise (Al-Majdoub, 2001).

Many students did not think that their modules of study are satisfactorily linked and appropriately progress from one level to another, a reference to inadequate curriculum design.

Many respondents disagreed that the curriculum covers employability issues and career advice. This may indicate that there are some loopholes in the curriculum which do not adequately prepare students for future employment. In spite of the importance of career

counselling services for students as potential employees (Mau and Fernandes, 2001; OECD, 2000), the findings revealed that most of the respondents have not obtained any information about work opportunities available to them after graduation. This finding was consistent with the findings of earlier studies (Elzalitini, 2008; Mogassbi, 1984). Furthermore, they have not had any work experience as part of their college training. This is further evidence of the nature of the curriculum which is more geared towards theory than practice; hence, fails to prepare students adequately for employment and future career. This might require university graduates who seek employment to undergo further training to gain adequate professional skills (Rauner, 2007).

Many engineers and technicians were not satisfied that their study was relevant to their job (Section 6.2.3.2.a). This can be said not to be surprising given that many technicians held secondary school certificate which does not prepare or qualify them fully for their jobs. As indicated earlier, students also reveal similar approach. Many engineers and technicians were also not content that knowledge and skills acquired during the study prepared them well to be professional engineers or technicians. It seems that Technical Diploma curriculum was not adequate enough to help them acquire the knowledge and skills required, or that this curriculum is not linked enough to the relevant industries. It is worth mentioning that 56.0% of the engineers and technicians sample held Technical Diploma Certificate, and 23.0% of them had secondary education certificate (see Chapter Six, Table 6.5). This is further evidence that study is based on traditional teaching methods and that courses attended should therefore be redesigned to help graduates obtain such knowledge and skills required for their employment.

As for learning independently, most engineers and technicians agreed they can learn independently; nonetheless, many were not; hence, this group of employees should be identified and offered further training on how they can manage to learn independently to expand their knowledge and skills in their field. This, however, does not mean that those who can do not need further training. To this effect, engineers and technicians need more access to the recent technologies and the Internet to further their knowledge and skills independently. Al-Sefaw and Al-Ahrash (2006) maintain that the most important transformations in Libya is expansion in the vocational and technical education, however, due to the recent establishment of this system of education it is still below the required standards in terms of using modern technologies.

Twati and Gammack (2006) also indicated that the use of technology in Libya is currently minimal, in spite of the fact that it is one of the wealthiest countries in Africa. Decades of strict rules on American exports to Libya and sanctions against Libya have led to minimum use of technology. Twati and Gammack (2006) indicated that Internet services in Libya are in the early growth stages, and according to the Internet World Stats (2004), Libya has one of the lowest penetration rates and one of the lowest percentages of Internet users in the Arab region. Nonetheless, Libya's growth rate of 1,500% in Internet use is high compared to other countries in the region, which indicates a change in the country's development of the Internet and its technology infrastructure that would affect the overall adoption and innovations of information system (Twati and Gammack, 2006). These recent development in the Internet technology might have facilitated the access of many of the respondents to learn new skills and knowledge independently. Decades of sanctions against Libya have participated to inadequate access to modern technology and the Internet.

On-the-job training was perceived by the majority of engineers and technicians as more effective than learning through academic institutions. This is not surprising given that on-the-job training is the most widely used by organisations and where employees can have at hand good training by their supervisors or peers within the context of their work environment and on appliances and technology they are in fact using daily at work. On-the-job training is an essential method in which people acquire relevant knowledge and skills at work (CIPD, 2007). It is an important means of advancing new recruits, developing apprentices or other long-term trainees, teaching staff new skills when new equipment and methods are introduced, and for updating and upgrading skills (Sloman, 2001). This indicates that on-the-job training is a multifaceted technique and involves a number of practices and procedures, rather than upgrading skills and knowledge of existing staff. Massie (1997) used the term on-the-job learning (OJL) to refer to on-the-job training (OJT). Massie refers to OJL as a multi-faceted technique, maintaining that it can be employed to "*provide new skills or to support used in the application of existing skills*" (p.138). He adds that OJL works with either one learner or several learners.

Many engineers and technicians did not perceive that subjects studied were relevant to their existing job. This is further evidence that the curriculum is not linked to industry to the required standards; hence, the curriculum needs to be redesigned such that it is linked to the industry and future career. Many others also disagreed that their study prepared them well

to globalisation and international business. This is further evidence of the weak link between TVET and industry and also further evidence of the traditional approach to studying engineering and technical subjects. This can also be linked to the consequences of the long sanctions against Libya. Zaabalawi (2007) notes that there is a considerable increase in the impact of globalisation on practising the profession; hence, he argues that engineering colleges should adopt standards derived from the international standards and in the meantime taking the national and regional aspects into consideration.

It can therefore be argued that the curriculum seems to be based on a traditional discipline and does not prepare well graduates for future employment; hence, it does not involve adequate preparation of engineering students for work after their graduation. Therefore, it can also be concluded that the curricula are not balanced from the view of knowledge, skills and values. Rowther (2008) argues that curricula should be balanced globally and internally, and it can be argued that while Libya has developed a national policy for HE and engineering and scientific research, such higher educational policy still needs further development and modernisation and curriculum redesign to better link study to industry and to help graduates meet economic and social developments in the twenty-first century.

7.5 Curriculum Delivery

Research findings analysed in Chapter Six (Section 6.2.4) show the most students were dissatisfied with the timetable design in relation to accommodating their needs. This is evidence for inappropriate timetable design and students not being involved in designing their timetable. This can be linked to the need for redesigning the timetable, such that it can better accommodate students' needs by involving students in designing the timetable. It is also possible that the design of departments and engineering colleges might be somewhat old and not appropriate for accommodating the increasing numbers of students entering these colleges in recent years; hence, it is unable to cater for students' needs, given that some students might need special attention, for example, disabled students and distant learning students.

Most students agreed that their tutors were available to help them. This is an important issue due to the fact that interaction between students and their tutors is well established as an important feature of the learning method (Watland, 2004). The literature (Anderson, 2003; Lentell, 2003; Garrison, 2000) clearly shows that this is one of the key concepts in

education as well as in open and distance learning (ODL) research. However, many students disagreed, possibly they have not come into contact with their tutors for reasons such as inappropriate timetable design; hence, they missed some of their lectures or tutorial sessions.

It seems from the findings (Section 6.2.4.c) that more students disagreed than agreed with tutorial sessions being appropriately allocated; this also links to inadequate timetable design relating to accommodating students' needs and with the unavailability of tutors to many students. To this effect, concerned departments need to involve students in timetable design to avoid any clashes in the timetable and to allow students get into contact with their tutors and help accommodate their needs.

Most students also maintained that study material were not available to them. This indicates that their libraries are short of such important materials, including text-books and journals. The Internet service in Libya is still in its infancy (Twati and Gammack, 2006); hence, not all students (and also lecturers) have full access to the Internet, given that Libya has very low Internet penetration rate and low percentage of users in the Arab World (Internet World Stats, 2004). The researcher believes that economic transactions imposed against Libya for almost three decades have contributed to this poor availability of study materials. This has resulted in reliance on old, some obsolete literature and denying students and staff to investigate and familiarise themselves with more recent developments in various spheres of knowledge.

Concerning the use of modern technology by lecturers to deliver their modules, almost half of the students maintained that their lecturers did not use such technologies, possibly depending on the institutions involved in the study. This ties up with the recent literature that TVET in Libya is still below the required standards in using modern technology (Al-Safaw and Al-Ahrash, 2006) and that the use of technology is nominal (Twati and Gammack, 2006). The researcher believes that such modern technologies should be available to both students and academic staff to help them in their study and in preparing lectures using most recent developments in their field of study. The researcher also believes that engineering practical work is currently more geared to using modern technologies to carry out experimental and applied work. It is also due to the UN sanctions that many

Libyan educational institutions could not have access to modern technologies. It is feasible that lifting of the sanctions would help Libya to have access to modern technology.

Research findings also indicate that many students disagreed or were not sure whether or not the delivery strategy has given them enough confidence to manage their study. This may point to the fact that student-centred learning has not been promoted by the institutions involved, mainly due to the shortage in the availability of study materials; hence, students depended on their tutors in providing lecture notes. This is consistent with the limited or poor access of students to modern technologies and that many of their lecturers experience such limited or poor access to such technologies. The concept of independent learning or student-centred learning has little place in the Libyan system (Alhmali, 2007); hence, knowledge is given or 'received' rather than being 'reflexive'. The literature indicates that the "active-learning, student-centred educational approach is built on cultural value of fairly democratic or egalitarian relations between adults and youth, and that active-learning, student-centred education is more along the lines of concepts of knowledge as socially constructed or "reflexive" rather than given or 'received' (USAID, 2006). Knowledge in the Libyan HE is given or 'received' rather than being 'reflexive' and the relationship between lecturers and students cannot be described as being democratic or egalitarian. This might be a reason for low agreement with this statement.

Many students either disagreed or were undecided that their laboratories are well equipped to deliver the practical part of the course; this is a matter of concern given that poor practical delivery of the courses is chronic in Libya (Alhmali, 2007; Al-Majdoub, 2001). Many students also disagreed that suitably and appropriately equipped lecture theatres/rooms are available. This might indicate that department buildings might have been designed some years ago without anticipating or taking into account future increases in the numbers of Libyans entering HE. According to Alhmali (2007), there are commonly not enough tools and facilities at some institutions (e.g., computers and laboratories). He argues that the place of new technology in education in Libyan institutions was not well integrated into classroom instruction. Collis (1993) argue that in Western European most students have access to computers and computer education is even compulsory in some European countries, such as the UK and Denmark. This suggests that access to a computer is important.

Kolari and Savander-Ranne (2000) suggest that laboratory work in engineering education can certainly influence students' learning skills and can also help in understanding important concepts in the course. However, laboratory procedures are vital learning tools in engineering and technology education that can be used to increase experimental instruction in engineering courses. As a result, laboratory accreditation is a very important and essential factor in the quality of engineering education (Patil, 2004). Patil also stated that engineering students need to be prepared for the increasing use of advanced and appropriate technology in their future workplaces.

Moreover, the education system lacked adequate facilities, such as libraries and laboratories, especially in the middle and high level of education with regard to the science sections (Agnaia, 1996; El-Magouri, 2005). Research findings also indicated that schools failed to support learners with diverse backgrounds, such as differences in learning abilities, interest in certain science subjects or mathematics.

With regard to engineers and technicians, more than half of them seem to indicate that the delivery methods of the curriculum they studied did not help them to be independent learners. This is further evidence that knowledge in the Libyan HE is given or 'received' rather than being 'reflexive, given that lectures are dictated to students due to the shortages of textbooks and other educational material that can help students read about their courses.

The majority of engineers and technicians indicated their agreement with the issue of part-time study and flexible delivery will encourage them to continue their study. Offering part-time study and flexible delivery of courses to employed staff will give them the space to pursue their study and increase and expand their knowledge and skills, as well as it will prompt them to change their attitudes and behaviours due to acquiring new knowledge and skills.

The majority of respondents also indicated that distance learning or e-learning over the Internet could be used to acquire the knowledge and skills required for the manufacturing industry. This vital issue has been investigated in the literature and can offer employees the chance to pursue their study or increase their knowledge and skills at their own time without leaving their jobs or homes. Sambrook (2003) argues the E-learning is frequently presented as a solution to training problems, such as, by helping to affect problems of accessing training in small organisations, or in remote or disadvantaged locations.

Sambrook also indicates E-learning may possibly be 'better' than traditional training given that it has the ability to offer custom-made learning, that is – customised to both the learners' knowledge and skills needs and their preferred learning style.

The majority of engineers and technicians also indicated that work-based learning is an effective way of acquiring the knowledge and skills relevant to their job. This is not surprising given that on-the-job training or learning is a major way to improve the quality of employee knowledge and skills while they are at work. Hutchinson, et al. (2001) stated that, some of the most valuable skills students can gain from WBL programmes include problem solving, communication, and team work. WBL programmes can enable students to get a general sense of a career area and through WBL programme could also enhance their personal and social competence. The literature (Hansson, 2007) clearly indicates that company-based training makes a key contribution to the whole investment in human capital stock. This issue has been recently addressed by the European Economic and Social Committee (2006). Engineering experiments can also be carried out using the Web and the Internet. According to Magoha (2002, p.213) the "*concept of Web-based experiments has revolutionised engineering laboratory and practical work.*" He adds that the idea is to perform real experiments in real time on real equipment, but over the Internet. The researcher believes that staff can join a course using distance learning institutions or e-learning centres over the Internet and study further without the necessity of leaving their jobs or homes to attend lectures and tutorials.

The majority of respondents also indicated that industrial placement is very useful for acquiring the employability skills. Velde and Cooper (2000) reported that students valued the workplace experience and perceived it as an opportunity for hands-on-experience, as part of preparation for work, developing a broader knowledge of work, and enhance their opportunities for employment. Likewise, Smith et al. (2002) recounted, in their longitudinal study of fifty-eight students who engaged in work placements in an engineering environment while still at secondary school, that placements had been successful in developing "*dispositional workplace knowledge that increases employability; development of informed choice about career pathways; transition into apprenticeships and further study*" (p.287). Davies (2000) argues that research has demonstrated that graduates trying to find their first employment do not have the personal, negotiable and employability skills that employers call for. Dearing (1997) recommended that students have to take on work

experience to resolve these shortcomings. Off-the-job learning is very important for the staff since this type of learning provide them with knowledge and skills that cannot be delivered at work; it allows trainees to study theoretical information or expose them to new and novel ideas (Beardwell and Holden, 1997).

The majority of respondents also maintained that short courses offered by HEIs are very useful in updating their knowledge and skills. This type of training or learning is also an off-the-job training. Off-the-job training is: "*Training provided away from the job site*" (Hodgetts and Kroeck, 1992, p.375), and can be provided by the organisation's training department, external education institutions, such as, universities, and training centres or training consultants. Organisations, however, tend to draw on external training providers rather than internal training providers for training their employees (Armstrong 2007). This type of training may be the only means to acquire knowledge required for certain jobs and off-the-job learning in the form of academic study or vocational training tends to form part of the employee specification for recruitment (Hackett, 2005). Beardwell and Holden (2007) maintain that this helps trainees to study academic information or exposing them to new and innovative ideas.

It can be argued that the curriculum was not well delivered and curricula need to be redesigned and delivered in a better way that qualify graduate to enter employment. The findings also indicated that TVET providers have not used a wide range of delivery methods.

7.6 Partnership with Industry

It seems evident that there is not much partnership between Libyan engineering HEIs and TVET institutions and the industry sector. This absence of partnership has led to preparing engineering and technicians for employment that does not exist or for specialisations not required by the industry sector. Literature concerning the Libyan HE system in general and TVET in particular has suggested that the system is suffering from a lack of appropriate planning mechanisms and procedures (Albadri, 2006 and 2007; Attir, 2006; El-Magouri 2005 and 2006; El-Hawat, 2003; Keibah, 1998; Alfaidy and Ibrahim, 1997; Mogassbi, 1984). This lack of planning considerations has subsequently produced to a number of inadequacies and limitations within the HE system.

To this effect, Keibah (1998, p.192) addressed the chronic mismatch between HE outputs and the actual demands and requirements of the labour market, indicating that any analyst of the performance of the Libyan economy in recent years can undoubtedly witness the emergence of job seekers' problem particularly among graduates of HE. He also argues that the obvious question arising in this case is how the phenomenon of job seekers in Libya can be describe in the light of demographic characteristics embodied in the following features:

(a) *The small size of the Libyan population and the small percentage of Libyan workers, which is about 22%,*

(b) *The proportion of the contribution of women in the labour force which does not exceed 25%, and*

(c) *The relatively higher proportion of non-Libyan employed in the labour.*

Keibah (1998) argues that this can only be attributed to a mismatch between the outputs of HE and the actual needs of the labour market, and if correct measures are not taken to solve this problem, it will become more acute in the coming years and consequently universities will be educational institutions graduating job seekers for jobs not available to them. He concludes that there needs to be a link between HE outputs and the needs of the labour market and that HE must be planned to meet the exact needs of labour market. Similarly, El-Hawat (2003, pp.391-395) discussed and commented on the lack of relationship between HEIs system in general and labour market, commenting that:

> *"The most important challenge facing Libya's system of education is its ability to adapt to the requirements of economic development in the relationship between the educational plan and the economy. For this reason, Libya has tried during the past few years to link higher education policies with those of development, the economy and the society. Policy makers have tried at least theoretically and render it part of the general development plan.....Nevertheless, despite this theoretical commitment, there is still disparity in the points of views of the educational planner and the economic planner."*

This situation of uncontrolled increase in the number of HEIs at the expense of qualitative outcomes can be strongly attributable to the absence of proper standards to link HE with relevant industry. According to Albadri (2006), the availability of such recommendations for a framework would provide planners and decision makers in the field on how to link HEIs and manufacturing industry. This clearly points to the gap between what students are taught in the classroom and real life perspective of students' current or future employment (Anamuah-Mensah et al., 2007).

The majority of students indicated that the course they study is not well linked to the relevant industry, which is an indication that the curriculum delivered is not well designed and that there is a rather poor link between course design by the HEIs and the relevant industry. This is in contradiction with the students' view that subjects studied are relevant for future profession as engineers. The literature (Zginin and Isawi, 2007) points to achieving linking specialism with labour market as one of the objectives TVET aspires to attain. It seems such aspiration has so far not materialised. Most of the students also disagreed that lectures delivered to them did not present case studies from industry. This is evidence of the weak linkage, if any at all, with the industry, and clearly demonstrates the poor or inadequate practical application of theory and the poor design of the curriculum. Students generally seem to have enjoyed visiting industrial sites relevant to their study. This is not surprising given that such visits would introduce them to the nature and types of work carried out in these sites, and also give them some practical insight of the job that they might have after graduation. Kamali (1997, p.325) studied the partnership of the Higher Colleges of Technology in the UAE with industry indicated that such partnerships have resulted in many benefits, given that they:

- *"ensure that the Colleges and their programmes keep close contact with international business/industry and this helps keep them up to date*
- *provide opportunities to give students, faculty and staff professional development training on advanced, state-of-the-art equipment, systems and practices*
- *help the Colleges develop a laboratory/knowledge resource equipped and/or staffed without cost to the College.*"

This can apply to the Libyan HEIs and through partnership with the relevant industries and sectors they can reap many benefits, including those mentioned above.

The majority of students expressed their aspirations to spend time on training in relevant industry to their study. Work placement is advantageous to students due to the fact that they would be directly involved in day-to-day work practices and procedures. Work placement will certainly increase students' knowledge and skills and qualify them professionally to enter the labour market after their graduation.

Many engineers and technicians indicated that TVET institutions played a key role in updating and enhancing their skills. This is not at all surprising given that the majority of

the respondents were technicians (79.6% of the sample). Off-the-job training of engineers and technicians in TVET institutions will help them obtain more knowledge, both theory and applied, as well as acquainting themselves with all recent developments in their field that would be helpful for them when they return back to work and also for their organisations. Benefits of off-the-job training have been discussed earlier in this chapter.

Most of the engineers and technicians agreed that hosting engineering and technician students in organisations will prepare them better for their future professional career. Students in this case will see at hand how the work is done and how the organisation operates. This will give them insight of the nature and type of work they might enter into after graduation.

Most of the engineers and technicians sample agreed that they did not consult TVET institutions to solve technical problem, develop new product or to enhance performance. This is further evidence of poor, or no linkage between HEIs and the industry.

The majority of respondents also indicated that have not kept any contacts with their college or university after their graduation. This indicates the absence of the alumni system, such as that in the UK, in which universities and college keep tract of their graduates and contact them on a regular basis. This seems an issue in the Arab World. Zaabalawi (2007) reports that engineering colleges graduate thousands of students every year; however, they lack the programmes to follow up these graduates such that they can improve or develop the situation of engineering colleges. He added that it should be benefited from the views of these graduates through the feedback concept.

The majority of engineers and technicians also agreed that placing lecturers in manufacturing organisations will improve their awareness of employers' requirements. This placement helps strengthen the ties and linkages between HEIs and the manufacturing organisations and also helps identify the type of graduates required by the relevant industries. Most of the respondents agreed that they will go back to college or university to study for a higher degree should an opportunity arises. This reflects the aspirations of many engineers and technicians to improve and further their career by obtaining higher qualifications that help their promotion within their organisations.

Accordingly, it can be said that there is poor, if any at all, linkage between the HEIs and the relevant industries. There is the need to employ several methods to help link HEIs (TVET providers) with the relevant industries.

7.7 Accreditation

Accreditation of engineering education programmes is a powerful tool to improve both academic quality and relevance for the job market. As indicated in Chapter Four (Section 4.2.5). Nor et al. (2008) maintains that accreditation provides quality control for engineering education, and assures that graduates of accredited programmes are prepared for professional practice.

Accreditation of engineering courses in Libya is vital for such courses as they will be the determinant factor in the quality of their graduates competitiveness and mobility within the industrial sector; especially that in recent times there had been a serious move towards privatisation of some of the organisations in the industrial sector. Privatised organisation would look at the quality of the graduates upon their recruitment and their suitability to work for such organisation since the private sector is not compelled to employ all graduates as is the case in the public sector in Libya. Edwards et al. (2009) reported that quality and accreditation of HE have confirmed to be at the focal point of the development of a European Higher Education Area (EHEA) and are deemed as an international determinant factor of the European competitiveness and mobility. Hence, accreditation is vital, as indicated above, for the competitiveness of the Libyan engineering colleges and programmes.

Research findings indicated that most students agreed that accredited courses increase their employability. This indicates the significance of accreditation of courses in delivering high quality accredited curriculum which will help students obtain employment.

Most engineers and technicians also agreed that graduates from accredited programmes have better employability chances. However, most engineers and technicians disagreed that graduates from accredited programmes have better pay/position. It may be that accreditation only result in good employability chances but not resulting in obtaining a better pay or a better job.

7.8 Quality Assurance

Considerable interest in quality assurance in educational establishments has emerged since the early 1990s (Colling and Harvey, 1995; Cullen et al. 2003). Nonetheless, regardless of the debate concerning quality globally, the concept of quality when applied to HE has been inconclusive (Sahney et al., 2004).

Quality assurance is a prevention-based system which advances product and service quality and increases productivity by focusing the emphasis on product, service and process design (Dale, 1999). Tam (2001, p.49) refers to quality assurance as: "*a system based on the premise that everyone in an organisation has a responsibility for monitoring and enhancing the quality of the product or service.*" Tam (2001) argues that when quality assurance is put in the university context, it calls for a whole-institution approach for an inclusive transformation to quality involving top-level commitment, followed by major and wide-ranging re-education of all staff. This transformation requires time, effort, and motivation of everybody in the institution to change to a culture which is quality-driven and ever-improving. According to Afeti (2007), quality should be seen as "fit for purpose". Quality that is fit for purpose is dynamic and improves as the purpose or the job to be done moves up to a higher level. Rafik (2009) argues that HEIs should make sure that the awards they offer are "Fit for Purpose" and that all stakeholders are satisfied with the quality of the learning experience offered by the institutions.

Many students thought that the services they receive from their university/college are not fit for purpose. This might indicate that services received by students were not up to the required standards, and reveal low standards of teaching and heavy reliance on theory-based instruction, and the content of the courses offered are not up to the desired standards.

Most students also indicated that published information about the university/college and courses are not accurate, which demonstrate that the curriculum is neither well designed nor well delivered. Many students further indicated that the published information about the University and the course is not very useful to help them decide to choose the course/modules to study. Most respondent students did not have access to regulations and processes to help them decide which courses/modules to study.

However, most students knew how to deal with problems, which might indicate the availability of facilities (for example, popular committees) and services to help them resolve their problems during the study.

Half of students agreed that they receive useful and timely feedback on their progress. This indicates that not all HEIs, departments, or modules involved in the study provide their students with useful and timely feedback concerning their progress. The majority of students agreed that their lecturers are knowledgeable in their subject areas. This indicates that lecturers know much about their subjects and deliver their lectures in a way that has motivated their students to take in the information conveyed during the lecture.

Many students agreed with the appropriateness of teaching methods; though many more were either not decisive or disagree with this issue. This may imply that teaching methods were not appropriate according to many students. Research findings also point to the different approaches to structuring and organising of lectures by the various modules taught. Research findings also indicate that many students are still reluctant to express their views about the lectures; possibly thinking that any criticisms would subject them to repercussions if they say something their lecturers do not like to hear.

The majority of engineers and technicians reported that quality assurance and enhancement processes are well documented. This may indicate that such processes are accessible by the company staff. Nonetheless, less than half of the respondent engineers and technicians agreed that these processed are well implemented. This clearly shows that while these processes are well documented they are not fully implemented by the company.

Research findings show that more than half of the respondent engineers and technicians were not satisfied with their work. They might be dissatisfied with their work, colleagues and/or supervisors. This is in line with Allen and Wilburn's (2002, p.23) argument that satisfaction is measured in response to three questions: "*those regarding satisfaction with work, satisfaction with co-workers, and satisfaction with supervision.*" However, it should be indicated that they present study did not attempt to identify the overall satisfaction of the respondent engineers and technicians.

Respondent engineers and technicians disagreed more than agreed that they have received regular feedback about their performance. This clearly indicates that the company does not

commit itself to provide their employees with feedback about their performance; hence, failing to identify the points of weaknesses of their employees. Feedback has a number of positive effects (see London, 2003, p.14, for the literature cited), including the following: "*Feedback influences future performance goals, essentially creating objectives for achieving higher levels of performance in the future. Employees know what they can do well, and how much better than can do if they try harder.... Feedback increases employees' abilities to detect errors on their own.*"

More engineers and technicians disagreed than agreed that they receive regular motivation and encouragement from their managers. This may link to respondents' disagreement with receiving regular feedback about their performance and clearly points to the breakdown of communication between employees and the management. To this effect, it can be argued that managers have not provided motivation and leadership. Lientz and Rea (2002, p.115) argue that "*managers have to provide motivation and leadership.*"

Respondent engineers and technicians also disagreed that procedures and processes are communicated well to them. This substantiates the researcher's view concerning the breakdown of communication between staff and management which seems to have negatively affected employees' satisfaction with their work.

Decision-making was not a transparent process, according to most respondents, indicating no role for the employees to play in the decision-making process, which highlights the highly bureaucratic and centralised nature of the company. It is evident that decision-making process in the company investigated is a rank-based practice, characterised as follows: "*Employee to-down, command-and-control management and decision making, where the few are treated and rewarded as leaders and the many are treated and rewarded as followers*" (Nielsen, 2004, p. 66).

As for dealing with problems, the majority of respondents indicated that they know where to go and what to do when having a problem. This is in line with the students' views.
Respondent engineers and technicians also more disagreed than agreed that they freely express their view of the management. This problem is persistent in many organisations, according to Katcher with Snyder (2007). Employees may not feel free to express their views about their managers for several reasons, including the fear of retribution, job insecurity, lack of management responsiveness, and uncaring organisational climate

(Katcher with Snyder, 2007), which may possibly apply for the respondents of the present study. Overall, it can be argued that the quality of services offered to students is poor.

7.9 Staff Development

Most students thought that their lecturers' knowledge and skill are up-to-date, and that they use modern teaching methods. Students, as well as engineers and technicians, referred to the essentiality of CPD and life-long learning.

Engineers and technicians also agreed that staff development system is effective in building workforce skills, possibly referring to the effectiveness of staff development in operation in building up their skills. This is reference to the importance of staff development and training. The power of staff development is of a great importance to support lecturers in making change (Tomlinson and Allan, 2000). Tomlinson and Allen (2000, p.78) argue that the literature shows that "*teachers who know a great deal about teaching and learning and who work in environments that allow them to know students well are a very powerful factor in determining student achievement – a far more powerful determinant than class size.*" Overall, it can be argued that the staff development is important to gain further knowledge and skills.

7.10 Cultural Aspects

Gender suitability to study engineering was not a key factor for students, given that 55% of them indicated that engineering is more suitable to men than women, in contrast to 45% of them who indicated otherwise. It seems that some female students agreed that engineering is more suitable for men than for women, given that female students represented slightly less than half of the respondent sample. However, for engineers and technicians, engineering was definitely more suitable for men than for women, given that almost all engineers and technicians were males, working for an industrial company.

Most students, engineers and technicians seem that they can identify wrong information delivered for them by their tutors or supervisors; hence, they did not do what their tutors or supervisors have asked them what to do. This indicates that students, engineers and technicians have been affected by the culture of the organisation and of the nation which prohibit doing wrong and where there is any improper information, people will not do that wrong thing.

Chapter Eight

Recommendations for a Framework to Strengthen the Link between TVET Providers and Manufacturing Industry in Libya

8.1 Introduction

In the previous chapter the main focus of the discussion has been on the overall themes identified in Chapter Six by students at the nine HEIs and engineers and technicians working for GCCI in Libya, which was selected as a case study in this research. In this chapter, however, an attempt is made to suggest recommendations for a framework to strengthen the link between TVET providers and manufacturing sector in Libya. The recommendations will be linked to the indicators discussed in Chapter Four.

The discussions and findings in the preceding chapters have provided evidence of the unplanned nature of the linkage between TVET institutions with the manufacturing industry in Libya. Obviously, when the TVET institutes were introduced in the country the focus of Government had been primarily on the quantitative aspects with not much concern given to qualitative aspects. Accordingly, TVET institutions appear not to have the required human and physical resources to support their learning/training programmes. Therefore, they do not produce adequate skilled graduates that meet the industry needs. As a result, attention must be focused on qualitative rather than quantitative expansion of TVET to help them graduate students with the skills needed by the labour market in general and manufacturing industry in particular.

Overall, results from preceding studies combined with the results of the present study have highlighted various limitations and shortcomings that significantly obstruct the operation and performance of the TVET. These shortcomings can be summed up as follows:

- **Strategies and policies:** it seems that there have been some attempts by some institutions to develop clear strategies and policies that promote collaboration between TVET providers and manufacturing industry. On the whole strategies and policies remain short of achieving such collaboration.
- **Infrastructure and facilities:** most of the HE in general and TVET in particular are suffering from inadequate buildings and other significant educational infrastructure, as

well as poor facilities (libraries, computer laboratories, workshops, laboratories and equipment). This situation might have resulted in students losing their confidence in the quality of their education.

- **Relevance to true needs:** evidently, there has been a chronic mismatch between the colleges' output and the true demands of the labour market. Also, there is a lack of relationship/cooperation between HE in general and TVET in particular and local business/industry.
- **Courses and instruction:** Most of TVET suffer from inadequate curricula, ineffective teaching/learning methods, and weaknesses in practical applications.
- **Accreditation:** Accreditation is important for both HEIs and students. It seems that not all engineering programmes have so far been accredited.
- **Quality assurance:** Services offered to students are not up to the required standard. Quality assurances processes at the workplace are not fully implemented.
- **Culture Aspects:** male dominance culture is still found in the Libyan workplace, where females are poorly represented in the workforce. However, such culture is not experienced at the educational institutions.

This unplanned situation, however, can be attributed to the unavailability of framework (Albadri, 2006 and 2007; Alfaidy and Ibrahim, 1997) that can be used to make accurate and meaningful decisions regarding the link between TVET institutions and manufacturing sector. It is clear that the availability of such framework would provide an effective method to assist planners and administrators in taking appropriate decisions in this regard.

8.2 The Main Components of the Recommendations for the Framework

The main components of the recommendations for the framework are derived from the research indicators as shown below:

8.2.1 Strategies and Policies

- A strategic approach by the Ministry of Higher Education, Ministry of vocational training, Ministry of Workforce, Ministry of Manufacturing and the Board of Commerce and Industry to promote, develop, spread and monitor strategies and policies for linking TVET providers and manufacturing industries.

- A committee considering graduates' recruitment must be established at national level, which should comprise representatives from all agencies concerned with the development of TVET. The function of this committee would be to study and monitor the problems of graduate recruitment on to TVET and to plan a systematic graduate recruitment programme, to be implemented according to the needs of all parties.
- Incentives for collaborative projects that link TVET providers with the manufacturing industries.
- Performance indicators to monitor the effectiveness of the Government strategies in linking the TVET with the manufacturing industries.
- Research and development forum to carry out research on new and innovative approaches to linking TVET providers with manufacturing industries.
- Educational policies need to take into consideration the combination of the quantitative expansion principle and the principle of controlling quality via a national programme for qualitative planning as a first step toward more specification and clarification of the educational objectives.

8.2.2 Curriculum Design

- The programme design should include industrial placement and live projects/case studies. To this effect, the concerned industries should provide places for students to work in the industries relevant to their specialisation in order to gain practical experience at the workplace.
- The academic programmes should be subjected to annual and periodical reviews to update the curriculum and evaluate performance. The industries should participate in such reviews to help finding out any loopholes in these programmes and to help resolving problems and close such loopholes as much as possible.
- Encourage the technical managers of the manufacturing industries to strengthen their links with TVET providers by hosting students, provide case studies, participating in developing the curriculum, facilitating site visits, etc.
- The manufacturing industries need to cooperate with TVET providers through their effective and proactive participation in the process of designing and developing

programmes that help TVET providers graduate the skilled and competent human resources required by these industries.

- Provide prizes for high performance students and staff. Relevant industries can take part in these activities and honour these students and staff.
- It is necessary to carry out a radical qualitative change in the Libyan curriculum such that the curriculum instead of being based on obsolete traditional methods to a curriculum that is based on providing students with contemporary knowledge and rapid advancements in information society. The relevant industries can help achieve such radical change given their experience of what they need in the future of graduates that would fit into their operations.
- It is also necessary to computerise learning and start teaching using English as the medium of instruction, provided that the Libyan education system should introduce teaching English from the lowest educational stages, given that English is main language used currently by the information society.
- Increasing the practical element in the curriculum and encouraging students to increase their knowledge and skills by following up any new developments in their fields and in information technology. Industries can play a significant role by providing industrial placement and live projects/case studies for students to increase their knowledge and develop their skills, as well as placements for staff as indicated earlier.

8.2.3 Curriculum Delivery

- The Secretariat of Education, the organisations and TVET colleges urgently need to review the current methods of teaching used, the instruction techniques employed by the instructors for the trainees, workshop provision, equipment, tools and materials provided in the vocational institutions.
- Introduction of part-time and flexible routes for learning. This can be achieved by offering part-time courses to employees in the industrial sector and in this context the relevant industries can play a major role in encouraging their employees to join these courses in order to obtain a higher degree.
- Encouraging work-based learning, and using new delivery methods like project based and problem based learning

- Introduce schemes for identifying and recognising learning achieved in informal ways.
- The inadequacy of the vocational training programmes and policies, the ad hoc training, absence of coordination between TVET providers and the industry, and the absence of a data bank of the labour market needs should be addressed properly in order to redesign the curriculum and deliver it appropriately to provide the labour market of its demands and needs of workforce. This can be achieved through the cooperation of the TVET providers, other governmental agencies concerned with vocational training and the relevant industries.
- The curriculum is delivered depending totally on university text-books which led to limiting students' and engineers' academic knowledge and preventing them from adopting the facility of academic and methodical research. TVET institutions should adequately address this serious problem by offering students and engineers a wide range of literature (academic and professional journals and text-books) and the computerisation of their libraries and laboratories to help students and engineers to access the Internet and search for any new developments in their field.
- The absence of a mechanism for the selecting of the teaching staff and monitoring the quality of their performance negatively affects the delivery of the curriculum. The TVET institutions should take the necessary measures.
- Introduction of summer terms in order to provide students with the recent developments technology and knowledge in order to increase their skills and prepare them for their future career. The relevant industries can play a major role in this field by participating in these courses in terms of providing case studies, and lecturers to take part in these courses.

8.2.4 Partnership with Industries

- Develop schemes for encouraging the formation of partnership between the TVET providers and the manufacturing industries. These could be in a form of sponsoring projects for knowledge transfer, research projects and sponsoring students.
- Share resources between TVET providers and manufacturing industries. For example, share the use of expensive equipment, use of experienced staff from the manufacturing

industry to give key lectures at TVET institutions, continuous development of staff through planned training programmes, etc.

- The parties involved must be provided with the opportunity to visit developed and developing countries, to acquaint themselves with the other training programmes in these countries, and so exchange ideas with their counterparts in these countries.
- Increasing training by cooperation with the private sector and industry, as well as with public sector institutions and granting academic training certificates for trained staff and students.
- Motivate the Higher Committee for Scientific Research to help undertake its role in coordination between research and HEIs and linking these institutions with the industry sectors.
- Review university admission policy within the context of creating new specialisms meeting the demands of the labour market and linking HEIs with the needs and requirements of the national, regional and global markets.
- Developing technical institutes and linking students with the labour market demands. The industrial sector can play a big role by offering technical institutes the opportunities of student and staff placement and undertaking live projects and case studies.
- Encouraging the private sector to participate and fund scientific research. Funding scientific research by industries is more financially economical to these industries given the available facilities and researchers at the HEIs that are not available at the industries or can be highly costly to the industries in terms of recruiting staff and equipping their workshops or laboratories with expensive equipment that might not be used later on.
- Linking academic staff members of the Colleges of Engineering and Technical Institutes, both with the labour market to benefit from their academic and professional expertise; and ultimately pass these benefits to their students.
- There should be an obvious methodology for integration between engineering colleges and technical institutes, on the one hand, and the labour market, on the other hand.

8.2.5 Accreditation

- Encourage the professional bodies to participate in the design and delivery of the academic programmes at TVET institutions. Industries concerned can contribute much

to this issue given the fact that they know their needs of skilled and competent human resources.

- ❖ Monitor and analyse the skills shortages in the manufacturing industries.
- ❖ Accredit the programmes that satisfy the skills need of the manufacturing industries.
- ❖ Participate in the design of academic programmes at TVET providers.

8.2.6 Quality Assurance

- ❖ Introduce system for quality assurance and enhancement. The experience of the industrial sector in this field can be advantageous in introducing such system.
- ❖ Clearly identify the roles and responsibilities of staff, the skills they need for carrying out their jobs and the means of gaining these skills and developing them.
- ❖ Adopting the quality of HE in order to evaluate the performance of universities and technical institutes and formulating systems to achieve quality and efficacy of the HE system.
- ❖ Reviewing of the programmes and curricula of universities and colleges and improving and developing their quality so as to become more oriented towards the needs of students and society and also to contribute to developing the skills of students and developing their innovative and creative capabilities and inculcating trust in themselves and preparing them for productive work.
- ❖ Adopting the system of quality assurance by the administrations of HEIs in order to realise raising their performance competencies and assuming their functions satisfactorily in the fields of preparing human resources, scientific research, and general cultural and intellectual activities.

8.2.7 Staff Development

- ❖ Raising the standards of the academic staff by providing them with high quality training programmes on most recent developments in teaching methods, to help them use these methods in their lectures.
- ❖ Encouraging and developing academic research in line with the development in this field at the global level.

- ❖ Giving academic staff the choice to research and to contact industries relevant to their field of specialisation and obtaining grants to undertake research that would benefit both the academics and the relevant industries.
- ❖ Encouraging academic staff to use modern technology in teaching, research and vocational training by providing the hardware and software necessary to undertake such activities.
- ❖ Encouraging academic research and postgraduate studies through the restructuring of the academic research units in universities and consolidating the links between university research centres and industry sectors, especially industries seeking the cooperation of universities to undertake research.

8.2.8 Culture Aspects

- ❖ Formulating a clear vision for the role of women in engineering, given the important role of engineers in the national development plans. Industries can help achieve this vision by offering equal opportunities of employment and not being biased to recruit males only on the premise they are more suitable for their type of work.
- ❖ Customs, traditions and other aspects of social behaviour have led to overlooking the importance of increasing the participation of women in the labour market, and concentrating women to work in the public administrative agencies or in teaching. It is required that policies should be formulated to encourage women in working in engineering and technical jobs after their graduation and to provide women with equal opportunities with men to work and participate in production sector.

8.3. Framework Suggested for Linking TVET Institutions with the Industry

The study findings indicated that at present the link between TVET institutions (providers) and the industry sectors (users) is unplanned. TVET institutions produce graduates (human resources) that are not much meeting the industry needs of such human resources. This clearly indicates that there is a gap between TVET output and industry requirements. It is therefore necessary to link both providers and users to close, or at least, narrow the gap between them. Closing or narrowing the gap can be achieved through planned linkage

between providers and users, in liaison with employment agencies (Ministry of Higher Education, Ministry of vocational training, Ministry of Workforce, Ministry of Manufacturing and the Board of Commerce). The parties concerned need to establish joint committees to meet regularly in order to identify industry current and future requirements of workforce. Through discussions in such meetings study programmes can be designed and formulated according to the industry needs given that such programmes would be capable of graduating qualified and competent workforce to meet industry needs of workforce. Study programmes should be designed in conformity with the following themes, which formed the basis of the present study: Strategy and Policy, Curriculum Design, Curriculum Delivery, Partnership with Industry, Accreditation, Quality Assurance, Staff Development, and Culture Aspects. The framework suggested is presented graphically in Figure 8.1.

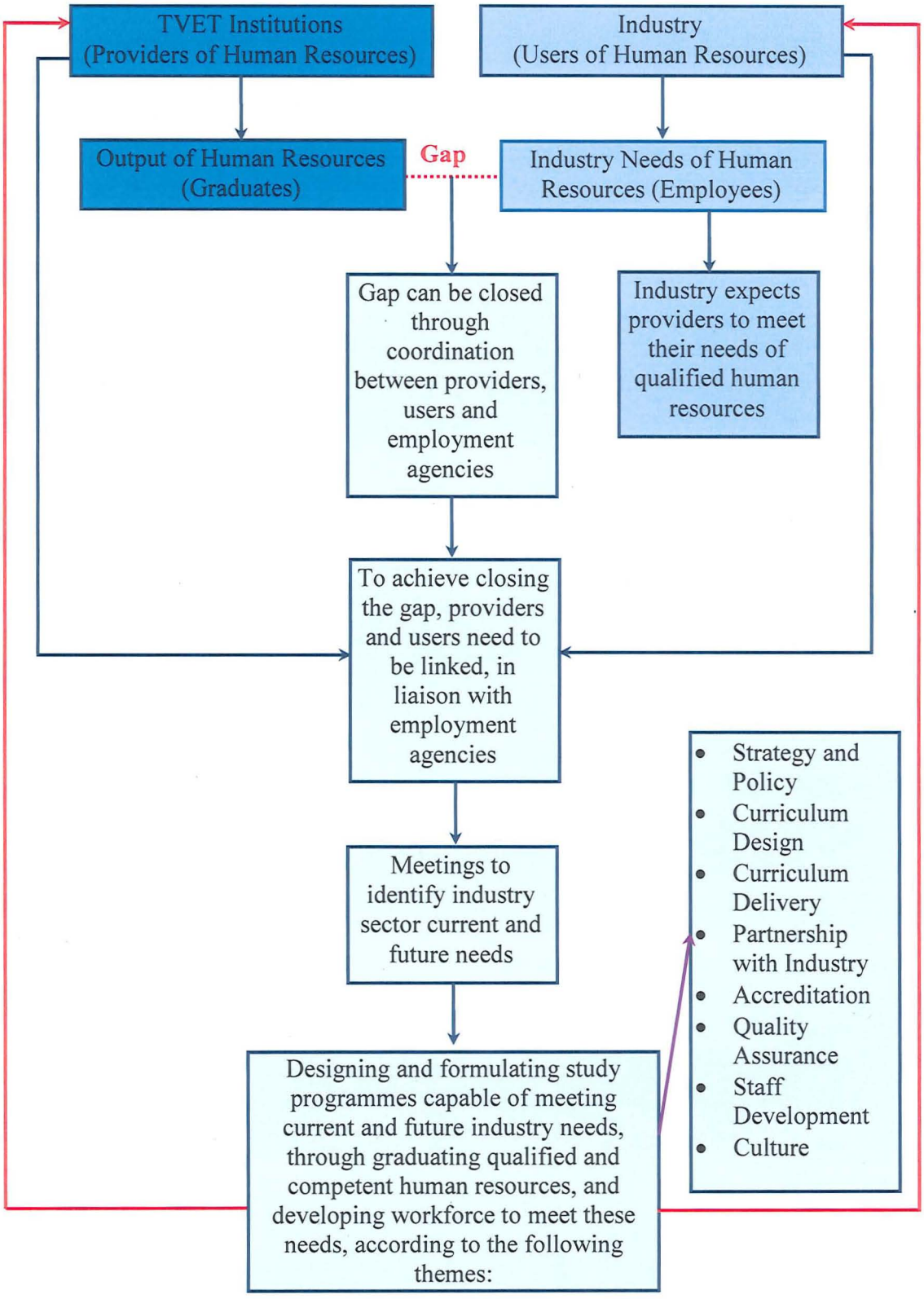


Figure 8.1: Proposed framework to link TVET providers with industry

Chapter Nine

Conclusions and Recommendations

9.1 Introduction

This chapter provides conclusions and recommendations of the research, and possible directions for further research will be suggested.

9.2 Conclusions

In Libya there is still a poor linkage between HEIs and the chemical industry, and there is little coordination between the two parties in order to provide the industry with the required skilled human resources.

The main findings of the research have revealed that HE system in Libya in general and TVET in particular suffer from random and lack of appropriate planning mechanisms and procedures. This situation has led to a mismatch between the graduates of TVET and the demand of the chemical industry. These findings are in close agreement with results from several previous studies concerning the Libyan HE in general and TVET in particular. The main findings of the research can be summarised as follows:

- Developing planning in general and HE planning in particular have long been based and formulated on more theoretical than practical considerations. In other words, it is often based on traditional objectives planning and not on problem-based planning approach. This lack of planning mechanism and procedures has affected the overall performance of HE system in general and TVET in particular.
- The absence of clearly defined philosophy and objectives on HE system. This has led to haphazard planning and improvisation of the establishment of the relationships and Links between TVET Providers and users are still very weak. In addition, such education was not in a position to prepare the graduates with the skills for current employment as well as the organisations' skills needs require other vocational training than that which vocational graduates are currently receiving.

- The growing dominance of humanities and social sciences fields at the expense of pure and applied academic fields. This situation probably, contributed to chronic mismatch between HEIs outcomes and the skills required by the national labour market.
- Despite significant improvements in Libyan TVET system, there is still a lack of strategic vision and alignment of HRD strategies to the national development plan;
- The curriculum in TVET providers is designed in isolation of stakeholders' input and it is poor in the practical part, as well as most of the curriculum is imported from other foreign institutions without taking the local needs into account;
- The delivery of the curriculum is mostly based on traditional classroom fashion and very little has been done to promote new innovative delivery methods;
- Links between TVET providers and users (manufacturing industry) are very weak and most of the academics are lack of the industrial experience;
- The inadequacy or unavailability of career counselling and job placement services as well as an absence of work experience/training programmes prior to graduation.
- Lack of information regarding employment prospects available to students after graduation.
- Lack of coherent staff development strategy that is aligned to the organisational aims and objectives as well as little concentration is paid to continuous professional development and lifelong learning.
- Lack of formal quality assurance and enhancement policies.
- There are many cultural factors which strongly affects the TVET system. These include the perception of engineering profession, female engineers, social factors which are based on strong family and tribal ties.
- Low percentages of those in the manufacturing industry who are approaching their retirement age due to their small numbers and the increases in the number of young workforce.
- There is a poor participation of HE outputs to the manufacturing industry despite the large numbers of graduates.

This gives indication that although the Libyan society has recently realised the utmost importance of TVET programmes in providing the highly qualified manpower urgently needed. The problem, however, lies in the tools, methods and processes that are used in the implementation and evaluations of such human developmental programmes.

9.3 Recommendations

The conclusions drawn from this research have important policy implications for HE programmes in general and TVET in particular. Therefore, on the basis of the research results some recommendations can be suggested as follows:

The recommendations can be suggested as follows:

- The colleges of engineering and TVET institutions should review their curricula, and also the delivery of these curricula to make them fit for the requirements of industrial sector, and offer their students programmes and courses that are linked to the relevant industry.
- Staff and students of the engineering colleges and TVET institutions should have more access to the Internet and technological advancements in their fields to help them increase their knowledge and upgrade their skills.
- Engineering colleges and TVET institutions should act positively towards obtaining accreditations from known organisations in Europe, the UK and the USA.
- The services offered to students should be of a high quality to help graduate with the knowledge and skills required by the relevant industry.
- TVET should establish links with local manufacturing sector and find out ways of coordination between the provided programmes and employers' requirements. This kind of coordination will undoubtedly, enhance future employment opportunities for students enrolled in TVET, on one hand, and bridge the gap between supply and demand of local labour market, on the other hand.
- To handle the uncertainty of employment prospects among graduates, TVET institutions should introduce career counselling and a job placement service. Such a service is considered a crucial tool that links the colleges with the outside environment. In other words, information on employment opportunities for vocational graduates

should be made available on a regular basis to the students in vocational institutions. Such career counselling services is an important tool in providing students with the needed information about work opportunities.

- Authorities at both national and local levels should be equally concerned with providing the TVET institutions with the adequate physical and human resources (buildings, labs, workshops, instructors, etc.) to enhance practical programmes, and consequently enhance the outputs in accordance with the needs of the manufacturing sector.
- The participation of females in the manufacturing industry should be increased to utilise the available human resources in an optimal way.
- TVET institutions should consider enriching the curriculum with key and transferable skills to increase the workforce mobility.
- Manufacturing organisations should provide incentives for workers who normally live far from the organisations. This will encourage more job applicants to apply which, in turn, will improve the workforce mobility.

As regards the academic/industry interaction, and based on the proposed framework (Figure 8.1), the following are recommended in order to relate to other countries' models:

- In the UK and Germany, the universities and TVET institutions (providers) have regular consultations with the employers (users) to keep up to date with changing needs of the industry. This helps these institutions design their curricula and courses that are useful to employees and employers. The mechanism for regular consultations is to establish and industrial advisory board (see Table 2.1 concerning the UK skill advisory boards) consisting of members from academic and industry and hold regular meeting of the board. This is good practice and is recommended to be adopted by the Libyan TVET providers and the relevant industry sector (the users).
- The study revealed that there is a mismatch between supply and demand for technical staff and engineers. To overcome this mismatch, it is important that the curricula are to be developed and designed by involving the TVET providers, the industry sectors and the Ministry of Higher Education and other governmental agencies in this process. The mechanism to involve representatives of all these parties provides the venue for TVET providers/industry interaction. This has been adopted in the UK and Germany and also in some developing countries, including Malaysia and South Korea. This is also a good

practice that must be implemented by the Libyan TVET providers to avoid current mismatch between supply and demand.

- Another mechanism to help overcome the mismatch between supply and demand is that of establishing centres of excellence within the higher education institutions, as is the case in the UK. These centres, in collaboration with the industry, help increase academic/industry interaction by identifying the industry needs of qualified and competent human resources. This mechanism also helps identify courses and programmes relevant to the industry. It is recommended that centres of excellence are to be established within the Libyan Universities and TVET institutions.
- Student visits to industry as part of their study is a mechanism adopted by many countries, including the UK, Germany, Malaysia and North Korea, to give students some practical idea of the nature of employment they might enter after graduation. This mechanism is recommended in the case of the Libyan higher education institutions. These visits offer good understanding of the industry and provide students with some practical experience needed for their future career.
- It is recommended that lecturers to be placed in industries relevant to their specialisation. This will help lecturers to work within such industries and promote the academic/industry interactions.
- In the UK universities and TVET institutions, representatives from the industry are invited to deliver lectures or seminars on issues relating both to the industry and the higher education institutions. This mechanism should be adopted by the Libyan universities and TVET institutions.
- The German 2+1 system, also adopted by many developing countries, for example, Korea and Malaysia, should be adopted by TVET providers. This helps provide the labour market with its needs of technical staff.

9.4 Areas for Further Research

Due to the lack of previous research and empirical studies in this area of TVET in Libya, neither changes nor trends about it can be observed. Therefore, it is suggested that similar research be conducted in the future. However, since this research is exploratory in nature, it raises several interesting research issues. Therefore, in the light of the research findings,

several areas for future research are suggested. Although, research data within these areas is limited, however, implications are potentially significant. As a result of this study, the following areas have been identified as meriting further investigation and studies:

- The study covered only chemical industry sector. It is suggested that future research should involve more than one sector, such as the oil and the construction sectors, and involve more universities and TVET institutions in different geographical areas of Libya.
- It is also suggested that future work should combine both quantitative and qualitative methodology; that is, implementing triangulation, since this will generate more reliable and in-depth data and information.
- Relevant discussions and research provide signs of long presence of negative attitude towards manual work in Libya. Also, there is a general tendency among Libyan society to attach less importance to TVET streams. Number of students at TVET institutions is relatively small compared to those at universities (about 29% in 2000) which the findings of this research also showed (61% BSc. and 39% Technical Diploma) which indicates that students prefer to enrol at universities rather than TVET institutions. This issue obviously is of importance and deserves more attention from researchers and policy analysts to explore factors and circumstances that contribute to the society misjudgment of TVET programmes.
- There is a need to investigate the role of females in economic development in general and the reasons behind the low contribution of female in manufacturing industry in particular.

Finally, it is hoped that the implementation of the above recommendations and suggestions will explain the process of TVET and will thoroughly improve the training programmes by improving the quality of training and establish an effective link between TVET and the manufacturing industry.

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Appendix A: Students Questionnaire Design

Questionnaire Concerning Technical and Vocational Education and Training in Libyan Higher Education Institutions

Dear Student,

Peace, mercy and blessing be upon you.

My name is Nuri Triki and I am currently studying for PhD. at the University of Wales, Institute Cardiff (UWIC) in the UK. My PhD. research is on investigating the match between the skills and knowledge provided by the Libyan Higher Education Institutions and the needs of the national and international manufacturing industry. An important part of my research is to critically analyse the students' perception of the skills and knowledge they are acquiring during their study at the Engineering Departments in different Libyan HE Institutions and the relevance of these to their future profession. Therefore, I need your help in filling the attached questionnaire.

I would like to assure you that all the data collected from this questionnaire will be used for academic research only and will be strictly confidential and no names will be recorded. We hope that the findings and recommendations of this research will provide useful information to policy makers and senior managers to enhance Engineering and Technical Education and Training in Libya and develop workforce suitable to the job market both nationally and internationally.

Finally, I would like to extend my thanks and gratitude for your time and effort in completing this questionnaire.

Yours truly,

Nuri Triki

General Information (for researcher use only)

Institution Details

Name of the Institution	
Address of the Institution	
Name of the Faculty	
Number of Student in the Faculty	
Number of Academic Staff in the Faculty	
Qualifications Offered	
Qualifications Accredited by Professional Bodies (if any)	
Entry Requirement	

Start of the Questionnaire

Student's Details

Gender	Male/Female
Age	
What qualification will you obtain upon completion of your study?	
Is your study Part Time or Full Time	Part Time / Full Time
What is the profession of your Father	
What is the profession of your Mother	

Please indicate the extent to which you agree or disagree with each of the following statements by tick the appropriate number according to the following scale where:

1	2	3	4	5	6
Strongly disagree	**Disagree**	**Slightly disagree**	**Slightly agree**	**Agree**	**Strongly agree**

Section One: Strategies and Policies:

		1	2	3	4	5	6
Q1	I received full information about the institution I am studying in now before I decided to apply to it.						
Q2	I received full information about my intended study and job opportunities after graduation.						
Q5	I am interested in playing an active role in the University's Committees and participate in shaping the policies and strategies of the University.						
Q6	My voice is listened to and considered respectably by the University management.						

Q3. My decision to apply to this University/College was based on:

Its reputation ☐
Programme of Study ☐
Proximity to home ☐
Good employability ☐
Pressure from parents ☐
Pressure from friends/relatives ☐
Others (please specify) ----------

Q4. My decision to study Engineering was based on:

- My personal interest ☐
- Parent's Pressure ☐
- What my National Baccalaureate results allowed me to ☐
- Good social status for graduates of Engineering ☐
- Good pay for Engineering graduates ☐
- Easy to find a job ☐
- Easy to work abroad ☐
- Others (Please specify) ----------

Section Two: Curriculum Design:

		1	2	3	4	5	6
Q7	I can relate the subjects I am studying to my future profession as an engineer.						
Q8	I think the subjects I am studying prepare me well to be an Engineer.						
Q9	The breadth of the knowledge and skills offered by my course qualifies me to be a successful Engineer.						
Q10	The depth of the knowledge and skills offered by my course qualifies me to be a successful Engineer.						
Q11	The balance between theoretical and practical sessions is appropriate.						
Q12	The assessment strategy for the course is appropriate.						
Q13	The modules of study are nicely linked and appropriately progressed from one level to another.						
Q14	The curriculum covers well employability issues and career advice.						

Section Three: Curriculum Delivery:

		1	2	3	4	5	6
Q15	The time table is appropriately designed to accommodate my needs.						
Q16	My tutors are available to help me when I need help.						
Q17	Tutorial sessions are appropriately allocated.						
Q18	All necessary study materials related to my course are available in the library.						
Q19	Lecturers use modern technologies in the delivery of their modules.						
Q20	The delivery strategy gives me enough confidence to manage my own study (promotes student-centred learning).						
Q21	The laboratories are well equipped to deliver the practical part of the course.						
Q22	The lecture theatres/rooms are suitable and appropriately equipped.						
Q23	My school provides additional support to learners with diverse background.						

Section Four: Partnership with Industry:

		1	2	3	4	5	6
Q24	The course is well linked to the relevant industry.						
Q25	Lecturers present case studies from industry in the delivery of the course.						
Q26	I enjoy visiting industrial sites that are relevant to my study.						
Q27	I like to spend time on training in relevant industry as part of my study.						

Section Five: Accreditation:

		1	2	3	4	5	6
Q28	Accredited courses increase the employability of graduates.						

Section Six: Quality Assurance:

		1	2	3	4	5	6
Q29	The service I am receiving from the University/College is fit for purpose.						
Q30	The published information about the University and the Courses are accurate and up to date.						
Q31	The published information about the University and the Course were very useful to make me decide to choose the course/modules I would like to study.						
Q32	All the relevant information regarding the University/College regulations and processes are easily accessible.						
Q33	I know where to go and what to do when I have a problem.						
Q34	I receive useful and timely feedback on my progress.						
Q35	The lectures are knowledgeable in their subject areas.						
Q36	The lecturers teaching methods are appropriate to the subject area.						
Q37	The lectures are well structured and organised.						
Q38	I can express my views to the lecturers easily.						

Section Seven: Staff Development:

		1	2	3	4	5	6
Q39	The lecturers' knowledge and skills are up to date.						
Q40	The lecturers use modern teaching methods.						
Q41	Continuous professional development and Life Long Learning are essential in the 21st century.						

Section Eight: Culture Aspects:

		1	2	3	4	5	6
Q42	Men are more suitable to study Engineering than Women.						
Q43	I should always do what my tutor asked me to do even if I think it is wrong.						

Q44. Below is a space in which you can provide any other ideas that you think might be useful for improving your experiences as a student and as a learner.

After completion, please hand this questionnaire to the researcher for processing and safe storage

Thank you for your time and co-operation in completing this questionnaire

Mr. NURI TRIKI
Tel. 0912121618; 0913209040 (Libya)
Email: altriki72@yahoo.com

Appendix B: Engineers and Technicians Questionnaire

Questionnaire Regarding Skills and Knowledge in Libyan Manufacturing Organisation

Dear Brother/Sister,

Peace, mercy and blessing be upon you.

My name is Nuri Triki and I am currently studying for PhD. at the University of Wales, Institute Cardiff (UWIC) in the UK. My PhD. research is on investigating the match between the skills and knowledge provided by the Libyan Higher Education Institutions and the needs of the national and international manufacturing industry. An important part of my research is to critically analyse the views of Engineers and Technicians working in manufacturing industry about the education and training they received before joining the organisation. Therefore, I need your help in filling the attached questionnaire.

I would like to assure you that all the data collected from this questionnaire will be used for academic research only and will be strictly confidential and no names will be recorded. We hope that the findings and recommendations of this research will provide useful information to policy makers and senior managers to enhance Engineering and Technical Education and Training in Libya and develop workforce suitable to the job market both nationally and internationally.

Finally, I would like to extend my thanks and gratitude for your time and effort in completing this questionnaire.

Yours truly,

Nuri Triki

General Information (for researcher use only)

Organisation Details

Name of the Organisation	
Address of the Organisation	
Total Number of Staff	
Funding	Private/Public

Start of the Questionnaire

Your Details

Nationality	Libyan/Arabic/African/Asian/Others
Gender	Male/Female
Age	
Qualifications	
How long you have been in this job?	
Is this your first job after graduation?	

Please indicate the extent to which you agree or disagree with each of the following statements by ticking the appropriate number according to the following scale where:

1	2	3	4	5	6
Strongly disagree	**Disagree**	**Slightly disagree**	**Slightly agree**	**Agree**	**Strongly agree**

Section One: Strategies and Policies:

		1	2	3	4	5	6
Q1	The organisation's aims, objectives, priorities and goals are clear and communicated well to us.						
Q2	The role of my Department/Section is very clear in the organisation structure.						
Q3	My role, duties and responsibilities are well defined.						
Q4	I receive regularly full information about the company and its performance.						
Q5	All the organisation's policies are well communicated to us.						
Q7	I am interested in playing an active role in the company's committees and participate in shaping the policies and strategies of the company.						
Q8	My voice is listened to and considered respectably by the company management.						

Q6. My decision to apply to this company was based on:

- Its reputation ☐
- Availabilities of professional development programme ☐
- Proximity to home ☐
- Good promotion and incentives opportunities ☐
- Good Salary ☐
- Others (please specify) ----------

Section Two: Education and Training before Employment:

		1	2	3	4	5	6
Q9	My study equipped me well with the knowledge and skills which required by the engineering profession.						
Q10	The knowledge and skills I gained during my study prepared me well to be a professional Engineer/Technician.						
Q11	I am confident to learn new skills and knowledge independently.						
Q12	I found on-job-training much more effective than learning through academic institutions.						
Q13	I can relate most of the material I studied to my current practice.						
Q14	My study prepared me well on issues related to globalisation and international businesses.						

Section Three: Delivery of Education and Training:

		1	2	3	4	5	6
Q15	The delivery methods of the curriculum I studied helped me to be independent learner.						
Q16	Part time and flexible delivery will encourage more staff to continue studying to gain new knowledge/skills.						
Q17	Distance learning or e-learning over the internet could be used to acquire most of the knowledge and skills needed for the manufacturing industry.						
Q18	Work-based Learning is an effective way of acquiring most of the skills and knowledge which required by the engineering profession.						
Q19	Industrial placement is very useful for acquiring employability skills.						
Q20	Short courses offered by HE Institutions are very useful in updating my skills and knowledge.						

Section Four: Partnership with Higher Education Institutions:

		1	2	3	4	5	6
Q21	TVET Institutions play a key role in updating and enhancing our skills.						
Q22	Hosting Engineering and Technician students in my organisation will prepare them better for their future professional career.						
Q23	We often consult with TVET Institutions to solve technical problem, develop new product or to enhance performance.						
Q24	I kept my contacts with my College/University after graduation.						
Q25	Placing lecturers in manufacturing organisation will improve their awareness of employers' requirements.						
Q26	I will go back to College/University to study for higher qualification if opportunity arises.						

Section Five: Accreditation:

		1	2	3	4	5	6
Q27	Graduates from accredited programmes have better employability chances.						
Q28	Graduates from accredited programmes have better pay/position.						

Section Six: Quality Assurance:

		1	2	3	4	5	6
Q29	Quality assurance and enhancement processes are well documented.						
Q30	Quality assurance and enhancement processes are implemented well.						
Q31	I am satisfied with my work at this organisation.						
Q32	I get regular feedback on my performance.						
Q33	I get regular motivation and encouragement from my managers.						
Q34	All the procedures and processes are communicated well to staff.						

Q35	The decision-making process is transparent.						
Q36	I know where to go and what to do when I have a problem.						
Q37	I can express my views to the management freely.						

Section Seven: Staff Development:

		1	2	3	4	5	6
Q38	The staff development system is effective in building up the skills of the workforce.						
Q39	Continuous professional development and Life Long Learning are essential in the 21st century.						

Section Eight: Culture Aspects:

		1	2	3	4	5	6
Q40	Men are more suitable to work at manufacturing industry than Women.						
Q41	I should always do what my supervisor asks me to do even if I think he/she is wrong.						

Q42. Below is a space in which you can provide any other ideas that you think might be useful for improving your experiences as a Technician and Engineers in the manufacturing company.

After completion, please hand this questionnaire to the researcher for processing and safe storage

Thank you for your time and co-operation in completing this questionnaire

Mr. NURI TRIKI

Tel. 0912121618; 0913209040 (Libya)

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The Arabic Translation of the Questionnaires

Appendix C: The Arabic Translation of Student Questionnaire

أستبيان بشأن التعليم التقني والتدريب المهني في مؤسسات التعليم العالي الليبية

أخي الطالب / أختي الطالبة ،

السلام عليكم ورحمة الله وبركاته

إنا الطالب نوري التريكي وأعمل حالياً في التحضير لرسالة الدكتوراه في جامعة ويلز ، كاردف (يووك) في المملكة المتحدة. بحث الدكتوراه الذي اعمل عليه يتناول دراسة العلاقة بين المهارات والمعلومات العلمية المقدمة من قبل مؤسسات التعليم العالي للجماهيرية واحتياجات الصناعة الوطنية والدولية. الجزء الهام في هذا البحث هو تحليل نقدي لتوقعات الطلاب للمهارات والمعارف التي تكتسب اثناء دراستهم في مختلف الكليات والمؤسسات الهندسية والتقنية في الجماهيرية وأهميتها بالنسبة لمستقبلهم المهني. ولذلك ، أنا بحاجة الى مساعدتكم في ملء الاستبيان المرفق.

أود إن أؤكد لكم إن جميع البيانات التي سيتم جمعها من هذا الاستبيان سوف يتم أستخدامها بشكل صرف للبحوث الأكاديمية فقط وستعامل بسرية تامة ولن تذكر أسماء المشاركين. كما آمل أن نتائج وتوصيات هذا البحث سوف توفر معلومات مفيدة لصانعي القرارات والسياسات العليا وكبار المديرين من أجل تعزيز التعليم الهندسي والتقني والتدريب في الجماهيرية العظمى وتطوير القوى العاملة لجعلها مناسبة لسوق العمل ، على الصعيدين الوطني والدولي.

وأخيراً ، أود أن أعبر عن شكري وإمتناني لوقتكم وجهدكم المبذولين في إنجاز هذا الإستبيان.

مع خالص الشكر،

نوري التريكي

معلومات عامة (تملأ من قبل الباحث فقط)

معلومات عن الكلية

أسم الجامعة / المعهد	
عنوان الجامعة / المعهد	
أسم الكلية	
عدد الطلاب في الكلية	
عدد الموظفين الأكاديميين في الكلية	
الدراسات المتوفرة	
الشهادات المعترف بها من قبل الهيئات المهنية	
شروط الدخول	

بداية الاستبيان

معلومات عن الطالب/الطالبة

الجنس	ذكر / أنثى
العمر	
ما هي المؤهلات التي ستحصل عليها عند إتمام دراستك؟	
هل دراستك هي بدوام جزئي (نصف دوام) ام بدوام كامل الوقت؟	نصف دوام / دوام كامل الوقت
ما هي وظيفة والدك؟	
ما هي وظيفة والدتك؟	

الرجاء الإجابة بوضع علامة صح على الرد الملائم على الجمل الاتية وفق المقياس التالي:

1	2	3	4	5	6
أختلف بشدة	أختلف	أختلف قليلاً	أتفق قليلاً	أتفق	أتفق بشدة

الباب الاول : الإستراتيجيات والسياسات:

		1	2	3	4	5	6
س[1]	وصلتني معلومات كاملة عن الكلية قبل أن أقرر التقديم فيها.						
س[2]	وصلتني معلومات كاملة عن الدراسة التي أقوم بها الآن ومجالات العمل بعد التخرج.						
س[5]	أنا مهتم في القيام بدور نشط في إتحاد الجامعة/المعهد والمشاركة في صياغة السياسات والإستراتيجيات للجامعة/المعهد.						
س[6]	صوتي مسموع ويُأخذ بنظر الاعتبار من قبل ادارة الجامعة/المعهد.						

س[3]. قراري بتقديمي لهذه الجامعة / المعهد كان يعتمد على:

سمعة الكلية ☐
برنامج الدراسة ☐
القرب من المنزل ☐
مجال توظيف جيد ☐
ضغط من قبل الأهل ☐
الضغط من قبل الأصدقاء / الاقارب ☐
أسباب اخرى (يرجى ذكرها) ----------

س[4]: قراري بدراسة الهندسة كان يعود الى :

اهتماماتي الشخصية ☐
ضغوط من قبل الأهل ☐
نتائجي لامتحانات البكالوريا هي التي حددت لي هذا الأختصاص ☐
المركز الاجتماعي الجيد لخريجي الهندسة ☐
الرواتب الجيدة المدفوعة لخريجي الهندسة ☐
سهولة العثور على وظيفة ☐

سهولة العمل في الخارج
أسباب اخرى (يرجى ذكرها)

الباب الثاني : تصميم المناهج:

		1	2	3	4	5	6
س7	أستطيع ان أربط العلاقة بين المناهج التي أدرسها حاليا ومهنتي كمهندس مستقبلا.						
س8	أعتقد ان المواضيع التي أدرسها حاليا تمهدني بصورة جيدة لأكون مهندساً / فنياً جيداً.						
س9	البرنامج الدراسي للكلية في مجال دراستي واسع ويشمل جميع النواحي العلمية والمهنية المطلوبة لجعلي مهندساً / فنياً جيداً.						
س10	عمق البرنامج الدراسي للكلية في مجال دراستي يشمل جميع النواحي العلمية والمهنية المطلوبة لجعلي مهندساً / فنياً جيداً.						
س11	التوازن بين المحاضرات النظرية و المحاضرات العملية هو ملائم.						
س12	الأستراتيجية المتبعة للبحوث هي ملائمة.						
س13	المواد الدراسية هي مرتبطة بشكل رائع وعملية الانتقال من مستوى الى آخر مناسبة.						
س14	المنهج يغطي قضايا التوظيف والنصائح المهنية بصورة جيدة.						

الباب الثالث: منهج التسليم:

		1	2	3	4	5	6
س15	الجدول الزمني صمم بطريقة ملائمة لإستيعاب إحتياجاتي.						
س16	الأساتذة موجودون لمساعدتي عندما أكون بحاجة الى مساعدة.						
س17	دروس الإرشاد والتقوية موضوعة بصورة مناسبة .						
س18	جميع المواد الضرورية التي ذات الصلة بدراستي متوفرة في المكتبة.						
س19	المحاضرون يستخدمون التقنيات الحديثة في ايصال المعلومات الينا.						
س20	التعليم التي تركز على الطالب وتعزز التعلم تعطيني ما يكفي من الثقة لكي أستطيع إستراتيجية إدارة دراستي.						
س21	المختبرات مجهزة بشكل جيد لايصال المعلومات العلمية والعملية بشكل جيد التي تكون كجزء من الدراسة المتبعة.						
س22	قاعات المحاضرات هي مناسبة ومجهزة بشكل مناسب.						
س23	كليتي توفر دعما لكافة المتعلمين والأخذ بنظر الإعتبار الخلفيات العلمية المختلفة للطلاب.						

الباب الرابع: الصلة مع الصناعة:

		1	2	3	4	5	6
س24	دراستي ترتبط بشكل جيد بالصناعة المختصة.						
س25	المحاضرون يعرضون حالة دراسية من الصناعة لأجل إيصال المعلومات بشكل جيد.						
س26	أستمتع بزيارة المواقع الصناعية التى لها علاقة بدراستي.						
س27	أفضل تخصيص فترات للتدريب في المؤسسات الصناعية ذات الصلة بدراستي كجزء من الدراسة.						

الباب الخامس : إعتماد المناهج من قبل المؤسسات المهنية:

		1	2	3	4	5	6
س28	الدراسات المعتمدة من قبل المؤسسات المهنية تزيد من امكانية توظيف الخريجين.						

الباب السادس: ضمان الجودة:

		1	2	3	4	5	6
س29	الخدمات التي أتلقاها من قبل الجامعة / المعهد هي ملائمة للغرض المطلوب.						
س30	المعلومات المتوفرة عن الجامعة /المعهد والدراسات هي دقيقة وحديثة.						
س31	المعلومات المنشورة عن الجامعة/المعهد وعن طبيعة الدراسة في اختصاصي كانت مفيدة للغاية لتجعلني أقرر اختيار التخصص/ المواد التي أود أن أدرسها.						
س32	جميع المعلومات ذات الصلة فيما يتعلق بقوانين الجامعة / المعهد والأنظمة من السهل الحصول عليها.						
س33	أنا أعرف الى أين أذهب وماذا أفعل عندما تكون عندي مشكلة.						
س34	أتلقى تقييم مستمر عن تقدمي الدراسي بشكل مفيد يساعدني على التحسن الدراسي.						
س35	مواضيع المحاضرات هي ضمن مجال المواد الدراسية المخصصة.						
س36	المحاضرون يستخدمون أساليب تدريس ملائمة للموضوع.						

س37	المحاضرات هي منسقة ومنظمة بصورة جيدة.						
س38	يمكنني أن أعبر عن آرائي الى المحاضرين بسهولة.						

الباب السابع: تنمية قدرات الموظفين:

		1	2	3	4	5	6
س39	معلومات ومهارات المحاضرون حديثة.						
س40	المحاضرون يستخدمون طرق تدريس حديثة .						
س41	التطوير المهني المستمر والتعلم مدى الحياة ضروريان في القرن الحادي والعشرين.						

الباب الثامن: الجوانب الحضارية:

		1	2	3	4	5	6
س42	الرجال هم أكثر ملائمة لدراسة الهندسة من النساء.						
س43	أنا يجب أن أفعل ما يطلبه مني أستاذي حتى لو كنت أعتقد إنه على خطأ.						

س44: في المجال أدناه يمكنك أن تكتب أي أفكار أو ملاحظات أخرى تعتقد أنها ستكون مفيدة لتحسين خبرتك كطالب ومُتعلم.

بعد الانتهاء، يرجى تسليم هذا الإستبيان الى الباحث لتجهيزه وتخزينه بشكل مأمون

شكراً على وقتك وتعاونك فى إنجاز هذا الإستبيان

نوري التريكي

هاتف. 0912121618؛ 0913209040 (ليبيا)
البريد الالكتروني:

altriki72@yahoo.com

Appendix D: The Arabic Translation of Engineers and Technicians Questionnaire

استبيان بشأن المهارات والمعارف المكتسبة في المؤسسات الصناعية في الجماهيرية العظمى

أخي الكريم / أختي الكريمة،

السلام عليكم ورحمة الله وبركاته

أنا الطالب نوري التريكي وأعمل حالياً في التحضير لرسالة الدكتوراه في جامعة ويلز ، كاردف (يووك) في المملكة المتحدة. بحث الدكتوراه الذي اعمل عليه يتناول دراسة العلاقة بين المهارات و المعلومات العلمية المقدمة من قبل مؤسسات التعليم العالي للجماهيرية وإحتياجات الصناعة الوطنية والدولية. الجزء الهام في هذاالبحث هو تحليل نقدي لآراء المهندسيين والفنيين العاملين في مجال الصناعة حول التعليم والتدريب الذي تلقوه قبل انضمامهم وعملهم في المؤسسات الصناعية. ولذلك ، انا بحاجة الى مساعدتكم في ملء الاستبيان المرفق.

أود ان اؤكد لكم ان جميع البيانات التي سيتم جمعها من هذا الاستبيان سوف يتم أستخدامها بشكل صرف للبحوث الاكاديمية فقط وستعامل بسرية تامة ولن تذكر أسماء المشاركين. كما آمل أن نتائج وتوصيات هذا البحث سوف توفر معلومات مفيدة لصانعي القرارات والسياسات العليا وكبار المديرين من أجل تعزيز التعليم الهندسي والتقني والتدريب في الجماهيرية الليبية وتطوير القوى العاملة لجعلها مناسبة لسوق العمل ، على الصعيدين الوطني والدولي.

وأخيراً ، أود أن أعبر عن شكري وإمتناني لوقتكم وجهدكم المبذولين في إنجاز هذا الإستبيان.

مع خالص الشكر،

نوري التريكي

معلومات عامة (تملأ من قبل الباحث فقط)

معلومات عن الشركة

إسم الشركة	
عنوان الشركة	
العدد الإجمالي للموظفين	
التمويل	قطاع خاص / قطاع عام

بداية الإستبيان

معلوماتك الشخصية

الرتبة الوظيفية	
الجنسية	ليبي / عربي / أفريقي /أسيوي / أخرى
الجنس	ذكر / أنثى
العمر	
المؤهلات والشهادات العلمية	
كم هي المدة منذ استلامك لهذه الوظيفة الى الآن؟	
هل هذه أول وظيفة لك بعد التخرج؟	

الرجاء الإجابة بوضع علامة صح على الرد الملائم على الجمل الاتية وفق المقياس التالي:

1	2	3	4	5	6
أختلف بشدة	أختلف	أختلف قليلاً	أتفق قليلاً	أتفق	أتفق بشدة

الباب الاول : الإستراتيجيات والسياسات:

		1	2	3	4	5	6
س[1]	غاية المؤسسة، وحدتها,أولوياتها وأهدافها هي واضحة وقد شرحت إلينا بصورة جيدة.						
س[2]	دور الشركة/القسم التي اعمل بها هو واضح ضمن تنظيم المؤسسة.						
س[3]	دوري ومسؤولياتي ونوع العمل معرفة آلي بصورة جيدة.						
س[4]	أنا أتلقى معلومات كاملة حول الشركة وأدائها بصورة منتظمة.						
س[5]	جميع قوانين ولوائح المؤسسة فسرت لنا بصورة جيدة.						
س[7]	أنا مهتم فى القيام بدور نشط فى لجان الشركة والمشاركة في صياغة السياسات والإستراتيجيات لها.						
س[8]	صوتي مسموع ويُأخذ بنظر الاعتبار من قبل إدارة الشركة.						

س[6]. قراري بالعمل في هذه الشركة كان يعتمد على:

- سمعة الشركة ☐
- توفير فرص تدريب وتطوير مهني ☐
- القرب من المنزل ☐
- مكافآت وحوافز جيدة ☐
- إعطاء رواتب جيّدة ☐
- أسباب اخرى (يرجى ذكرها) ----------

الباب الثاني: التعليم والتدريب قبل العمل:

		1	2	3	4	5	6
س[9]	دراستي أهلتني بصورة جيدة بالمعارف والمهارات التي تتطلبها مهنة الهندسة.						
س[10]	المواضيع التي درستها أهلتني لأن أكون مهندساً / فنياً محترفاً.						
س[11]	أنا واثق من إمكانيتي لتعلم معارف ومهارات جديدة بصورة مستقلة.						
س[12]	لقد وجدت إن التدريب أثناء العمل هو أكثر فعالية من التعلم في معاهد وكليات الأكاديمية.						
س[13]	أنا أستطيع أن أربط العلاقة بين معظم المواد التي درستها مع عملي الحالي.						
س[14]	دراستي أهلتني للتعامل مع المسائل المتعلقة بالعولمة وبالأعمال التجارية الدولية بصورة جيدة.						

الباب الثالث: توفير التدريب والتعليم:

		1	2	3	4	5	6
س15	أساليب تدريس المناهج التي درستها ضمن دراستي ساعدتني لكي أتعلم بصورة مستقلة.						
س16	توصيل المناهج بطريقة تتوافق مع التزامات الموظفين سيشجعهم على المزيد من المتابعة وإكمال الدراسة لاكتساب معارف/مهارات جديدة.						
س17	الدراسة الخارجية أو التعليم الألكتروني عبر شبكة الأنترنيت يمكن أن تستخدم للحصول على معظم المعارف والمهارات اللازمة في مجال الصناعة						
س18	العمل القائم على التعلم هو وسيلة فعالة للحصول على أغلب المعارف والمهارات التى تتطلبها مهنة الهندسة.						
س19	الإنتساب الى الصناعة هو مفيد جداً لإكتساب مهارات العمل.						
س20	توفير برامج تعليمية قصيرة من قبل مؤسسات التعليم العالي هي مفيدة جداً لتحديث معرفتي ومهاراتي.						

الباب الرابع: العلاقة مع مؤسسات التعليم العالي والتدريب المهني:

		1	2	3	4	5	6
س21	مؤسسات التدريب المهني والتعليم التقني تلعب دوراً أساسياً في تحديث وتحسين مهاراتنا.						
س22	إستضافة طلاب الدراسة الهندسية والتقنية في مؤسستي سوف يعدهم على نحو أفضل في مستقبلهم المهني.						
س23	نحن كثيراً ما نتشاور مع مؤسسات التدريب المهني والتعليم التقني لحل مشكلة تقنية، لتطوير منتج جديد أو لتحسين الأداء.						
س24	إتصالاتي بقيت مستمرة مع الكلية/الجامعة بعد التخرج.						
س25	وضع محاضرون في المؤسسات الصناعية سيحسن من معلومتهم حول متطلبات العمل.						
س26	إني سوف أعود الى الكلية/الجامعة للحصول على شهادات عالية إذا أتيحت الفرصة اليّ .						

الباب الخامس: اعتماد المناهج من قبل المؤسسات المهنية:

		1	2	3	4	5	6
س27	الخريجون الحاملون لشهادات معترفة من المؤسسات المهنية يملكون فرص توظيف أفضل.						
س28	الخريجون الحاملون لشهادات معترفة من المؤسسات المهنية يمنحون رواتب/رتب وظيفية أفضل.						

الباب السادس: ضمان الجودة:

		1	2	3	4	5	6
س29	ضمان الجودة وعمليات التطوير موثقة بشكل جيد.						
س30	ضمان الجودة وعمليات التطوير منفذة بشكل جيد.						
س31	إنني راض عن عملي في هذه الشركة / القسم.						
س32	أتلقى تقييم مستمرعن إدائي المهني.						
س33	أحصل على تشجيع ودفع بصورة مستمرة من قبل مديري.						
س34	جميع الإجراءات والعمليات للشركة فسرت بصورة جيدة للموظفين.						
س35	عملية صنع القرار في الشركة واضحة.						
س36	أنا أعرف الى أين أذهب وماذا أفعل عندما تكون عندي مشكلة.						
س37	يمكنني أن أعبر عن آرائي الى الإدارة بسهولة.						

الباب السابع : تنمية قدرات الموظفين:

		1	2	3	4	5	6
س38	نظام تطوير الموظفين هو جانب فعّال لبناء وتطوير المهارات لدى القوى العاملة.						
س39	التطوير المهني المستمر والتعلم مدى الحياة ضروريان في القرن الحادي والعشرين.						

الباب الثامن: الجوانب الحضارية:

		1	2	3	4	5	6
س40	الرجال هم اكثر ملائمة للعمل في مجال الصناعة أكثر من النساء.						
س41	أنا يجب أن أعمل ما يطلبه مني مشرفي حتى لو كنت أعتقد إنه/ إنها على خطأ						

س[42]: في المجال أدناه يمكنك أن تكتب أي أفكار أو ملاحظات أخرى تعتقد أنها ستكون مفيدة لتحسين خبراتك كفني وكمهندس في شركة صناعية.

بعد الانتهاء، يرجى تسليم هذا الاستبيان إلى الباحث لتجهيزه وتخزينه بشكل مأمون

شكراً على وقتك وتعاونك في إنجاز هذا الاستبيان

نوري التريكي

هاتف. 0912121618؛ 0913209040 (ليبيا)

البريد الالكتروني:
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Appendix E: Summary of Students Questionnaire Results

Characteristics of a Sample Study for Students

General Information

❖ **Gender**

Gender	No.	%
Male	317	50.7
Female	308	49.3
Total	625	100

❖ **Age**

Age	No.	%
Less than 20 years	80	12.8
From 20 to less than 23 years	292	46.7
From 23 to less than 26 years	206	33.0
From 26 to less than 29 years	44	7.0
More than 29 years	3	0.5
Total	**625**	**100.0**

❖ **Academic Qualification**

Qualification	No.	%
Bachelor	380	60.8
Technical Diploma	245	39.2
Total	**625**	**100.0**

❖ **Time of Study**

Time of Study	No.	%
Full Time	542	86.7
Part Time	83	13.3
Total	**625**	**100.0**

❖ **Father Profession**

Profession	No.	%
Public Sector	372	59.5
Private Sector	144	23.0
unemployed	5	0.8
Retired	104	16.6
Total	**625**	**100.0**

❖ **Mother Profession**

Profession	No.	%
Public Sector	236	37.7
Private Sector	1	0.2
Housewife or unemployed	385	61.6
Retired	3	0.5
Total	**625**	**100.0**

Section One: Strategies and Policies

No. of Question	Strongly Disagree		Disagree		Slightly Disagree		Slightly Agree		Agree		Strongly Agree	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Q1	82	13.1	84	13.5	76	12.1	71	11.4	**234**	**37.5**	78	12.4
Q2	86	13.8	67	10.7	83	13.2	74	11.8	**229**	**36.7**	86	13.8
Q5	**153**	**24.5**	143	22.8	75	12	66	10.6	111	17.8	77	12.3
Q6	**217**	**34.7**	120	19.2	93	14.9	34	5.4	111	17.8	50	8

Q3. The decision to apply to this University/College was based on

Reason	(No) the decision to apply not depends on		(Yes) the decision to apply depends on	
	No.	%	No.	%
1	466	74.6	159	25.4
2	437	69.9	188	30.1
3	537	85.9	88	14.1
4	452	72.3	173	27.7
5	583	93.3	42	6.7
6	605	96.8	20	3.2
7	584	93.4	41	6.6

Q4. The decision for study Engineering was based on

Reason	(No) the decision to study engineering depends on		(Yes) the decision to study engineering depends on	
	No.	%	No.	%
1	344	55.0	281	45.0
2	577	92.3	48	7.7
3	504	80.6	121	19.4
4	531	85.0	94	15.0
5	576	92.2	49	7.8
6	536	85.8	89	14.2
7	598	95.7	27	4.3
8	619	99.0	6	1.0

Section Two: Curriculum Design

No. of Question	Strongly Disagree		Disagree		Slightly Disagree		Slightly Agree		Agree		Strongly Agree	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Q7	43	6.9	46	7.4	84	13.4	117	18.7	**263**	**42.1**	72	11.5
Q8	37	5.9	36	5.8	68	10.9	123	19.7	**267**	**42.7**	94	15.0
Q9	39	6.2	56	9.0	112	17.9	122	19.5	**224**	**35.8**	72	11.5
Q10	39	6.2	59	9.4	110	17.6	136	21.8	**223**	**35.7**	58	9.3
Q11	89	14.2	81	13.0	119	19.0	77	12.3	**185**	**29.6**	74	11.8
Q12	71	11.4	84	13.4	115	18.4	123	19.7	**195**	**31.2**	37	5.9
Q13	42	6.7	61	9.8	123	19.7	103	16.5	**222**	**35.5**	74	11.8
Q14	66	10.6	95	15.2	131	21.0	130	20.8	**169**	**27.0**	34	5.4

Section Three: Curriculum Delivery

No. of Question	Strongly Disagree		Disagree		Slightly Disagree		Slightly Agree		Agree		Strongly Agree	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Q15	138	22.1	**162**	**25.9**	63	10.1	46	7.4	119	19	97	15.5
Q16	74	11.8	65	10.4	59	9.5	70	11.2	**219**	**35.0**	138	22
Q17	125	20.0	110	17.6	124	19.8	93	14.9	**147**	**23.5**	26	4.2
Q18	143	22.9	**159**	**25.4**	85	13.6	76	12.2	124	19.8	38	6.1
Q19	122	19.5	94	15.1	79	12.6	60	9.6	**174**	**27.8**	96	15.4
Q20	109	17.4	76	12.2	128	20.5	118	18.9	**142**	**22.7**	52	8.3
Q21	**153**	**24.5**	93	14.9	100	16.0	92	14.7	136	21.8	51	8.2
Q22	**186**	**29.8**	89	14.2	115	18.4	75	12.0	112	17.9	48	7.7
Q23	130	20.8	**178**	**28.5**	80	12.8	67	10.7	124	19.8	46	7.4

Section Four: Partnership with Industry

No. of Question	Strongly Disagree		Disagree		Slightly Disagree		Slightly Agree		Agree		Strongly Agree	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
24	83	13.3	**198**	**31.7**	136	21.8	97	15.5	64	10.2	47	7.5
25	113	18.1	**158**	**25.3**	83	13.2	92	14.7	98	15.7	81	13.0
26	112	17.9	48	7.7	51	8.2	49	7.8	**214**	**34.2**	151	24.2
27	41	6.6	23	3.7	39	6.2	77	12.3	**228**	**36.5**	217	34.7

Section Five: Accreditation

No. of Question	Strongly Disagree		Disagree		Slightly Disagree		Slightly Agree		Agree		Strongly Agree	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Q28	54	8.6	54	8.6	106	17.0	104	16.6	**234**	**37.4**	73	11.7

Section Six: Quality Assurance

No. of Question	Strongly Disagree		Disagree		Slightly Disagree		Slightly Agree		Agree		Strongly Agree	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Q29	76	12.2	97	15.5	137	21.9	99	15.8	**183**	**29.3**	33	5.3
Q30	76	12.2	99	15.8	**170**	**27.2**	102	16.3	143	22.9	35	5.6
Q31	77	12.3	103	16.4	111	17.8	106	17.0	**164**	**26.2**	65	10.4
Q32	74	11.8	76	12.2	139	22.2	91	14.6	**191**	**30.6**	54	8.6
Q33	101	16.2	59	9.4	64	10.2	85	13.6	**207**	**33.1**	10 9	17.4
Q34	94	15.0	84	13.4	131	21.0	80	12.8	**172**	**27.6**	64	10.2
Q35	26	4.2	32	5.1	77	12.3	110	17.6	**292**	**46.7**	88	14.1
Q36	51	8.2	49	7.8	127	20.3	113	18.1	**225**	**36.0**	60	9.6

Q37	81	13.0	92	14.7	143	22.9	83	13.3	**179**	**28.6**	47	7.5
Q38	74	11.8	77	12.3	116	18.6	112	17.9	**195**	**31.2**	51	8.2

Section Seven: Staff Development

No. of Question	Strongly Disagree		Disagree		Slightly Disagree		Slightly Agree		Agree		Strongly Agree	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Q39	77	12.3	109	17.4	64	10.3	70	11.2	**195**	**31.2**	110	17.6
Q40	104	16.6	124	19.8	74	11.9	73	11.7	**202**	**32.3**	48	7.7
Q41	17	2.7	20	3.2	16	2.6	40	6.4	218	34.9	**314**	**50.2**

Section Eight: Culture Aspects

No. of Question	Strongly Disagree		Disagree		Slightly Disagree		Slightly Agree		Agree		Strongly Agree	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Q42	119	19.0	79	12.6	82	13.1	55	8.8	131	21.0	**159**	**25.4**
Q43	**160**	**25.6**	114	18.2	101	16.2	72	11.5	93	14.9	85	13.6

Source: Field Study conducted by the Author in 2008

Appendix F: Summary of Engineers and Technicians Questionnaire Results

Characteristics of a Sample Study for Engineers and Technicians

General Information

- **Nationality**

Nationality	No.	%
Libyan	133	97.1
Arabs	3	2.2
African	1	0.7
Total	**137**	**100.0**

- **Gender**

Gender	No	%
Male	135	98.5
Female	2	1.5
Total	**137**	**100.0**

- **Age**

Age	No.	%
Less than 30 years	4	2.9
From 30 to less than 40 years	58	42.3
From 40 to less than 50 years	59	43.1
More than 50 years	16	11.7
Total	**137**	**100.0**

- **Academic Qualification**

Qualification	No.	%
Secondary School	32	23.4
Technical Diploma	77	56.2
Bachelor	28	20.4
MSc.	0	0.0
PhD.	0	0.0
Total	**137**	**100.0**

- **Experience of Work**

Experience	No.	%
Less than 5 years	12	8.8
From 5 to less than 10 years	30	21.9
From 10 to less than 15 years	33	24.1
From 15 to less than 20 years	32	23.4
More than 20 years	30	21.9
Total	**137**	**100.0**

- **First job after Graduation**

First job	No.	%
No	42	30.7
Yes	95	69.3
Total	**137**	**100.0**

Section One: Strategies and Policies

No. of Question	Strongly Disagree		Disagree		Slightly Disagree		Slightly Agree		Agree		Strongly Agree	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Q1	12	8.8	28	20.7	20	14.3	13	9.1	**53**	**39**	11	8.1
Q2	11	7.9	10	7.6	16	11.5	9	6.7	**64**	**46.5**	27	19.8
Q3	2	1.5	6	4.4	22	16.1	9	6.4	**65**	**47.4**	33	24.2
Q4	28	20.2	**36**	**26.3**	20	14.8	18	13.1	24	17.5	11	8.0
Q5	30	21.7	**31**	**22.6**	19	14.1	24	17.5	27	19.7	6	4.4
Q7	38	27.8	**43**	**31.4**	17	12.3	13	9.5	23	16.8	3	2.2
Q8	**49**	**35.8**	42	30.7	16	11.5	15	11	15	11	0	0.0

Q6. The decision to apply to this company was based on:

Reason	(No) the decision to work was not depends on		(Yes) the decision to work was depends on	
	No.	%	No.	%
1	114	83.2	23	16.8
2	85	62.0	52	38.0
3	63	46.0	74	54.0
4	129	94.2	8	5.8
5	124	90.5	13	9.5
6	127	92.7	10	7.3

Section Two: Education and Training before Employment

No. of Question	Strongly Disagree		Disagree		Slightly Disagree		Slightly Agree		Agree		Strongly Agree	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Q9	11	8.0	10	7.3	19	13.9	26	19.0	**61**	**44.5**	10	7.3
Q10	7	5.1	10	7.3	20	14.6	30	21.9	**57**	**41.6**	13	9.5
Q11	0	0.0	2	1.5	17	12.4	33	24.1	**69**	**50.4**	16	11.7
Q12	3	2.2	4	2.9	12	8.8	21	15.3	**56**	**40.9**	41	29.9
Q13	5	3.6	9	6.6	39	28.5	23	16.8	**51**	**37.2**	10	7.3
Q14	15	10.9	27	19.7	32	23.4	20	14.6	**38**	**27.7**	5	3.6

Section Three: Delivery of Education and Training

No. of Question	Strongly Disagree		Disagree		Slightly Disagree		Slightly Agree		Agree		Strongly Agree	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Q15	6	4.4	12	8.8	31	22.6	25	18.2	**51**	**37.2**	12	8.8
Q16	1	0.7	7	5.1	24	17.5	22	16.1	**58**	**42.3**	25	18.2
Q17	2	1.5	4	2.9	6	4.4	18	13.1	**57**	**41.6**	50	36.5
Q18	0	0.0	6	4.4	7	5.1	26	19.0	**68**	**49.6**	30	21.9
Q19	0	0.0	0	0.0	5	3.6	16	11.7	**76**	**55.5**	40	29.2
Q20	1	0.7	5	3.6	7	5.1	23	16.8	**61**	**44.5**	40	29.2

Section Four: Partnership with Higher Education and Vocation Training Institute

No. of Question	Strongly Disagree		Disagree		Slightly Disagree		Slightly Agree		Agree		Strongly Agree	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Q21	9	6.6	18	13.2	30	21.8	22	16.1	**38**	**27.7**	20	14.6
Q22	0.0	0.0	8	5.8	13	9.5	21	15.3	**66**	**48.2**	29	21.2
Q23	38	27.7	**39**	**28.5**	15	10.9	14	10.2	25	18.2	6	4.4
Q24	**50**	**36.5**	46	33.6	18	13.1	8	5.8	14	10.2	1	0.7
Q25	5	3.6	8	5.8	11	8.0	15	10.9	**60**	**43.8**	38	27.7
Q26	5	3.6	18	13.1	24	17.5	15	10.9	**40**	**29.2**	35	25.5

Section Five: Accreditation

No. of Question	Strongly Disagree		Disagree		Slightly Disagree		Slightly Agree		Agree		Strongly Agree	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Q27	4	2.9	7	5.1	29	21.2	24	17.5	**61**	**44.5**	12	8.8
Q28	10	7.3	22	16.1	**43**	**31.4**	13	9.5	42	30.7	7	5.1

Section Six: Quality Assurance

No. of Question	Strongly Disagree		Disagree		Slightly Disagree		Slightly Agree		Agree		Strongly Agree	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Q29	5	3.6	10	7.3	16	11.7	27	19.7	**70**	**51.1**	9	6.6
Q30	5	3.6	11	8.0	28	20.4	30	21.9	**55**	**40.1**	8	5.8
Q31	18	13.1	**41**	**30.0**	14	10.2	13	9.3	39	28.5	12	8.9
Q32	19	14.1	32	23.6	18	12.8	20	14.7	**35**	**25.3**	13	9.5
Q33	**35**	**25.5**	33	24.1	23	16.8	18	13.1	24	17.5	4	2.9
Q34	21	15.3	37	27.0	**44**	**32.1**	14	10.2	20	14.6	1	0.7
Q35	35	25.5	**39**	**28.5**	30	21.9	7	5.1	24	17.5	2	1.5
Q36	5	3.6	19	13.9	19	13.9	16	11.7	**58**	**42.3**	20	14.6
Q37	30	21.9	26	19.0	20	14.6	13	9.5	**42**	**30.7**	6	4.4

Section Seven: Staff Development

No. of Question	Strongly Disagree		Disagree		Slightly Disagree		Slightly Agree		Agree		Strongly Agree	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Q38	8	5.8	11	8.0	9	6.6	15	10.9	**62**	**45.3**	32	23.4
Q39	1	0.7	3	2.2	2	1.5	12	8.8	50	36.5	**69**	**50.4**

Section Eight: Culture Aspects

No. of Question	Strongly Disagree		Disagree		Slightly Disagree		Slightly Agree		Agree		Strongly Agree	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Q40	5	3.6	8	5.8	8	5.8	14	10.2	41	30	**61**	**44.5**
Q41	31	22.6	**44**	**32.1**	27	19.7	11	8.0	18	13.1	6	4.4

Source: Field Study conducted by the Author in 2008

Appendix G: Summary of Statistical Analysis with Respect to the Effect of Gender for Students

Q3. Decision to apply to the University/College

Reason	Male		Female		(Yes) depends on	
	No.	%	No.	%	No.	%
1	92	14.7	67	10.7	159	25.4
2	124	19.8	64	10.2	188	30.1
3	18	2.9	70	11.2	88	14.1
4	118	18.9	55	8.8	173	27.7
5	19	3.0	23	3.7	42	6.7
6	7	1.1	13	2.1	20	3.2
7	25	4.0	16	2.6	41	6.6

Q4. Reasons for studying engineering

Reason	**Male**		**Female**		**(Yes) depends on**	
	No.	**%**	**No.**	**%**	No.	%
1	**188**	30.1	**93**	14.9	281	45.0
2	**12**	1.9	**36**	5.8	48	7.7
3	**73**	11.7	**48**	7.7	121	19.4
4	**49**	7.8	**45**	7.2	94	15.0
5	**28**	4.5	**21**	3.3	49	7.8
6	**59**	9.4	**30**	4.8	89	14.2
7	**22**	3.5	**5**	0.8	27	4.3
8	**1**	0.2	**5**	0.8	6	1.0

Q5. Playing an active role in the institute's committees

Q5	Total		Male		Female	
	No.	%	No.	%	No.	%
Strongly Disagree	153	24.5	64	10.3	89	14.2
Disagree	143	22.8	66	10.6	77	12.3
Slightly Disagree	75	12	46	7.8	29	4.2
Slightly Agree	66	10.6	49	7.8	17	2.8
Agree	111	17.8	92	14.7	19	3.1
Strongly Agree	77	12.3	51	8.2	26	4.1

Q27. Training in industry as part of their study

Q27	Total		Male		Female	
	No.	%	No.	%	No.	%
Strongly Disagree	41	6.6	7	1.1	34	5.5
Disagree	23	3.7	8	1.3	15	2.4
Slightly Disagree	39	6.2	17	2.7	22	3.5
Slightly Agree	77	12.3	48	7.7	29	4.6
Agree	228	36.5	179	28.6	49	7.9
Strongly Agree	217	34.7	163	26.1	54	8.6

Q33. Dealing with problem

Q33	Total		Male		Female	
	No.	%	No.	%	No.	%
Strongly Disagree	101	16.2	63	10.2	38	6.1
Disagree	59	9.4	32	5.1	27	4.3
Slightly Disagree	64	10.2	39	6.2	25	4.0
Slightly Agree	85	13.6	41	6.6	44	7.0
Agree	207	33.1	123	19.7	84	13.4
Strongly Agree	10 9	17.4	77	12.3	32	5.1

Q42. Men are more suitable to study engineering than women

Q42	Total		Male		Female	
	No.	%	No.	%	No.	%
Strongly Disagree	119	19.0	72	11.5	47	7.5
Disagree	79	12.6	40	6.4	39	6.2
Slightly Disagree	82	13.1	45	7.2	37	5.9
Slightly Agree	55	8.8	32	5.1	23	3.7
Agree	131	21.0	83	13.3	48	7.7
Strongly Agree	159	25.4	92	14.7	67	10.7

Q43: Following tutor's instruction

Q43	Total		Male		Female	
	No.	%	No.	%	No.	%
Strongly Disagree	160	25.6	74	11.8	86	13.8
Disagree	114	18.2	63	10.1	51	8.1
Slightly Disagree	101	16.2	56	9	45	7.2
Slightly Agree	72	11.5	39	6.2	33	5.3
Agree	93	14.9	49	7.8	44	7.1
Strongly Agree	85	13.6	44	7.0	41	6.6

Appendix H:

Table for Determining Sample Size from a Given Population

Population Size	Sample Size	Population Size	Sample Size	Population Size	Sample Size
10	10	220	140	1200	291
15	14	230	144	1300	297
20	19	240	148	1400	302
25	24	250	152	1500	306
30	28	260	155	1600	310
35	32	270	159	1700	313
40	36	280	162	1800	317
45	40	290	165	1900	320
50	44	300	169	2000	322
55	48	320	175	2200	327
60	52	340	181	2400	331
65	56	360	186	2600	335
70	59	380	191	2800	338
75	63	400	196	3000	341
80	66	420	201	3500	346
85	70	440	205	4000	351
90	73	460	210	4500	354
95	76	480	214	5000	357
100	80	500	217	6000	361
110	86	550	226	7000	364
120	92	600	234	8000	367
130	97	650	242	9000	368
140	103	700	248	10000	370
150	108	750	254	15000	375
160	113	800	260	20000	377
170	118	850	265	30000	379
180	123	900	269	40000	380
190	127	950	274	50000	381
200	132	1000	278	75000	382
210	136	1100	285	100000	384

Source: Krejcie and Morgan (1970, p. 608).