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THE QUALITY MANAGEMENT SYSTEMS OF ISO 9000 REGISTERED FIRMS IN A RANGE OF MANUFACTURING SECTORS IN SAUDI ARABIA

BY

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ABSTRACT

The objective of this study is to investigate the quality management systems of ISO 9000 registered firms in the manufacturing sectors in Saudi Arabia. For this purpose, different aspects were studied; a study of the characteristics of firms; an investigation into their quality systems, which includes some ISO clauses and other elements; and a comprehensive study of the implementation of ISO 9000. To achieve these objectives, 140 questionnaires were distributed to all possible known firms holding an ISO certificate. 97 were returned, of which 83 were considered usable. In addition, 10 postal questionnaires were sent to assessors in Saudi Arabia, 3 were returned; and interviews were conducted with three SASO officials.

The chemical and petrochemical sectors had the largest number of ISO registered firms, followed by the metal sector, and ISO registration was adopted by all sizes of firms. Moreover, the largest number of firms, were joint ventures, and approximately 90% of all the firms were involved in exports, the majority comprising the chemical and petrochemical ones. Most of the employees in quality-related positions were expatriates, while the 12 Sabic firms employed a higher percentage of Saudi nationals than other firms did. Two thirds of the firms were registered to ISO 9002 and one third to ISO 9001, while no firms were registered to ISO 9003 or to ISO 14001. The study also revealed that a third of the firms were implementing TQM, and the remaining ones were not. Large firms and Sabic's companies were more likely to implement TQM than others. The Western Region housed the largest number of firms, followed by the Eastern then the Middle Region, while the city of Jeddah came first, followed by Riyadh and then Jubail.

The study concludes that ISO registered firms performed well in terms of the quality system elements, and in their compliance to ISO clauses. Among these, TQM firms generally performed better than Non-TQM ones in executing quality system elements and were significantly better in some aspects such as training, relations with suppliers, qualitative tools, SPC, quality culture and measuring performance. However, many ISO firms tended not to implement advanced and other techniques such as QFD; benchmarking; cross-functional teams; a vendor rating system; failure mode and effect analysis; and quality circles. Nor did they use sophisticated techniques to measure

customer satisfaction and performance. The study also showed that ISO firms substantially fostered quality culture.

The commitment of top managers to ISO was significantly higher than their commitment to quality in general. By applying factor analysis, it became evident that the 19 motives to ISO registration were grouped into 5 factors: increase market share; improvement of functions; international marketing; cost reductions; and joint venture influence. It was also found that there was a positive correlation between the international marketing motives for ISO and the extent of involvement in export. A large number of firms, small and large alike, appeared not to take sufficient preparation measures before implementing ISO. Approximately 53 % of firms relied on external consultants, and some of them used their registration agencies for this purpose, which constituted a conflict of interest and a violation of ISO 62. The most important factors in helping in the implementation were top management commitment; a well-structured system of procedures; and the contribution of the internal auditors. The private training agencies ranked first in training for ISO, followed by the chambers of commerce then the registration agencies, while SASO ranked fourth. The participation of the registration agencies in training their clients may question the conflict of interests matter and the integrity of the registration process.

Firms, when choosing their registration agencies, considered such criteria as their reputation and image, their knowledge about their industry, and their experience in Saudi Arabia. It was also found that small firms tended to use subjective factors more than did large firms when choosing the agencies. Before contracting agencies, many firms did not adequately assess their operations and work. The study showed the dominant role of the British agencies in the ISO scene providing more than 80% of registration and the known private training. For those who did not choose SASO, this was because the certificate of the foreign agency was more prestigious, valid, and credible. About 88% of the firms achieved registration in the first audit, and more than half of all firms achieved it in less than a year; the smaller the firm, the faster. It was found that the British agencies and SASO conducted two surveillance visits a year, while the Germans and the Americans did so once a year. The most significant problems with agencies were their high fees, the confusion of choosing the appropriate agency and the complication of the assessment procedures. However, the level of

satisfaction with these agencies was high. In arranging the quality manual, about 85% of firms did so according to ISO clause sequencing, and more than half of all firms relied on consultants to write the manual. The majority of firms showed satisfaction with the manual, although some expressed annoyance with certain shortcomings, such as: the involvement of a large administrative burden; being too theoretical, and leading to a loss of flexibility. However, the severity of those problems was not great.

Internal costs and consultancy fees incurred about 90% of all expenses, but could be avoided if firms used their own resources. Firms were generally convinced that ISO benefits were worth the costs. By using factor analysis, the 20 benefits of ISO were reduced to 5 factors: internal benefits; marketing benefits; efficiency benefits; inspection benefits; and quality benefits. About two thirds of firms used the ISO logo as a promotional tool in their advertisements and publications. The majority of firms were satisfied with ISO, the larger the firm the more likely it was likely to be uncomplaining. However, they did not think that ISO guarantees good quality products, nor that ISO alone could establish a sufficient quality system, but both ISO and TQM together may do so. Moreover, many respondents and assessors felt the need for the amendment of ISO clauses.

When evaluating the role of SASO in ISO implementation, it was found that the organisation played a minimal role in terms of registration, publications, and training for ISO, and had not been accredited to ISO 62. The chambers of commerce provided training for ISO more than did SASO, and were led by the chambers in the Eastern Region. The Saudi government was found not to play an active role in ISO implementation.

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CHAPTER ONE

INTRODUCTION

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INTRODUCTION

1.1 Introduction:

In 1987, the International Organisation for Standardisation (ISO) published the ISO 9000 standards for the first time in order to establish voluntary quality management systems in those firms trying to ensure compliance to the minimum requirements for a quality system. After discussion in the quality literature and in the industry about a total quality approach, those standards were intended to be total quality management systems, but their elements had to be verifiable so that an external assessor could audit them. However, in no way were the ISO requirements intended to prevent a firm from implementing any other tools that are not included in ISO 9000 clauses.

At the beginning of the 1990s, registration to ISO 9000 in Saudi Arabia started to grow rapidly as was the case in many other countries. Although the experience of implementing ISO 9000 has been tested and evaluated, though only to a limited extent (e.g. motives and benefits of ISO) in many countries, no study has been conducted to investigate ISO 9000 in Saudi Arabia. This research, therefore, is about examining this experience in the Kingdom of Saudi Arabia, taking into consideration the similarity of Saudi business approaches and economics to many other developing countries. Since ISO 9000 standards reflect quality management systems, this study investigates the quality management of ISO 9000 registered firms in a range of manufacturing sectors in the country, and includes a thorough investigation of the implementation of ISO 9000.

To begin with, this introductory chapter focuses on the research objectives, research questions, research methodology applied, the significance of the study, and the organisation of the thesis.

1.2 Research Objectives:

The objectives of this study are related to the research problem, which is the need to investigate the quality management systems and ISO implementation among ISO 9000 registered firms in Saudi Arabia, and are as follows:

- To determine the general characteristics of ISO 9000 registered firms in Saudi Arabia.
- To study the performance of ISO 9000 registered firms in complying with the quality system elements.
- To determine the differences, if any, between Total Quality Management firms (TQM Firms) and Non-TQM firms in complying with the quality management system elements.
- To examine the degree of compliance among ISO 9000 registered firms in Saudi Arabia to some of the ISO clauses.
- To investigate all possible aspects of the implementation of ISO 9000 in Saudi Arabia.
- To investigate the registration process to ISO 9000 in Saudi Arabia.
- To investigate the plans of ISO 9000 registered firms in Saudi Arabia after ISO implementation.
- To evaluate ISO 9000 in general in the country including satisfaction of firms with ISO 9000 and ISO vs. TQM.

- To investigate the role of the Saudi Arabian Standards Organisation (SASO), Chambers of Commerce and the Saudi Government in ISO implementation.

1.3 Research Questions:

This research will answer questions related to the implementation of quality system elements and ISO 9000 among ISO registered firms in the manufacturing sectors in Saudi Arabia. The first question to be answered is what are the characteristics of the ISO 9000 registered firms in the manufacturing sectors in Saudi Arabia? In terms of size, sector, standards of registration, periods of registration to ISO and extent of their involvement in exports. Moreover, what percentage of Saudi employees has a main remit for quality as a proportion of the total number of employees? What are the relationships between those characteristics, such as employees in quality-related roles by size of firms; size by type of ownership; and degree of export by sector and type of ownership? What percentages of firms have implemented TQM in addition to ISO 9000? And finally, where are those firms geographically located in Saudi Arabia?

The study will also answer questions regarding the implementation of the quality system elements. For example, how well have ISO 9000 registered firms performed in their compliance to quality system elements? This question encompasses people issues, customer focus, product issues, tools for quality improvement, quality culture and measuring performance in the organisation. In addition, among ISO 9000 registered firms, is there any significant difference between TQM and Non-TQM firms in complying to quality system elements or not?

What degree of compliance to some of the ISO clauses did ISO 9000 registered firms achieve? These clauses include management representation, internal auditing, documentation and surveillance visits, among others. In addition, the study will answer questions concerning ISO implementation in Saudi Arabia, for instance, how strong was the commitment of senior managers to ISO? What were the motives for registration? How did firms plan for ISO? To what extent did firms rely on external consultants? How much does ISO implementation cost? What were the ISO training programmes adopted and who provided training for ISO? How helpful were certain factors in implementing ISO and what were the problems of ISO implementation? How did firms deal with ISO documentation, especially the quality manual? Who wrote the quality manual? How did firms write their quality manual? What were the problems associated with the quality manual and were respondents satisfied with it or not?

In addition, the study will examine issues surrounding the process of ISO registration. How did firms choose their registration agencies? Which registration agencies operate in Saudi Arabia? What were the factors influencing the choice of registration agency? And why did firms not choose SASO? How did registration agencies perform pre-assessment audit, formal auditing, and surveillance visits? What are the problems with the registration agencies, and how great was the satisfaction with registration agencies?

Questions related to the evaluation of ISO 9000 implementation in the country will be explored. What were the benefits of ISO implementation? How did the benefits compare to the costs of implementation? How great was the level of satisfaction with ISO 9000? How did firms evaluate ISO alone and ISO vs. TQM; how did firms

evaluate ISO clauses? Did respondents feel the need to amend ISO clauses? Is ISO sufficient to establish a quality system or is a combination of ISO and TQM needed?

Moreover, the study will investigate the prospects for the future beyond ISO and the role of SASO and the Saudi Government in implementing ISO 9000. What will firms do after ISO 9000? Will they renew registration to ISO when it expires? Are they going to register for ISO 14000 or other standards? Are they going to implement TQM if they have not implemented it already? Are firms using ISO as a promotional tool? Have they used it in their publications or advertisements? What was the role of SASO in implementing ISO in the country? What was the evaluation of quality managers of SASO's role in implementing ISO and does the Saudi Government demand an ISO certificate in its contracts and tenders?

1.4 Research Methodology:

This research was conducted in two stages; the literature review and the survey. The first stage initially involved a study of Saudi Arabia covering mainly Saudi industry and the Saudi Arabian Standards Organisation (SASO). This preliminary investigation helped the researcher to address the issues relating to those aspects either in the questionnaire or in the interviews with the officials of SASO. In addition, a review of the literature was conducted, which included ISO 9000 literature, quality management in general, Total Quality Management (TQM), previous studies in ISO and TQM, and ISO 9000 family of standards. Other related standards were also reviewed, such as those pertaining to the quality manual, internal auditing and ISO 62 governing registration agencies. Following on from the literature review, the research questions and objectives were developed.

The second stage of the research involved the design of a structured (closed-ended) questionnaire addressed to the quality managers of ISO 9000 registered firms in Saudi Arabia. The questionnaires were distributed during September, October and November 1998 to 140 respondents; 97 were returned of which 83 were considered usable. In addition, three interviews were conducted with three officials of SASO to investigate the role of their organisation in ISO implementation. After obtaining the preliminary results of the questionnaire analysis, postal questionnaires (open-ended) were sent to assessors operating in Saudi Arabia to clarify some aspects included in the responses of the quality managers. Of the 10 questionnaires that were sent, 3 were received from the assessors. SPSS software was used to analyse the quantitative data.

1.5 The Significance of the Study:

As mentioned, this study investigates the quality management systems of ISO 9000 registered firms in Saudi Arabia, including the implementation of the standards in those firms. This study is considered important for the following reasons:

- As far as the researcher is aware, this study is the first to investigate ISO 9000 implementation in Saudi Arabia; thus its findings will be an original contribution to the field of ISO 9000 (quality management systems) implementation in the country. Moreover, it is the first to investigate almost all the important aspects of the implementation of ISO 9000. It addresses the incorporation of ISO clauses into the quality system as well as the evaluation of the firms in complying with the quality system elements. The researcher hopes that this study will contribute to the field of ISO, not only in the Kingdom but also in the other Arab and Gulf countries which share similar business and economic environments. As there has been a shortage of research in the field of ISO and quality management in general in the Middle

Eastern countries, the researcher hopes that this study will establish a foundation for further research in the region.

- As this study was conducted mainly by means of a questionnaire, which covered almost all known ISO registered firms in the country, the researcher hopes that it will reflect the actual situation and explore the different opinions and perceptions of quality managers regarding ISO 9000.
- This research has substantially contributed to the evaluation of ISO 9000 in general. It has evaluated its components, such as the quality manual, and tried to measure the level of satisfaction of respondents. Therefore, the researcher hopes that the study will contribute to the macro picture about the importance and significance of ISO 9000, and validate any previous thoughts on those matters either in the literature or in previous studies of ISO 9000.
- As there has been some confusion as to the relationship between and TQM and ISO 9000 (i.e. whether or not they complement each other), the researcher hopes that this study will provide some clarifications. Moreover, it will try to compare TQM with Non-TQM firms in terms of executing the quality system elements.
- The researcher hopes that this study will provide valuable assistance to firms pursuing ISO 9000 registration. Such firms will benefit from the implementation process of ISO included in this study, such as planning measures, costs of implementation and auditing procedures.
- Since this study covers the registration process, the researcher hopes that firms and registration agencies will find the results of this study valuable. The registration agencies operating in the Kingdom or elsewhere may benefit from the perceptions and evaluation of their performance by their clients.

- As this study has evaluated the performance of SASO in matters related to ISO 9000 implementation, the researcher hopes that it will help SASO and other standards organisations in the Arab and Gulf regions to assess their involvement in ISO 9000 implementation. In doing so, such organisations may seek improvements in their performance and work towards any necessary accreditation so that they can improve their market share in terms of ISO registration.
- The Saudi Government represented by the concerned ministries and the chambers of commerce and industry in Saudi Arabia may find this study useful since it includes some evaluation of their roles in ISO 9000 implementation. The chambers of commerce in the major cities may increase their share of involvement in ISO 9000 implementation, such as enhancing their training programmes and the production / dissemination of publications.

1.6 Organisation of the Thesis:

This study is divided into eleven chapters, as shown in Figure 1.1. Chapter one is committed to an introduction to the study, including research objectives, research questions, the methodology, the significance of the study, and the organisation of the thesis. Chapter two addresses the basic information related to this research regarding the Kingdom of Saudi Arabia in three parts. Part one includes a general overview of the country, including its history, geography, government, and economy. Part two comprises information on the Saudi industrial environment, such as the government and industry, major supportive agencies, regional activities and industry statistics. The third part entails a brief coverage of SASO, including its establishment and its major functions in the country.

Chapters three, four and five of this thesis address the literature review. Chapter three covers the introduction of quality and includes different definitions of quality as well as information on the quality gurus: Deming, Juran, Crosby, Ishikawa, and Feigenbaum. It also includes the phases of the evolution of quality. Chapter four addresses ISO 9000 in detail, including information about ISO, the organisation itself, such as its organisational structure, the technical committees (TC) and TC 176 responsible for developing ISO 9000. In addition, Chapter four covers the ISO 9000 family of standards, motives for ISO, ISO 9001 in detail, the world-wide growth of ISO registration, ISO implementation and the registration process. Chapter four also discovers the benefits and limitations of ISO, ISO 9000 in the developing countries, and the new version of ISO 9000: 2000. Chapter five is committed to Total Quality Management (TQM), including a definition of the concept, the origin of TQM, an explanation of TQM elements, problems with TQM, TQM and ISO 9000 and problems of quality in the developing countries.

Chapter six of the study addresses its research methodology and comprises research objectives and questions, research strategy, data collection, questionnaire development, scales, distribution of questionnaires, response rate, data analysis techniques and the validity and reliability of the research instrument.

Chapters seven eight and nine, concentrate on the results, analysis and discussion. Chapter seven addresses the characteristics of ISO 9000 registered firms in the country. In terms of sector of activity, size of firms, employees in quality-related positions, ownership of firms, involvement in exports, scope of registration, period of registration, TQM among firms, and the distribution of firms among Saudi cities and regions.

Chapter eight covers the quality system elements of the firms, whether those elements are included in ISO 9000 or not. Some of those elements or their sub-elements are covered by ISO 9000 requirements while others are not. Those elements are people issues, customer focus, product issues, tools for quality improvement, quality culture and measuring performance in the organisation. In addition, the chapter draws a comparison between TQM and Non-TQM firms in executing those elements. Chapter nine of this thesis entails a comprehensive coverage of ISO 9000 implementation in Saudi Arabia, examining related aspects such as commitment and motivation as well as mechanisms for achieving ISO that cover both consultancy and training. In addition, it investigates stages within the process of ISO registration and issues related to the registration agencies. ISO documentation is included, which covers the quality manual and quality records. Moreover, the chapter includes details of the costs of ISO implementation and factors involved such as those helping and hindering ISO and the benefits to be gained from ISO. An overall evaluation of ISO implementation was also investigated as well as a prediction of what lies beyond ISO 9000. Finally, Chapter nine presents the role of the Saudi Government and SASO in implementing ISO.

Chapter ten of the study includes a summary of the findings, the research contribution, limitations of the research, and directions for further research. Chapter eleven covers conclusions and recommendations. The thesis ends with references and Appendices A, B, C, D, E, and F, which are related to Chapter six while Appendix F includes tables related to Chapters seven and eight.

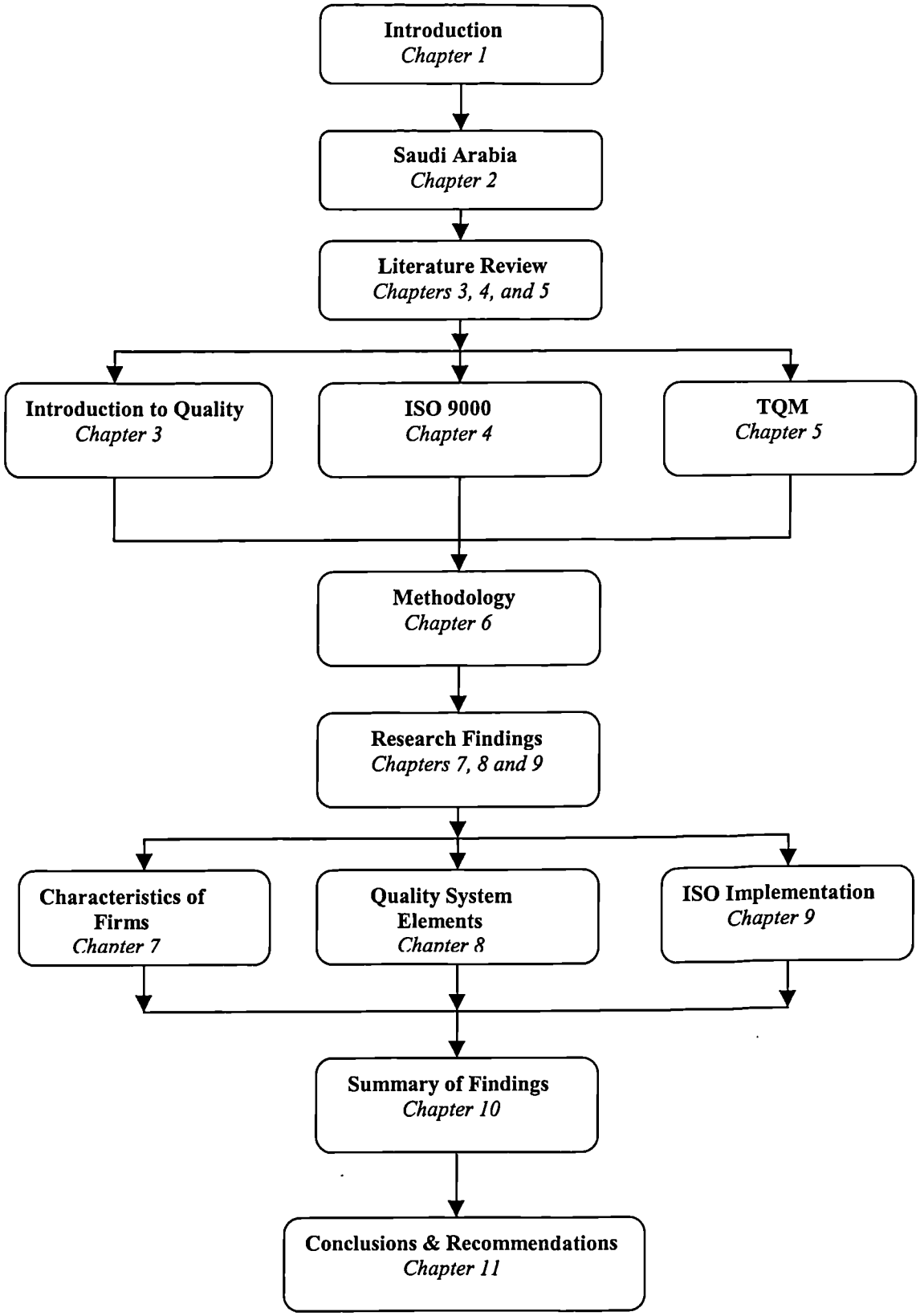

Figure 1.1 Organisation of the thesis

CHAPTER TWO

THE KINGDOM OF SAUDI ARABIA

CHAPTER TWO

THE KINGDOM OF SAUDI ARABIA

2.1 Introduction:

This chapter, which covers the Kingdom of Saudi Arabia, is divided into three parts. The first part is committed to a general outlook including the country's history, geography, government and the economy. In the second part, the Saudi industrial environment is discussed along with the government and industry, major supportive agencies, regional activities and industry statistics. The third part of the chapter involves a brief coverage of SASO, which explores its establishment and its major functions in the country.

2.2 Part 1: A General Outlook:

2.2.1 A Brief History:

In 1744, Sheikh Mohammed Bin Abdul Wahab, the son of a religious judge, and Mohammed Bin Saud, the ruler of the town of Diriyah, formed an alliance to revive Islam in the Arabian Peninsula. The partnership between the two leaders led to the establishment of Saudi Arabia in the 18th century. Following this, Mohammed Bin Saud founded a state comprising the vast majority of the peninsula, but by 1818, the Ottoman Empire had ended the first phase of the Al-Saud reign. The Saud family then regained power over central Arabia in 1824, making Riyadh, which was close to Diriyah, as their capital. This second phase of the Al-Saud reign ended in 1891 under the rule of Abdul Rahman, the father of King Abdul Aziz. It was the Al-Rashid family with the support of the Ottoman Empire who ended this era of Al-Saud power.

The modern history of Saudi Arabia started at the beginning of the 20th century when the legendary founder, King Abdul Aziz Bin Abdul Rahman Al-Saud, began the process of unifying the different regions of the Arabian Peninsula by capturing Riyadh in 1902. By 1926, he had expanded the country to include the holy places (Makkah and Madinah) and Jeddah in the west. On September 23rd 1932, the country was named the Kingdom of Saudi Arabia, comprising almost four-fifths of the Arabian Peninsula (see Figure 2.1).

2.2.2 The Geography of Saudi Arabia:

Saudi Arabia is located in the south-western part of Asia in what is known as the Middle East. It covers an area of approximately 2.2 million square kilometres, making it almost a third of the size of the United States of America. In the eastern part of Saudi Arabia is a plateau that starts in the north at the Nafud desert and ends in the south in the Rub Al-Khali (Empty Quarter), which is considered to be the largest sand desert in the world. To the west of this plateau is the Najd, the heart of the country comprising escarpments, and gravel and sand deserts. In the west, a chain of mountains, called Sarawat, runs parallel to the Red Sea and is separated from it by the Tihama coastline. In the south, the Asir Province is located at the southern part of the Sarawat mountains where they rise to over 9,000 feet above sea level.

The country shares borders to the north with Jordan, Iraq and Kuwait and to the east with Bahrain, Qatar, United Arab Emirates, and Oman. To the south, it borders Yemen and to the west is the Red Sea (Figure 2.1). The climate of Saudi Arabia between June and August is very hot and the midday temperature can reach over 45° C, with the exception of the south-western mountains and the Asir province, which are mild during

those months. During winter, the central and northern regions are cold and the temperature can drop below freezing. Rainfall ranges from zero in the Empty Quarter to 20 inches in the Asir Province per year.[1] The land use consists of 2% arable land, 56% permanent pastures, 1% forests and woodlands and 41% other.[2]

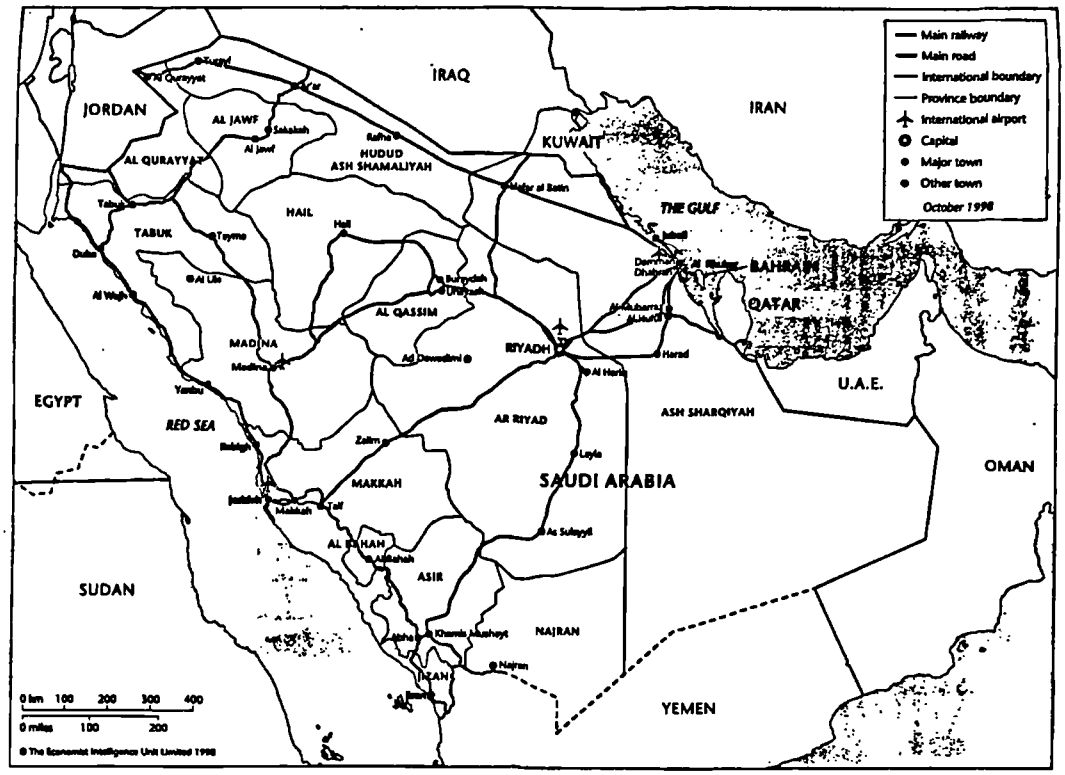

Figure 2.1 A Map of Saudi Arabia
Source: *Country Profile, Saudi Arabia 1998-1999* (1998) London: The Economist Intelligence Unit.

In 1992, the population of Saudi Arabia was approximately 17 million according to the latest official general census of housing and population conducted in that year. Among them are 12.3 million Saudi nationals and 4.7 million foreign nationals, mainly working

[1] Royal Embassy of Saudi Arabia (2000) Washington, DC, (available at) *http://www.royalembassy.net/.*

in Saudi Arabia.[3] The estimation of the population in 1997 was 19.5 million,[4] while for the year 1998, it was estimated at 20.8 million, of which 5.2 million were non-nationals. In the same year, the country's population growth rate was 3.41%, which was considered one of the highest rates in the world. The birth rate was 37.63 births/1000 population and the death rate was 5.02 deaths/1000 population for 1998.[5]

2.2.3 The Government in Saudi Arabia:

Saudi Arabia is a monarchy in which the King heads the executive system. The Shari'ah (Islamic law) is the source of all laws and regulations in the country and the pillar of the basic system of government. The Saudi Arabian government consists of three branches: the Council of Ministers, the Consultative Council and the Provincial System.

In 1953, King Abdul Aziz, the founder of modern Saudi Arabia, established the Council of Ministers, which was to form, along with the King, the legal and legislative branches of the government. The King is also the Prime Minister, ruling the country through the Council of Ministers. The Crown Prince is the First Deputy Prime Minister and there is also a Second Deputy Prime Minister. In September 1993, King Fahad issued a decree organising the work of the Council of Ministers. Based on that decree, the Council became the highest authority, ruling internal, external, economic, education and defence affairs along with processing all other policies in the country. The decree specifies the

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[2] CIA Publications (2000) Fact-book, Saudi Arabia, Washington, DC, (available at) *http://www.odci.gov/cia/publications/factbook/sa.html.*

[3] Ministry of Planning (1993) *General Census of Housing and Population*, Riyadh, Kingdom of Saudi Arabia.

[4] The Economist Intelligence Unit (1998) *Country Profile, Saudi Arabia 1998-1999,* London, UK, p.3.

[5] CIA Publications (2000) Fact-book, Saudi Arabia, Washington, DC (available at) *http://www.odci.gov/cia/publications/factbook/sa.html.*

term of the council as four years after which it has to be re-established by a royal decree.

The second branch of government is the Consultative Council, which was revived by King Fahad in 1993 after its original establishment at the beginning of the reign of King Abdul Aziz. The new Consultative Council of 1993 included 60 members in the first term, but was then increased to 90 members in the second term of 1997. Members of the Council are chosen from among the elite of the country, and have extensive experience and knowledge gained by serving the Kingdom for many years. The main duty of the Council is to advise the government on matters that have been transferred by the latter to the former. The Council has eight specialised committees in education, health, foreign affairs, security affairs, organisation and administration, Islamic affairs, economic and financial affairs, and service and public utilities affairs.

The third branch of government in Saudi Arabia is the provincial system. This was established during the reign of King Abdul Aziz, but was organised and regulated in detail in 1993 along with the other two branches of government. The provincial system is a necessity due to the large size of the country and the geographic remoteness of the different cities in a vast area of land. Since 1993, the Kingdom has been divided into thirteen provinces, Baha, Al-Hudud Al-Shamaliyah (Northern Border), Jouf, Madinah, Qasim, Riyadh, Sharqiyah (Eastern Province), Asir, Ha'il, Jizan, Makkah, Najran, and Tabuk (Figure 2.2). Each one is headed by a ruler and a vice-ruler and includes several districts which are classified into three categories, A, B and C, depending on their size and population.

Figure 2.2 The 13 Provinces of Saudi Arabia
Source: Royal Embassy of Saudi Arabia (2000) Washington, DC, (available at) *http://www.royalembassy.net/*

2.2.4 The Economy of Saudi Arabia:

The economy of Saudi Arabia is relatively more prosperous than that of a typical Third World economy since the country is the largest producer and exporter of oil in the world. The size of the Gross National Product (GDP) of Saudi Arabia was the largest in the Middle East in 1997, followed by those of Israel, Iran, Egypt, UAE, Algeria, Morocco and Kuwait respectively.[6] Table 2.1 shows significant economic figures relating to the Saudi economy.

[6] The Economist Intelligence Unit (1998) *Country Profile, Saudi Arabia 1998-1999*, London, UK.

Table 2.1 Major economic indicators of Saudi Arabia (1995-2000)* (£1= 6 Saudi Ryals SR)

Economic Indicators	**1995**	**1996**	**1997**	**1998**	**1999**	**2000****
Gross Domestic Product (GDP) (SR billions)	471	511	544	491	488	525
Real GDP change (%)	0.5	1.4	3.0	1.6	-2.0	2.0
GDP per capita (SR/capita)	25792	27141	29145	25751	24874	26250
Inflation rate (%)	5.0	0.9	-0.5	-0.2	3.0	2.0
Exports (SR billions)	188	213	224	149	146	146
Imports (SR billions)	105	104	107	94	94	94
Trade balance (SR billions)	83	109	117	55	52	52
Government budget deficit (SR billions)	-27	-17	-6	-45	-45	-19

* Sources: IMF (1999) *International Financial Statistics*, Saudi Arabian Monetary Agency (SAMA) (1999) *The 35th Annual Report*, Economist Intelligence Unit, *Middle East Monitor* (1998) and Timewell (1999)

** The year 2000 is forecasted (numbers are rounded).

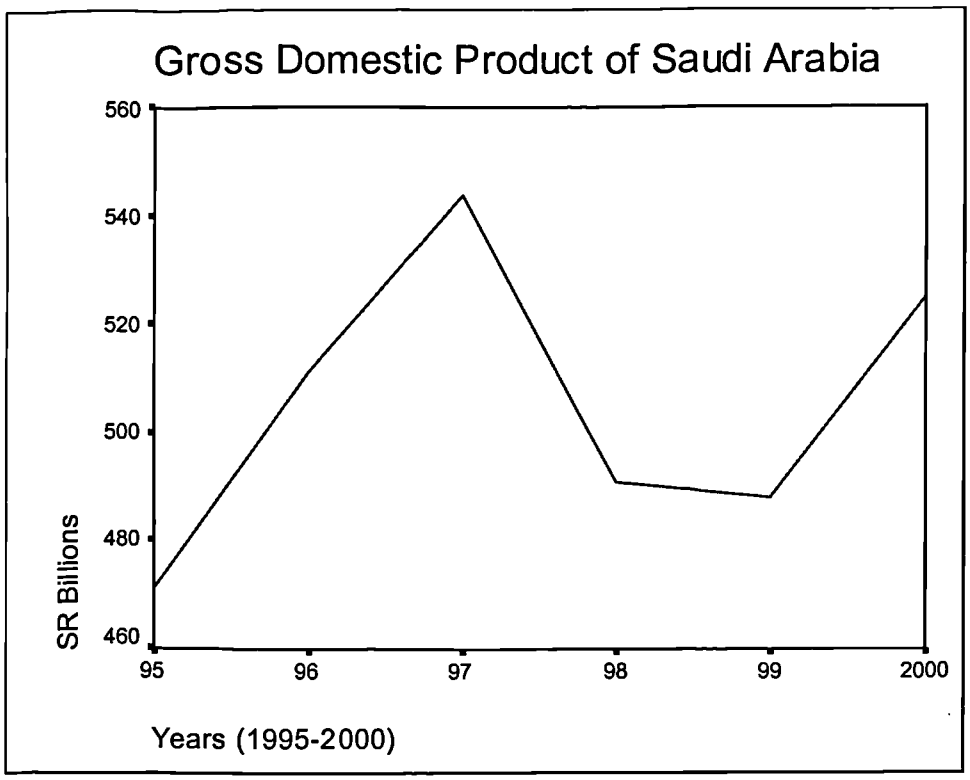

Figure 2.3 Real Gross Domestic Product (GDP) of Saudi Arabia (1995-2000)

Table 2.1 illustrates that the Saudi economy has been in a fairly strong position, although there was some weakening during 1998 because of the slump in oil prices. In 1999, oil prices rose substantially, which contributed to the well-being of the economy

and reduced the budget deficit. During the year 2000, the economy is expected to do significantly better since oil prices were at their highest point during 1999, although the estimated figures given in the table are conservative. The trade balance in the country has shown a surplus for many years, but this has decreased more recently. The inflation rate in Saudi Arabia, as shown in the table, has been low for the last 6 years unlike in other developing countries. The government budget has shown a deficit for the last 6 years; its worst was in 1998. However, the budget of 2000 showed a lower deficit due to an increase in oil prices.

Crude oil sales comprise the biggest share of the national economy, accounting for 40% of GDP and 70% of the government budget in 1998 and 1999 (Timewell, 1999). The proven oil reserve in Saudi Arabia at the end of 1999 was 261.5 billion barrels, which at 25% was the highest proven reserves in the world. The production of oil in the Kingdom is approximately 8 million barrels a day. Figure 2.4 shows a comparison of oil reserves made between Saudi Arabia and other countries at the end of 1999. In addition, the estimated natural gases reserves in the country, is at 204.5 trillion cubic feet, ranked fifth in the world after Russia, Iran, Qatar, and UAE, respectively.[7]

[7] United States Energy Information Administration (2000) Washington, DC, (available at) *http://www.eia.doe.gov.*

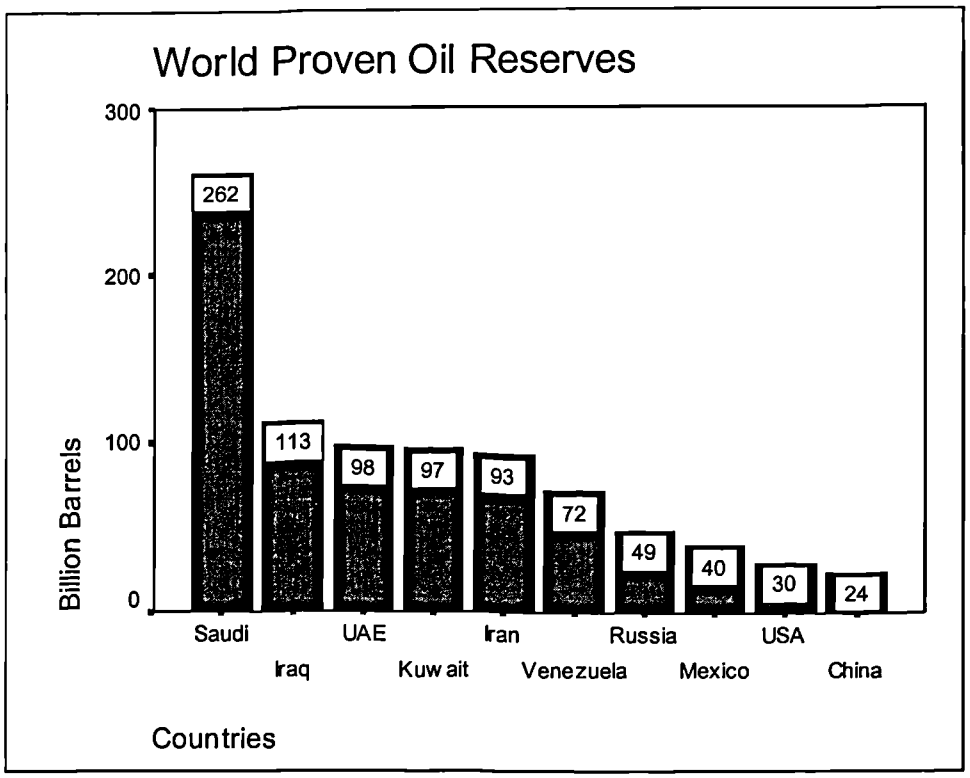

Figure 2.4 World proven oil reserves (1999) (Numbers are rounded)
Source of data: BP Amoco (2000) BP Amoco Statistical Review of World Energy, (available at): www.bpamoco.com/oil/index.html.

Saudi Arabia exports commodities other than crude oil and natural gases. These include chemical and petrochemical products, which rank second, construction materials, which rank third, and agricultural products which rank fourth in total exports. Export commodities for 1998 are shown in Table 2.2, while Figures 2.5 and 2.6 show Saudi exports and imports.

Table 2.2 Saudi exports by commodities for 1998*

Products	**SR billions**
Oil (crude and refined oil)	125.541
Petrochemicals	9.961
Construction Materials	2.737
Agricultural, animal and food products	1.663
Other products including re-exports	9.055
Total	**148.957**

*Source: Saudi Arabian Monetary Agency (SAMA) (1999) 35th Annual Report, p. 110-111

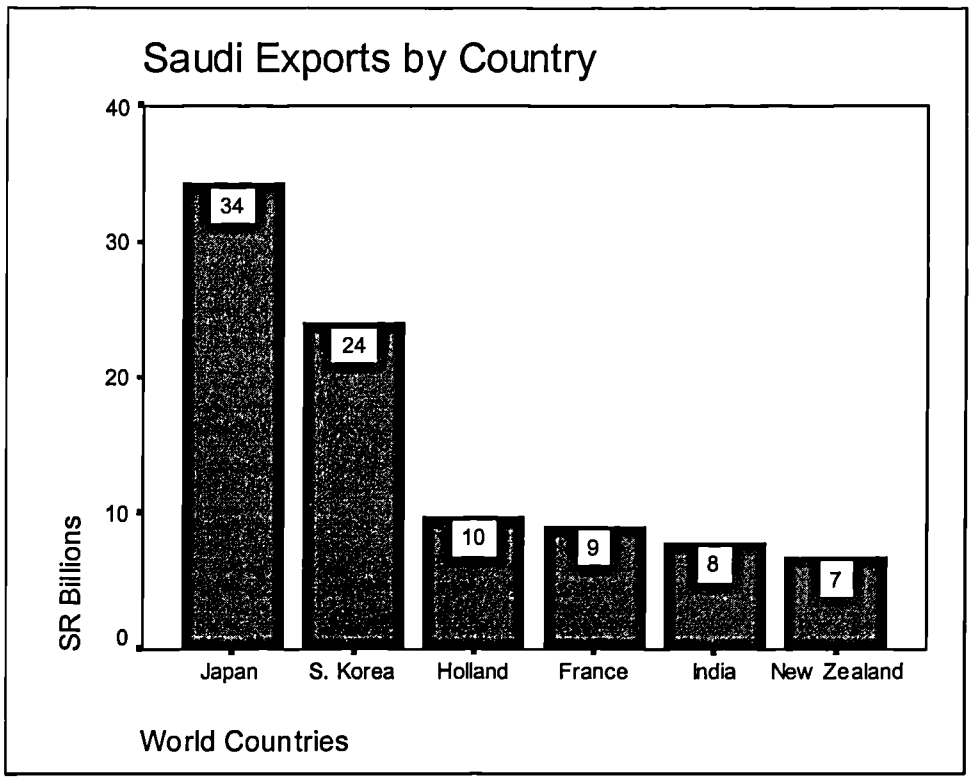

Figure 2.5 Saudi exports to world countries (the leading six countries) (1998)
Source: Saudi Arabian Monetary Agency (SAMA) (1999) 35th Annual Report

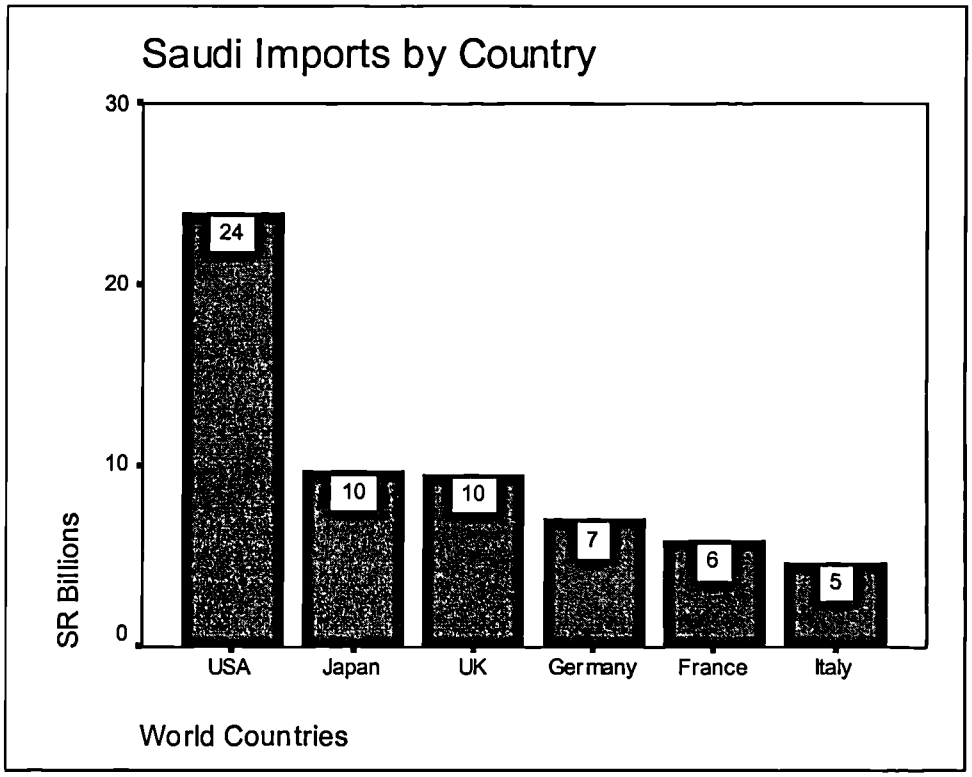

Figure 2.6 Saudi imports from world countries (the leading six countries) (1998)
Source: Saudi Arabian Monetary Agency (SAMA) (1999) 35th Annual Report

2.3 Part 2: The Saudi Industrial Environment:

2.3.1 The Saudi Government and the National Industry:

As a developing country, Saudi Arabia is relatively new to the industrialised world. After the great increase in the oil prices in the 1970s and the subsequent accumulation of wealth, the country started to implement ambitious industrial policies. At that time, the private sector had neither the capital nor the technical capabilities to establish mechanised, large factories. Therefore, the Saudi Government became involved in the establishment and support of the industries in the country, and found itself in a position where it had to provide every form of assistance until the private sector could bear the responsibility of dealing with the more sophisticated and complicated industries itself. The Saudi Government has supported industry in many ways, and has thus played a crucial role in its development. The following sections will demonstrate the contribution of the Government in this area.

Government Policies for Industry:

The Saudi Government has paid considerable attention to its industry since 1970, which saw the beginning of the first five-year development plan. Prior to this, Saudi industries were limited to a few hundred manual factories that produced or packed simple goods, such as dates and fruits, sweets, ice, matches, wooden furniture and some leather products.

In 1974, the Saudi Government issued a first declaration of principles for its industry comprising 11 points that established the first commitment of the latter to the former. The declaration started by encouraging people to invest in industry in order to increase national income and provide employment opportunities for Saudi nationals. The

Government considered free enterprise to be the principle for industrial activities, creating competition that would help to keep prices of goods reasonable. In addition, the Government would distribute information and data about new opportunities arising in the industry and provide technical and administrative services to the factories in the country. It then issued some encouragement policies, such as the provision of loans; tax exemptions; giving national products the priority in purchasing; and imposing taxes on imported goods, among other measures. Moreover, it created a number of large, well-constructed industries, and asked the private sector to participate according to its capabilities. It then encouraged foreign investment in the industrial field to ensure the free movement of capital from and into the Kingdom.[8] In 1975, the government established the Ministry of Industry and Electricity, which had been part of the Ministry of Commerce for decades.

The more significant expanding projects of the Saudi industry started after 1976, during the second five-year development plan of 1975 to 1980. The Government was involved on a large scale by providing massive industrial loans and technical assistance, establishing industrial cities and giant government corporations, as well as by enacting encouragement laws and regulations. In the current, sixth five-year development plan, of 1995-2000, the Government issued its latest strategy for Saudi industry and presented its objectives for developing the industrial sectors.[9] These aims included the increase of the contribution of the industrial sector to the national economy and the expansion of the industries that rely on raw materials that exist in the country. They also aim at the achievement of the co-operation and liaison between the industrial and

[8] Chamber of Commerce & Industry of the Eastern Province (1996) *Industry Guide*, 2nd edition, Dammam, Kingdom of Saudi Arabia, pp. 13-17.
[9] Ministry of Planning, *The Sixth Development Five-year Plan 1415-1420 A.H* (1995-2000), Riyadh: Kingdom of Saudi Arabia, pp. 237-252.

other sectors in the economy, especially the agricultural and the mining sectors. Another objective is the expansion of the contribution of the industrial sector in meeting local demand for goods to replace imports of such commodities. Finally, in this plan, the Government is now trying to achieve diversification of industry and, most importantly, its employment of Saudi nationals. Moreover, it aspires to expand the petrochemical and metal industries and develop of the industrial cities. The plans also include an increase in industrial investment locally and globally, a growth in the industrial exports, the development and employment of Saudi nationals and the privatisation of the government-owned industries.

Government Incentives to Industry:

The Saudi Government has offered a number of incentives and enacted regulations to maintain its infant industry. Moreover, it established industrial cities in which it has rented pieces of lands with a symbolic value of SR .08 for each square metre and provided electricity at low tariffs. In addition, Saudi factories enjoy exemption from company taxes, unlike foreign companies operating in the country that after ten years of exemption, have to pay between 25-40% of their profits in taxes. The Saudi Industrial Development Fund (SADF) provides loans at up to 50% of the total capital of industrial projects. Furthermore, the Government provides financial assistance for the training of Saudi nationals who are working in industries that employ more than 100 workers. Finally, Saudi industries are protected by the imposition of custom fees on similar imported goods with certain conditions to protect customers from high prices and exploitation.[10] Another incentive to industry is the enactment of a series of regulations that make government purchases almost exclusive to Saudi factories. In these

[10] Jeddah Chamber of Commerce & Industry (1994) *Industry Guide*, Jeddah, Kingdom of Saudi Arabia, pp. 23-25

regulations, the Government has given national firms absolute priority in such purchases.[11]

2.3.2 Major Supportive Agencies:

The Saudi Industrial Development Fund:

The Saudi Industrial Development Fund (SIDF) was established in 1974 to work in liaison with the Ministry of Finance in order to provide industrial loans to Saudi factories. The SIDF started with a capital of SR 500 million and increased rapidly to reach SR 7 billion as of 1997. Between 1974 and 1997, the SIDF provided 1959 loans, which were distributed to 1515 industrial projects and amounted to a total value of SR 30.6 billion. As of 1997, SR 21.5 billion was paid to those projects and SR 13.2 billion was paid back to the SIDF from those factories.[12]

The SIDF has regulations to define a firm's eligibility for a loan. These state that the firm should be a Saudi factory engaged in the manufacturing industry and viable from the marketing, technical and financial points of view. The project should be a capital and power-intensive rather than a labour intensive one and provide the opportunity to employ Saudi nationals. The SIDF has demanded that the projects utilise local raw materials, replace imported goods, aim at increasing exports and bring advanced technology to the country. The maximum loan is SR 400 million and the fixed assets of the project are mortgaged. The size of the loan can be up to 50% of the total capital of

[11] Chamber of Commerce & Industry of the Eastern Province (1998) *Regulations of Encouragement of National Industries in Government Purchases*, Dammam, Kingdom of Saudi Arabia.
[12] Ministry of Industry & Electricity (1999) *Development of the Industry in 100 Years 1319-1419 A.H*, Riyadh, Kingdom of Saudi Arabia, p. 131.

the project, and there is a 2.5% administrative fee to be collected from the client. The SIDF usually provides technical, marketing and managerial services to such clients.[13]

Industrial Exports Organisations:[14]

There are two organisations in charge of promoting exports in Saudi Arabia. They are: the Saudi Export Development Centre (SEDC); and the Saudi Industrial Exports Company (SIEC). The former was established in 1986 to provide the private sector with assistance in order to increase Saudi exports. It has taken measures such as conducting research and collecting information about the prospects for exports, as well as providing industry with such information. The centre also organises industrial exhibitions and conferences abroad to educate other countries about Saudi industries. In addition, the SEDC provides technical assistance to industries in aspects such as product design, packaging, and product development.

On the other hand, the Saudi Industrial Exports Company (SIEC) was established in 1989 with an initial capital of SR 50 million for the purpose of increasing Saudi industrial exports and opening new markets. At the beginning of its activities, the company concentrated on promoting plastic, metal, cement, agricultural products and petrochemical products since they rely on local raw materials.

[13] Ministry of Finance & National Economy (1995) Saudi Industrial Development Fund , *Guide to Industrial Loans,* Riyadh, Kingdom of Saudi Arabia

2.3.3 Regional Development Activity:

The Royal Commission for Jubail & Yanbu:

The Royal Commission for Jubail & Yanbu (RCJ&Y) was established in 1976 and comprises two large industrial areas located in the cities of Jubail and Yanbu. Jubail is situated in the Eastern Province on the Arabian Gulf, while Yanbu is by the Red Sea in the western part of Saudi Arabia (See Figure 2.1). They are known as Jubail Industrial City and Yanbu Industrial City, and house industries such as those of Sabic and other factories. RCJ&Y provides an infrastructure, resources such raw materials, as well as technical and educational services to the manufacturing firms located in its two cities. Both cities have industrial seaports to facilitate the import and export of materials and goods. Their main attraction is the abundance of raw materials, such as oil, gas, petrochemical and chemical products, iron ore, copper and potash.

The two cities house mainly well-known joint venture firms, such as Exxon, Mobil, Celanese, Texas Eastern, Honeywell, Ameron and Shell, among many others. In addition, they provide power, telecommunications, housing, health care, water, industrial-cooling water, wastewater collection, pipelines, solid waste disposal, roads, and vocational colleges as well as other services.[15]

The Saudi Basic Industries Corporation:

Saudi Basic Industries Corporation (Sabic) was established by the Saudi Government in 1976 in order to exploit the country's basic raw materials, such as oil, gas and iron ore. Sabic consists of 19 companies, the majority of which are joint venture firms with

[14] Jeddah Chamber of Commerce & Industry (1994) *Industry Guide*, Jeddah, Kingdom of Saudi Arabia, pp. 47-52 and Chamber of Commerce & Industry of the Eastern Province (1996) *Industry Guide*, Dammam, Kingdom of Saudi Arabia, pp. 31-33.

leading world industrial corporations. Of the Sabic firms, 13 are located in Jubail, two in Yanbu and one in Jeddah, while the remaining two firms operate from Bahrain. Sabic's main products are petrochemicals, chemicals, gas, plastics, fertilisers, metal, and petroleum products.[16] Its firms employ 70% of their workforce from Saudi nationals, which is a relatively high percentage compared to the private sector in Saudi Arabia (8%).[17] In the middle of the 1980s, the Saudi Government sold out 30% of its ownership of Sabic as shares to Saudi nationals. The researcher surveyed 12 Sabic firms in this study.

The Industrial Cities:

Starting in 1970, the Saudi Government has established eight industrial cities in the country, and these house most of the industries in the Kingdom. However, many factories are located outside of these. These industrial cities provide the necessary facilities such as electric power, telecommunications, health clinics and other services. They are built away from the populated cities in order to keep pollution out of the residential areas and maintain a clean and healthy environment. The industrial cities house 1232 factories, which comprise about half of the total number of factories (2688) in the country as of 1998, not including petroleum refineries or the Jubail and Yanbu cities. Table 2.3 shows the number of factories in each of the eight industrial cities.

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[15] Royal Commission for Jubail & Yanbu (1999) *Jubail and Yanbu Industrial Cities*, Jubail, Kingdom of Saudi Arabia

[16] Saudi Basic Industries Corporation (Sabic) (1999) *SABIC Chemicals, Fertilisers, Plastics and Steel*, Jubail, Kingdom of Saudi Arabia

[17] Ministry of Industry & Electricity (1999) *Development of the Industry in 100 Years 1319-1419 A.H*, Riyadh, Kingdom of Saudi Arabia, p. 108

Table 2.3 Number of factories in the industrial cities* (Excluding Jubail & Yanbu)

Industrial City	Province	Number of Factories
Riyadh First	Riyadh (Middle)	51
Riyadh Second	Riyadh (Middle)	516
Jeddah	Makkah (Western)	338
Dammam First	Eastern	123
Dammam Second	Eastern	127
Al-Ahsa	Eastern	24
Al-Qassim	Al-Qassim	33
Makkah	Makkah (Western)	20
Total		**1232**

* Source: Ministry of Industry & Electricity (1999) *Development of the Industry in 100 Years 1319-1419 A.H*, Riyadh, Saudi Arabia, p. 173.

2.3.4 Problems in Saudi Industry:[18]

Industry in Saudi Arabia has encountered several problems. The first of these is the lack of diversification resulting from a strong focus on petrochemical products. Petrochemical output represents more than 60% of the national income of industry in general. The second problem is the fierce competition in the world petrochemical market, which requires Sabic to increase its efforts to compete in the world arena. The third impediment lies in technology transfer, since the Kingdom relies mainly on foreign technology and thus requires the Government and industry to establish technology exchange that is suitable for local needs. The fourth difficulty facing industry is a lack of advanced techniques and experience in industrial marketing, while the fifth hurdle is a lack of databases and information centres to serve the industries in the country. The sixth problem concerns small industries, which do not benefit from the Government incentives offered to larger projects. The seventh difficulty is that some people might establish industrial projects out of personal desire rather than create viable, profitable projects based on actual studies.

[18] Al-Dakheil (1993) and Ministry of Planning, *The Sixth Development Five-year Plan 1415-1420 A.H (1995-2000)*, Riyadh, the Kingdom Saudi Arabia, pp. 245-247.

The final and a more subjective problem is that the majority of workers in the private sector are not Saudi nationals. Al-Dakheil (1994) mentions that Saudi workers in the private sector represented only 8% of total employees while 92% were foreign workers. In the industries owned by both the Government and the private sector, the percentage is higher: 67% were Saudi nationals while the remainders were foreign labourers. Recent figures are not available since the industry statistics for the Ministry of Industry do not include the percentages of Saudi vs. foreign labours working in the country.

The reasons for not employing Saudi nationals might be that private firms are not willing to pay the high salaries that they demand. Instead, they pay foreign workers half or a quarter of the local salary. Another reason is that the Government, until now, has not imposed strict laws on foreign labour, although it has created some restrictions on the employment of foreigners. The third reason might be that some Saudi nationals are not willing to work in certain vocational occupations for different cultural reasons. Finally, some of the technical jobs require highly skilled workers, who might not be available among Saudi nationals.

The Government is trying to solve this problem in the private sector by imposing new laws, although at present this has proved ineffective. Moreover, in 1996, the Government issued a regulation demanding that a firm with more than 20 workers should ensure that at least 5% of its labourers are Saudi nationals.[19] In addition, it has increased the fee of issuing a visa to a foreign worker to SR 2000 for each person. In 1999, the Ministry of Interior refused to issue any new visas to firms with more than 100 workers of whom fewer than 20% were Saudi workers. Moreover, the Government

[19] Riyadh Chamber of Commerce & Industry (1996) *Annual Report*, Riyadh, Kingdom of Saudi Arabia, pp. 35-36

now contributes to the training programmes of Saudi workers by encouraging firms to hire them even if they require training. In this study, the researcher has investigated the employment of Saudi and foreign workers in quality-related positions among ISO 9000 registered firms in the country.

2.3.5 Saudi Industry Statistics:[20]

Factories by Saudi Provinces:

By 1998, Saudi industry had 2688 factories with an investment of about SR 207 billion and employing more than 250 thousand workers. Among these factories there were 362 foreign firms operating in the country, who were offered 10 years' free tax. Table 2.4 shows the distribution of Saudi factories in the 13 provinces.

Table 2.4 Factories' statistics in Saudi Arabia in the13 Saudi provinces (1998)

Province	No. of Factories	No. of Workers	Capital Investment SR millions
Riyadh	924	86480	24827.77
Makkah	728	70109	33705.57
Eastern Province	651	71006	106370.41
Qassim	113	6697	3051.41
Madinah	99	11080	37271.76
Assir	58	2286	598.70
Jizan	28	1339	1382.34
Tabuk	23	596	207.94
Ha'il	22	614	127.85
Najran	15	438	107.45
Baha	11	244	46.93
Jouf	11	238	49.45
Northern Boarders	5	92	13.94
Total	**2688**	**251219**	**207761.52**

[20] Data included in this section are obtained from: Ministry of Industry & Electricity (1999) *Development of the Industry in 100 Years 1319-1419 A.H*, Riyadh, Kingdom of Saudi Arabia.

From Table 2.4, it can be seen that in 1998 Riyadh ranked highest with 924 factories employing more than 86 thousand workers, followed by Makkah, which includes the Jeddah factories, employing more than 70 thousand workers. The Eastern Province came third in terms of its number of factories but was highest in capital investment due to the large oil and petrochemical industries of Sabic and Aramco. The Eastern Province, which includes the Jubail industries, has investments of more than SR 100 billion, and in terms of outputs is the largest in the country. Figure 2.7 shows the growth in the number of factories in the country between 1989 and 1998.

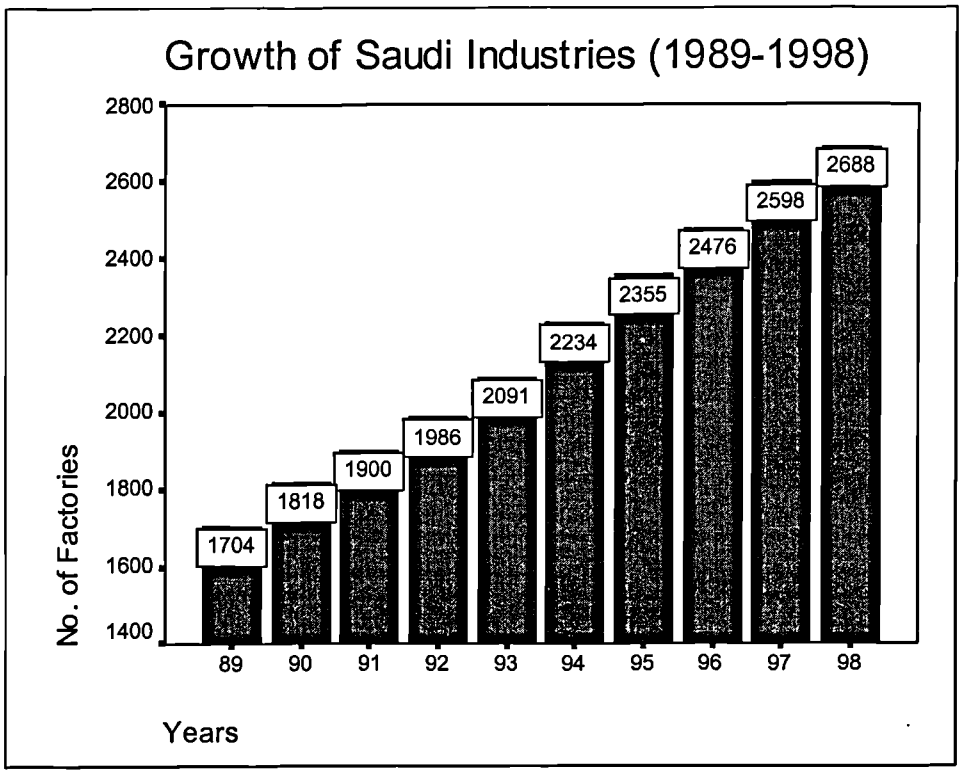

Figure 2.7 Growth of Saudi industries between 1989 and 1998.

Factories by Sector of Activity:

The distribution of Saudi factories by the 10 sectors of activity or types of products is shown in Table 2.5.

Table 2.5 Factories' statistics in Saudi Arabia by sector of activity (1998)

Sector of Activity	No. of Factories	No. of Workers	Capital Investment SR millions
Metallic Products and Machines	737	63340	17535.76
Plastic and Chemical Industries	515	59205	138085.54
Building Materials and Glass	493	43312	23486.01
Foodstuff	426	35305	13043.64
Paper Products and Printing	174	13752	5131.40
Wooden Products and Furniture	125	10326	1792.18
Textile and Leather Products	121	14943	2987.94
Miscellaneous	65	5482	989.15
Transportation and Storage	19	1995	402.07
Basic Metal products	13	3559	4307.83
Total	**2688**	**251219**	**207761.52**

The table shows that in 1998, metallic products ranked first with 737 factories, followed by plastic and chemical industries with 515 factories, while the building materials industries came third with 493 factories. However, in terms of capital investment, plastics and chemical industries ranked highest, investing more than SR 130 billion as a result of the existence of the chemical and petrochemical industries of Sabic and Aramco.

Industrial Exports:

In 1997, the industrial exports of Saudi Arabia (other than oil products, natural gases and mines) were distributed to 118 countries in the world. Table 2.6 shows the statistics for industrial exports from Saudi Arabia during this period.

Table 2.6 Industrial exports of Saudi Arabia (1997)

Sector of Activity	Value of Exports (SR millions)	%
Sabic exports	13496	58.26
Metallic Products and Machines	4752	20.51
Plastic and Chemical Industries	2599	11.22
Miscellaneous	1674	7.23
Foodstuff	434	1.87
Textile and Leather Products	211	0.91
Total	**23166**	**100.00**

Table 2.5 shows that the value of Saudi exports for 1997, excluding crude oil, refined oil, natural gases and mines, exceeded SR 23 billion. Sabic products were valued at more than SR 13.4 billion, comprising more than 58% of the total exports of chemicals, petrochemicals, plastics, metal products and fertilisers. The table also illustrates that Saudi Arabia's main exports (other than Sabic's) were metallic products, chemicals and petrochemicals, which reflect the abundance of raw materials that exist in the country.

2.4 Part 3: The Saudi Arabian Standards Organisation (SASO):

2.4.1 The Establishment of SASO:

Due to the increase in business and industrial activities in Saudi Arabia at the beginning of the 1970s, the Government felt the need to establish a central standardisation body in the Kingdom. On 16.4.1974 (3.3.1393 A.H), a royal decree was issued to establish the Saudi Arabian Standards Organisation as a corporate body with an independent budget under the directorship of the Minister of Commerce. SASO started its actual business in the late 1970s at the beginning of the country's industrial revolution, which was driven by high oil prices and the accumulation of wealth that underpinned the Kingdom's radical development plans.

SASO's main responsibilities, as declared in its official publications, are mainly related to standardisation and measurements. The first function of SASO is to apply national standards for products; metrology; calibration of equipment; marking and identification of products and inspection, and then to publish such standards. Another function of SASO is the granting certificates of conformity and quality marks. In addition, SASO claims that it promotes standardisation in the Kingdom and creates awareness of standards. Finally, SASO represents the country in the international arena as a member body in the International Organisation for Standardisation (ISO).

Although SASO issues new standards every year, the fact is it simply adopts other world standards and specifications, such as those of BSI or ISO. Its contribution in terms of standardisation is very limited or even non-existent. The organisation does not have highly experienced staff to deal with product specifications or standards. Therefore, the role of SASO is merely to discuss and evaluate other world standards to find out the most appropriate ones to be adopted in Saudi Arabia.

2.4.2 SASO Principal Departments:

SASO comprises six major departments: the Standards General Department, the Quality Control General Department, the Laboratories General Department, the Information Centre, the General Department of Services, and the Administrative and Financial Affairs General Department. The following sections briefly explain the functions of each department.

2.4.2.1 The Standards General Department:[21]

This department is responsible for the drafting and approval of standards or, in other words, product specifications. It comprises several sections covering various types of product categories, such as agricultural and food products, electrical and electronic goods, mechanical and metal products, chemical and petroleum products, construction and building materials, and textiles. In addition, the department includes a metrology specification section and a technical committee section. Supervising each product category is a committee of experts, usually from Saudi industry. The Standards Department obtains product specifications from international standards organisations and distributes them to the members of each committee to solicit their views and comments. After discussion, SASO approves the most appropriate specifications based on the judgement of the committee concerned.

2.4.2.2 The Quality Control General Department:

The major concern of this department is the application of quality control and quality assurance systems. This department includes four sections: certificates of conformity, quality mark, accreditation of laboratories and quality assurance, as outlined in the following sections.

Certificates of Conformity:

This section includes two services. The first is the issuing of certificates of conformity by SASO according to Part 2 of the Quality Mark and Certificates of Conformity Regulations (1994), while the second service relates to the International Conformity Certification Programme (ICCP). The former service concerns the certificates of

[21] SASO (1994) Catalogue of Saudi Standards and updated from SASO (2000) (available at) *http://www.saso.org/.*

conformity, issued by SASO upon request from any firm to indicate that a certain product complies with certain mandatory or optional standards. This service may cover any commodity or product, whether manufactured in Saudi Arabia or imported from abroad. For this service, SASO charges the firm a sum equal to 0.3% of the total retail value of the lots that will be evaluated.[22] The second service, as mentioned, is the International Conformity Certification Programme (ICCP), which is conducted by SASO and the Ministry of Commerce to ensure that imported goods into the Kingdom comply with the standards developed or approved of by SASO. The objective of this programme is to prevent inferior quality and dangerous goods from entering Saudi Arabia. Currently, the programme covers 76 product categories divided into five groups: food and agriculture, electronic and electrical products, automobile and related products, chemical products, and other products. The programme has 37 affiliated offices throughout the world, which provide services to exporters and importers to and from the Saudi market.[23]

Quality Mark:

The quality mark is probably the most used service among all other SASO services in the Kingdom. SASO issues the quality mark according to the regulations in Part 1 of Quality Mark, Certificate of Conformity and Accreditation of Services (1994).[24] The quality mark is exclusive to national products that are manufactured in the country and which conform to Saudi standards. Under this service, SASO inspects both the product and the quality system of the firm to ensure the efficiency of the quality system and the

[22] SASO (1994) *Quality Mark, Certificate of Conformity and Accreditation of Services Regulations, Part2: Certificate of Conformity*, published 12.1.1994; as of 2000, no changes on the regulations including the charges, information is updated through SASO (2000) (available at) *http://www.saso.org/.*
[23] SASO (2000) (available at) *http://www.saso.org/.*

conformity of the product to the relative SASO standards. SASO then allows the firm to stamp the product with the quality mark logo of SASO (as shown in Figure 2.8) for one year.

Figure 2.8 The SASO quality mark stamped on products complying with standards
Source: SASO (1994) Quality Mark and Certificate of Conformity Regulations, Part 1, p.8

The fees that are charged by SASO for using its quality mark are relatively high and might be unjustifiable. SASO charges a percentage of sales revenue depending on the number of products; the minimum amount is SR 5000 and the maximum ceiling is SR 70,000 for each year. The returns from obtaining this mark are simply propaganda-related, and there are no other actual benefits to the firm. Each year, SASO charges an amount based on the previous year's statement of income without enhancing the firm's quality system or suggesting ways of improving the product.

[24] SAS) (1994), Qua*lity Mark, Certificate of Conformity and Accreditation of Services Regulations , Part 1: Quality Mark,* published on 12.1.1994; no changes on these regulations including fees, updated in 2000 through SASO (2000) (available at) *http://www.saso.org/.*

Accreditation of Laboratories:

The Accreditation of Laboratories regulations were issued under Quality Mark, Certificates of Conformity and Accreditation of Services (1992) Part 3, Section 1.[25] Laboratories that conduct testing, and which operate in the country may be eligible for accreditation by SASO under this scheme. SASO assesses several aspects of a laboratory and provides accreditation when a laboratory complies with its criteria, covering such aspects as technical matters, which include the testing, measuring and reporting of results. In addition, SASO assesses human factors, such as the competence of employees, and evaluates facilities, equipment, calibration, records and the conduct of the laboratory.

Quality Assurance:

The Quality Assurance Department assesses firms against ISO 9000 quality management systems. The role of SASO in the implementation of ISO 9000 in the country was investigated in this research and will be explained in detail in Chapter nine ISO 9000 implementation.

2.4.2.3 The Laboratories General Department:[26]

This department includes two sections: the Quality Control Laboratory and the Metrology and Calibration Laboratory. The Quality Control Laboratory carries out laboratory tests and examinations for various products and commodities. It is comprised of nine laboratories, including mechanical and metal, electrical, petrochemical, agriculture and food, general materials, construction and building

[25] SASO (1992) *Quality Mark, Certificate of Conformity & Accreditation of Services, Part 3: Accreditation of Services, Section 1: Accreditation of Laboratories*, published on 26.1.1992, no changes in the regulations nor fees, updated in 2000 through SASO (2000) (available at) *http://www.saso.org/.*
[26] SASO (1994) *Catalogue of Saudi Standards* and SASO (2000) (available at) *http://www.saso.org/.*

materials, motor vehicle, pesticide, and textiles. Their function is to carry out tests on different types of products.

On the other hand, the Metrology and Calibration Laboratory of SASO performs the calibration and measurement of equipment, including testing equipment. It has ten laboratories: dimensional, mass, volume and density, pressure and force, thermometry, radiation, electrical measurement, time and frequency, electronics testing and electrical and electronics workshops. Since calibration is required by ISO 9000, the researcher has covered some aspects of calibration by SASO in Chapter nine.

2.4.2.4 Other Supporting Departments:

SASO has three supportive departments to help the organisation in the execution of its work and functions. These are: the Information Centre; the General Department of Services; and Administrative and Financial Affairs General Department. The Information Centre of SASO and is a typical library containing materials related to the work of the organisation, as well as books and references in fields such as standards, specifications, calibration, and other related disciplines. The General Department of Services is responsible for providing the necessary services to other departments of SASO to facilitate their execution of their responsibilities. It provides services such as translation, editing and publishing, managing the SASO Printing Press facility, typing, and printing. In addition, the department provides the transportation and other logistical services for various SASO departments. The third supporting department the Administrative and Financial Affairs General Department, conducts the administrative and financial matters of SASO which support the technical functions of the

organisation. It includes typical departments such as finance, personnel, purchasing, and a storehouse.

2.5 Summary:

In this chapter, a brief coverage of the Kingdom of Saudi Arabia has been presented in three parts. The first part included a brief coverage of the general features of the country, covering subjects such as the history, the geography, and the political scene. The second part entailed information about the Saudi industries, while the third part gave a brief summary of the activities of SASO. In the next chapter, an introduction to quality management will be presented.

CHAPTER THREE

INTRODUCTION TO QUALITY

CHAPTER THREE

INTRODUCTION TO QUALITY

3.1 Introduction:

This chapter is an introduction to the literature review and consists of three sections. The first section presents the definition of quality according to a number of scholars. The second section is committed to the classic writers on quality who are considered as the quality gurus. The evolution of quality is presented in the third section of this chapter.

3.2 Definition of Quality:

Many scholars give different meanings to quality; however, the central aspect of the definition is the customer. Quality might mean fitness for use, implying that the product, when it is fit for its intended use is of a good quality. In addition, quality might imply conformity to specifications, which once achieved again indicates that the product bears quality. Whether quality implies fitness for use, fitness for purpose or conforming to standards, it has to satisfy the needs of the customers who consume the product or use the service. From this concept, many writers in quality stress the customer satisfaction needed to achieve quality in the product or service. Juran (1988a:2.2) emphasises the concept of the customer giving two correlated meanings to quality. The first is that "quality consists of those product features which meet the needs of the customers and thereby provide product satisfaction". The second meaning is that "quality consists of freedom from deficiencies". Feigenbaum (1991:7) also emphasises the needs of the customers by saying that quality is "the total composite product and service characteristics of marketing, engineering, manufacture, and

maintenance through which the product and service in use will meet the expectations of the customers". Moreover, Ishikawa (1985:44), when defining quality control states that the bottom line of quality is satisfying the customers. He says that, "to practice quality control is to develop, design, produce and service a quality product which is most economical, most useful, and always satisfactory to the customer".

The modern scholars were no different from the quality gurus in defining quality and emphasising the satisfaction of customers as an indicator of quality. Bergman and Klesfsjo (1994) consider the quality of the product, as is its ability to satisfy the needs and expectations of the customers. They argue that the quality dimensions of the product include reliability, durability, safety, faultlessness, aesthetics, environmental friendliness, serviceability, and performance. In addition, Oakland (1996:4) gives a short definition in which he emphasises the customer by saying that, "quality is simply meeting the customer's requirements". Harry (2000:78) defines quality as "a state in which value entitlement is realised for customer and provider in every aspect of the business relationship".

ISO, the subject of this study, is no exception to all the previous definitions in regarding making the satisfaction of the customer as the centre of quality of the product or service. ISO 8402 (1994:7) defines quality as "the totality of characteristics of an entity that bear on its ability to satisfy stated or implied needs". The word 'entity' refers to product as well as service, person, activity, process, organisation, system, or any combination of one or more of those elements. The new ISO CD 2 9000:2000 (1999:11)[1] gives practical and technical meaning to quality. The former meaning is

[1] In the new ISO of 2000 series (expected to be published in 2000), the definitions of quality terms are included in ISO 9000, thereby omitting ISO 8402.

"satisfaction of needs and expectations", while the latter is "the nature of an object related to needs and expectations". The new ISO draft is similar to all previous definitions of quality, satisfying the needs and expectations of the customers.

3.3 The Quality Gurus:

The quality gurus are the scholars who first contributed to the field of quality management after the Second World War by establishing the initial concepts in the field. Bendell (1991) considered the quality gurus as those who made the most impact to the field of quality. Harris (1995) argues that although many figures have contributed in the field of quality, the most prominent quality gurus in North America are Deming, Juran, Crosby, and Feigenbaum. He added that the Quality Circles concept is associated with Ishikawa of Japan, and the concept of TQM is associated with Feigenbaum. In addition, Black and Porter (1996) agree that the recognised gurus in the field of TQM are Deming, Juran, Crosby, Feigenbaum, and Ishikawa. Bendell (1991) classifies the quality gurus into three groups: the early Americans (Deming, Juran, and Feigenbaum); the Japanese (Ishikawa, Taguchi and Shingo); and the New Western Wave (Crosby, Peters and Moller). In the following sections, the work of five quality gurus (Deming, Juran, Crosby, Ishikawa, and Fegenbaum) are presented, focusing on their most predominant and crucial contributions in quality.

3.3.1 W. Edwards Deming:

Deming is probably the most famous and prominent figure in the field of quality management in the world, and part of his fame is drived from his influence on Japanese industry. During the 1950's, he was invited to Japan to lecture to the Japanese on quality following the ruin of its industry. Because of his contribution, the Union of

Japanese Science and Engineering (JUSE) named a quality prize after him, to be awarded each year to a Japanese company that had successfully adopted a company-wide quality control system and the Deming philosophy of quality (Scholtes, 1996; Walton, 1989).

Scholtes (1996) presents Deming's view of the world as he saw it in 1950 while lecturing to the Japanese. The first point is that an emphasis should be placed on globalisation and consequently on international standards to ease the exchange of products. Secondly, priority should be given to customer needs and demands, and a company should therefore meet those needs. Thirdly, the responsibility for quality is the burden of management, and quality cannot be better than the standard expected by management. Fourthly, the manufacturing process should be regarded as a system where suppliers and customers should be seen as essential components. These four points of are still viable and crucial these days; standardisation of products, meeting customer needs, top management commitment to quality, and system-oriented firms.

Deming (1982) contended that a product of good quality does not necessitate that high costs associated with quality are increased; costs will decrease as quality increases because the costs of rework and mistakes are reduced. As the quality of the product or the service increases, Deming asserted, productivity will consequently increase and in both cases the company will capture a greater market share. As the company has a larger market, prices will go down due to economies of scale, and this will lead to more customers, and more businesses flourishing and, eventually, more jobs. This chain is shown in Figure 3.1.

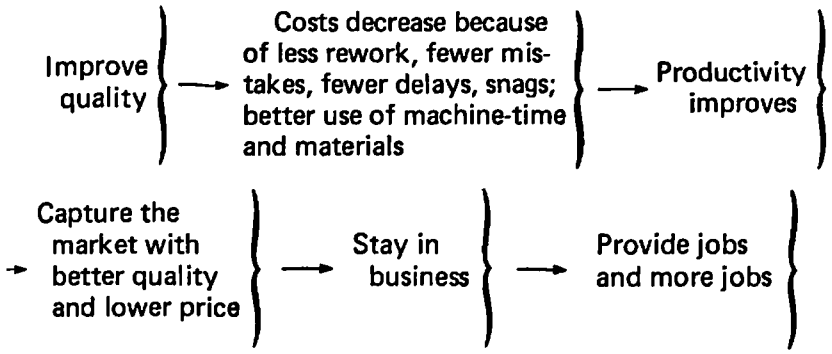

Figure 3.1 Deming's view of costs associated with quality
Source: Deming (1982) p.3.

Deming's 14 Points:

Deming presented his 14 points for transforming American industry in accordance with his opinion that Japanese industry was superior to that of the Americans. Based on Deming (1982), Walton (1989), Bendell (1991) and Roehm (1997), the following is a summary of the 14 points upon which this transformation hinged.

Point 1: The creation of constancy of purpose to improve products and services: a long-term commitment to customers by providing them with valuable products and services through continual improvement to processes and products.

Point 2: The adoption of the new philosophy of the new economic age: Western industry should transfer itself through management, responsibility, learning, and personal transformation.

Point 3: Ceasing dependence on inspection to achieve quality: Deming always believed that quality should be built into a product in the first place and at all stages to avoid mass inspection.

Point 4: Ending the awarding of contracts on the basis of the lowest tender. Instead, emphasis should be given to a long-term relationship with and commitment to one supplier.

Point 5: Improving the whole system of production at all stages and for all its components in order to improve quality and productivity.

Point 6: The institution of on-the-job-training so that, employees can learn how to prevent mistakes while they are performing their jobs.

Point 7: The institution of leadership: supervision should help people to do their jobs well. An overhaul of both management and production supervision should be undertaken.

Point 8: Driving out fear among employees by establishing dual channels of communication between management and subordinates.

Point 9: Breaking down the barriers between departments by encouraging more co-ordination and co-operation between the different parts of the organisation in sales, production, finance, and other departments. This, among other things, will facilitate an

exchange of ideas and each department will have the opportunity to gain some insight into another department's problems.

Point 10: The elimination of slogans, exhortations, and numerical targets, such as zero defects on quality. Deming, in most of his writings and lectures, opposed the idea of numerical targets, believing that most of the problems arose from the systems as a whole and not from the individuals. Asking people to do what is beyond their capabilities will lead to adverse reactions.

Point 11: The elimination of quotas and management by objectives and substituting them with leadership. Real leadership should understand the system and not manage by targets without specifying the methodology of implementation.

Point 12: The removal of barriers that rob people of their pride in workmanship, whether management or engineering, and the elimination of annual ratings and management by objectives.

Point 13: The implementation of a vigorous programme of education and self-improvement.

Point 14: Everybody in the company should be involved in the transformation process. It is therefore everybody's job at all levels.

Deming's System of Profound Knowledge:

Prior to his death, in 1993, Deming summarised his sixty years' experience in quality in what he called a "System of Profound Knowledge". Deming (1993), Walton (1989), Bendell (1991), and Scholtes (1996) have all presented this system and have agreed that it was an attempt by Deming to explain his philosophy to American managers. Deming (1993:94) stated in his introduction that "the System of Profound Knowledge provides a lens. It provides a new map of theory by which to understand and optimise the organisations that we work in, and thus to make a contribution to the whole country". The system has four interrelated areas of understanding which form a system's approach. They are Knowledge about the System, Knowledge about Variation, Theory of Knowledge, and Knowledge of Psychology, as described briefly in the following points.

1. Knowledge about the System:

The system contains inter-related components working together in harmony. Managers should ensure communication and co-operation among the different parts of the system and each component has a duty to contribute to the whole system. Therefore, it is not important if any of the components is losing money as long as it contributes to the success of the other components.

2. Knowledge about Variation:

In most of Deming's writings; he emphasises the need to understand variations between people, processes, products, and outcomes; nothing remains constant. Managers should consider variations in process capability and control charts, and most importantly, variations in people.

3. Theory of Knowledge:

Prediction based on past experience is a very important element for managers. Deming claimed that there is no true value of any conditions any experience might yield different results when different procedures are used.

4. Knowledge of Psychology:

Management should understand the human side of the organisation and the human interactions of employees. People differ, and management should use these differences for optimisation providing incentives and motivation to succeed.

3.3.2 Joseph M. Juran:

Joseph M. Juran is another leading world expert in the field of quality management. Having graduated as an engineer in 1924, Juran then committed himself to this field, emphasising its integration in all sequences of operations and not just at final inspection and testing. He stressed the importance of giving top management a more responsible role in the quality function. In 1954, the Union of Japanese Scientists and Engineering (JUSE) invited Juran to Japan, just like Deming, to help Japanese industry deal with its problems. Quality was considered an important element that needed to be tackled.

The Juran Trilogy:

Juran (1988a) classified the process of planning for quality into three categories: quality planning, quality control, and quality improvement (Figure 3.2). The following is a summary of each function:

1. Quality Planning:

This function includes the activities of developing the products and processes that are intended to meet the needs of the customers. Quality planning, in the view of Juran, involves a few steps in a sequence. Firstly, deciding who are our customers and determining their needs. Secondly, specifying the characteristics in the products that meet those needs. Thirdly, developing the processes that are capable of manufacturing such products. Fourthly, transferring the prepared plans to the operating forces for implementation.

2. Quality Control:

After the plans have been prepared, based on the needs of the customers and based on actual process capability, the quality control team will then aid those forces in attaining their goals. Quality control involves three steps, based on Juran's approach. The first is the evaluation of actual performance. There then follows a comparison of actual performance to the original goals and objectives. The final step involves taking action to correct any variations.

3. Quality Improvement:

Juran views quality improvement as ongoing actions aimed at the attainment of a level of performance that is superior to any previous level.

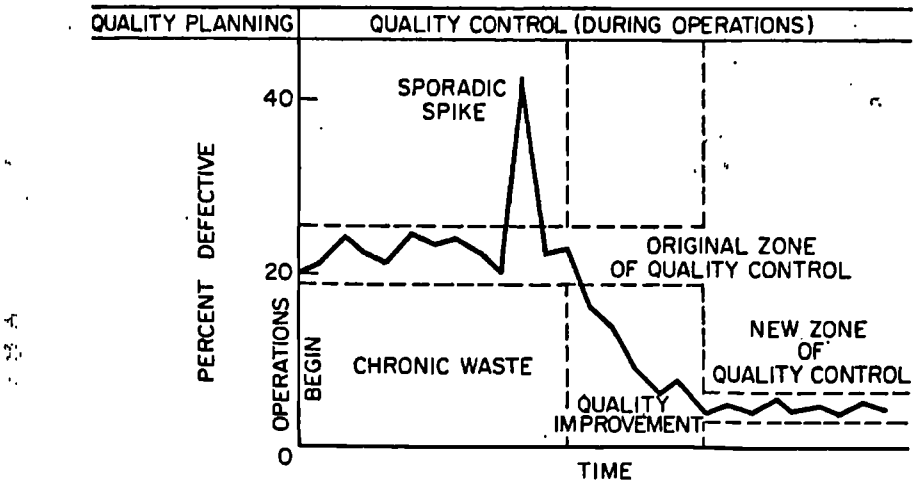

Figure 3.2 Juran Trilogy
Source: Juran (1988a) p. 2.7.

3.3.3 Philip B. Crosby:

Morehouse (1996) claims that Crosby invented the zero defect approach to quality in the 1960s. Crosby (1984) emphasised the cost-effective concept of quality, which considers the costs associated with quality as not being a burden. In addition, he stated that while quality does not cost the company money, what does incur costs is the failure to prevent errors. Like Juran, Crosby put the responsibility for quality failure on management rather than on the workers since it is management that sets the tone and the workers follow. Bendell (1991) mentioned that the Crosby's approach to quality improvement could be achieved through the creation of a core of quality specialists in the organisation. Furthermore, training should be provided to all staff for quality improvement.

Crosby's Four Absolutes:

Crosby (1984) presents the Four Absolutes about quality in his book "Quality without Tears". The first is that the definition of quality is conformity to requirements. The second absolute is that the system of quality is prevention rather than appraisal, while the third is that the desired performance is zero defects. Finally, the fourth absolute is that the measurement of quality is the price of non-conformity.

Crosby's 14 Steps of Quality Improvement:

Similar to Deming's 14 points, Crosby (1979; 1984) presented a programme of 14 steps that he claimed would achieve quality improvement in the organisation, as follows:

1. Management Commitment:

Senior management commitment is the foundation of any improvement programme in an organisation. Firstly, commitment should be included in the corporate policies, making it clear that the commitment is real and understandable. Secondly, quality must be regarded as the first priority in the agenda of management meetings. The third requirement is that senior managers should foster a commitment to quality among all employees at all levels of the organisation.

2. The Quality Improvement Team:

The team for improvement has to have clear direction and leadership. It should be formed by people who have a vision to clear the road for the others, and who will represent the company in the outside world. In addition, the team should prepare educational programmes and represent all functions of the organisation. The leader of

the team has to have an ability to communicate with senior management, to understand the whole improvement strategy, and to change improper actions.

3. Measurement:

Establishing measurement will help the improvement team to execute their responsibilities, clearly knowing whether or not their efforts are successful. Tools for measurement are available in most of the quality aspects, and statistical process control is just one measurement tool among others. Senior managers cannot communicate definitively without the existence of measures.

4. The Cost of Quality:

The establishment of procedures to calculate quality costs is not desirable. The quality function wants those costs to be small and to be related only to the manufacturing system. The organisation has to set procedures for calculating quality costs properly and objectively. With the co-ordination of the comptroller, the several parts making up quality could calculate the costs in a standard format.

5. Quality Awareness:

Top management should establish an awareness programme that uses the existing systems inside the company. Quality awareness should be part of a communication system that extends beyond a simple newsletter. Thus, a communication system can be helpful in spreading quality awareness in the organisation. Awareness should not be raised through words alone but be extended to management actions.

6. Corrective Action:

The real purpose of corrective action is to eliminate problems forever. Corrective action could potentially fix any non-conformity in manufactured products, but the problem might arise again if the action does not deal with the elimination of the defect. Furthermore, corrective action must be based on sufficient data that show the causes of the problem.

7. Zero Defects Planning:

The zero defects (ZD) process should not be just a slogan or a one-day commitment to the concept of ZD. On the contrary, it must be planned in a definite way and be taken seriously. Zero defects must be communicated in a different way from other programmes. During the planning phase for ZD, the team should consider inviting speakers from all interested parties, such as customers, government, and council representative and so forth.

8. Employee Education:

After understanding the four absolutes about quality, management should educate all employees in quality matters. The conventional way of education is for the training department to put some information together and work with consultants. However, the employees can easily forget this information. Therefore, the organisation should develop a complete quality education system: a system that will provide a standard message that can be easily taught. Such a programme would comprise extensive class meetings and application in the workplace afterwards.

9. Zero Defects Day:

After zero defects planning, management should organise a zero defects day supported by a top management commitment to every employee that quality is fundamental, that everyone should be involved, and that management is serious about quality.

10. Goal Setting:

The process of setting goals is usually carried out after the measurement step of quality improvement. When management starts measurement, its employees will think about goals. The ultimate goal is zero defects, and although intermediate goals will help in achieving that direction, minor goals should not be considered. Goal setting must be performed as far as possible by a group, and targets should be placed on a chart available for everyone to see.

11. Error-Cause Removal:

This step involves employees presenting their problems so that they can be resolved. Teams are usually informed of the various errors that employees are encountering, and are then expected to deal with such errors, analysing them and taking recommended action.

12. Recognition:

Recognising the good performance of others is an important step in the quality improvement process. Awards recognise the hard work that people have performed, and provide a clear description of quality performance. The recognition and award system is as important as supplier-customer relations are, or as quality costing is to a quality improvement programme.

13. Quality Councils:

This step of quality improvement requires an organisation to bring quality professionals together to discuss matters related to quality. In this way, they can learn from, educate, and influence each other.

14. Do it all over again:

Quality improvements must never be considered as a single task that must be accomplished. Instead, the process is one that consists of continuous improvement programmes and is never-ending.

3.3.4 Kaoru Ishikawa:

Ishikawa is probably the most prominent figure in the field of quality in Japan. Morehouse (1996) claims that in 1962, Ishikawa was the first person to invent the concept of Quality Circles (QC), and to promote Statistical Process Control (SPC) as an essential tool for quality. Ishikawa (1982) emphasised the importance of using certain tools for the achievement of reliable quality in the organisation. These tools include data collection, histograms, cause-and-effect diagrams, check sheets, Pareto diagrams, control charts, and scatter diagrams. Clark (2000) claims that the cause-and-effect diagram was developed by Ishikawa in 1943, while Bendell (1991) mentions that the diagram is sometimes called Ishikawa's after this famous scholar (Figure 3.3).

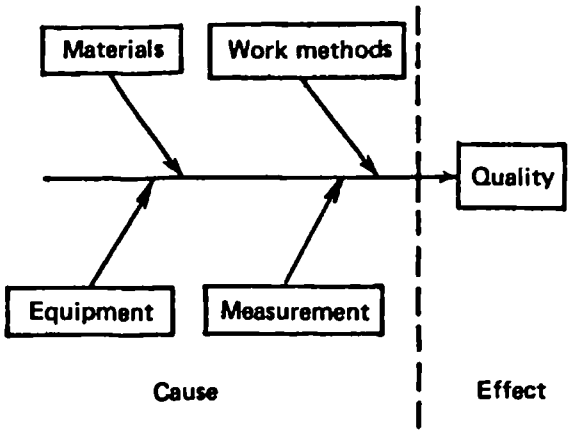

Figure 3.3 The Cause-and-effect diagram
Source: Ishikawa (1982) p.19.

Ishikawa (1985) presented three steps to control the implementation of quality. The first step is to understand the true quality characteristics. The second is to determine the measuring and testing methods of those characteristics. The third step is to discover substitute quality characteristics and to compare them to the true quality ones.

Ishikawa's Quality Circles (QCs):

Ishikawa (1985:139) claims that he first started teaching about Quality Circles (QC) to his students in 1949. He defined the QC as "a small group to perform quality control activities voluntarily within the same workshop, carrying out its work continuously as a part of company-wide, quality control activities". Ishikawa emphasised several points about quality circles. Firstly, they should be practised voluntarily rather than be regarded as mandatory. Secondly, QCs should contribute to the improvement and development of the organisation. Thirdly, they should respect humanity and a happy

workplace. Fourthly, QCs should fully exercise human capabilities and draw out infinite possibilities. Fifth, the ten basic activities of QCs are; self-development, voluntarism, group activity, participation by all employees, utilisation of QC techniques, activities closely connected with the workplace, vitality and continuity in QC activities, mutual development, originality and creativity, and awareness.

3.3.5 Armand V. Feigenbaum:

Bendell (1991), Stevens (1994), and Morehouse (1996) consider Feigenbaum as the originator of total quality control when, as a postgraduate student in the 1950s, he published his book entitled "*Total Quality Control*". In addition, Morehouse (1996) claims that Feigenbaum started the approach of "cost of non-conformance", and Stevens (1994) mentions that he has contributed to the field of quality in many world industries such as in Japan, Europe and Latin America, and specifically in Argentina.

Feigenbaum's Fundamentals for Total Quality Control:

Feigenbaum explained that total quality control is a way of managing business to serve the customer. In order to achieve this, every part of the organisation needs to work in a co-ordinating way. Stevens (1994) mentions that Feigenbaum considered quality as a process and not as a technical issue. It does not mean the reduction of defects, instead it is an increase in the number of good values that customers receive.

Feigenbaum (1991) considered quality not to mean the best. Rather it should mean the best for satisfying certain customer conditions that are related to the product and service. Such conditions include operating characteristics, reliability, safety, relevant standards, the cost of manufacturing, maintenance, the environment, and the cost of the

customer operating the product. In addition, there are four steps towards achieving control: setting standards; appraising conformity; acting when necessary; and planning for improvements.

Feigenbaum (1991) mentions that the concept of total quality control starts with the identification of customer requirements and ends when the product is in the hands of the customer. Therefore, the concept is wide and covers all stages of manufacturing, and thus requires the different functions of the organisation to take certain steps. Moreover, he specifies eight stages of the industrial cycle and their implications for quality (Figure 3.4). The first is marketing, which entails evaluating the level of quality the customers want and the amount they are willing to pay. The second is engineering, which means translating those requirements into specifications. The third is purchasing in order to choose and contract the needed parts and materials. The fourth is manufacturing engineering, which involves choosing the processes, jigs and tools for production. The fifth is manufacturing supervision and this is to ensure quality during manufacturing until the product is at its final stage. The sixth is mechanical inspection to check conformance to specification. The seventh is shipping, which entails packaging and transportation. The eighth and final function is the installation of the product based on the instructions, followed by its maintenance throughout its service.

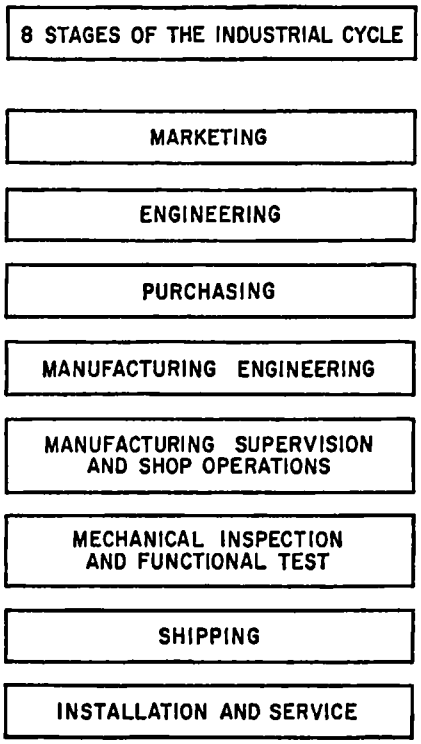

Figure 3.4 Implications of quality in the eight industrial cycle stages
Source: Feigenbaum (1991), p.11.

Feigenbaum and Feigenbaum (2000) wrote about quality in the 21st century, mentioning that leading companies will have common characteristics. Among them is that the objectives of business should be the continuous acceleration of benefit for customers and stakeholders in delivering consistently improving customer quality and business results. Another characteristic is that quality is what the customers, not the company, say it is. The third is that they bring enthusiasm to work through deep commitment to business improvements derived from knowledge, skills and solving problems democratically, and recognising the value of teamwork.

3.4 The Evolution of Quality:

The evolution of quality started from a simple inspection period to the Total Quality Management concept. Feigenbaum (1991) mentions that the development of quality control started at the beginning of this century and changed every 20 years to form different eras (Figure 3.5). Dale *et al.* (1990) and Dahlgaard *et al.* (1998) classify the development of quality into four such eras: simple inspection, quality control, quality assurance, and total quality management. Bounds *et al.* (1994) have produced almost the same classifications for the periods of quality evolution but with slight differences in names. They are: inspection (1800s), statistical quality control (1930s), quality assurance (1950s), and strategic quality management (1980s). The following sections present the four eras of quality development.

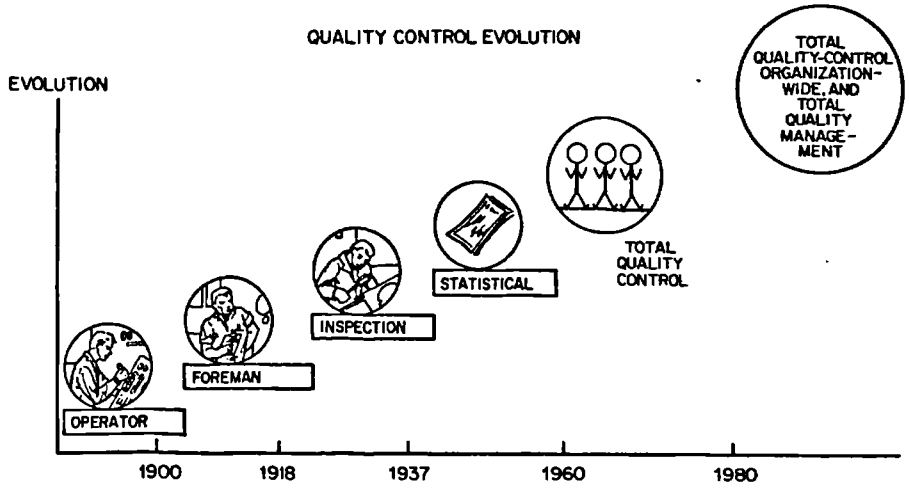

Figure 3.5 Evolution of quality
Source: Feigenbaum (1991) p.16.

3.4.1 Simple Inspection Era:

During this era of quality, the focus was on the inspection process only as a means of ensuring quality. In this system, one or more of the product characteristics are measured against certain specifications. Dale *et al.* (1991) argue that this type of inspection was used to concentrate on correcting quality problems after their occurrence without taking any preventive measures, and it was conducted wholly inside the organisation without involving suppliers or customers. Bregman *et al.* (1994) mention that the main concern of the inspection era was detection; its view of quality was that quality was a problem to be solved, and its emphasis was on product uniformity. They add that the methods used in that era were gauging and measurement; the role of quality workers was inspection, sorting, counting and grading; and the responsibility for quality was that of the inspection department.

3.4.2 Quality Control Era:

Dahlgaard *et al.* (1998) named this period 'statistical quality control' due to its use of acceptance sampling and control charts. Bregman *et al.* (1994) contend that during this era, the primary concern was control, the emphasis was on product uniformity but with a reduction in inspection, and the methods used were statistical tools and techniques. In addition, the role of quality workers was troubleshooting and the application of statistical methods, while the manufacturing and engineering departments were responsible for quality in organisations during that period. As Dale *et al.* (1990) mention, during this period, there was a greater emphasis on paperwork control as well as the use of basic statistics, product quality planning, self-inspection, process performance data, and the development of the quality manual.

3.4.3 Quality Assurance Era:

During this era, the concept of quality expanded from manufacturing-based systems to one that had more implications for management throughout the firm. Bregman *et al.* (1994) claim that the four elements that emerged from the quality assurance era were quality costs, total quality control, reliability engineering, and zero defects. In addition, Dale *et al.* (1990) describe this era as characterised by adopting system audits and third party approvals as a way of ensuring the existence of quality in the organisation. Moreover, more of the statistical process control tools were used, as well as failure mode and effects analysis, the involvement of non-production operations, and advanced quality planning.

3.4.4 Total Quality Management Era:

The concept of Total Quality Management (TQM) (explained in detail in Chapter five) refers to the implementation of quality management principles at all levels and at each stage in the organisation. Dahlgaard *et al.* (1998) contend that the idea of TQM should go beyond the organisation and be extended to suppliers and customers. While many elements could be included under TQM, it can be maintained that some of these are central to the concept. These include top management commitment; customer focus; the use of statistical process control; education and training; the involvement of all employees; continuous improvement; benchmarking; changing quality culture; and perhaps the implementation of the ISO 9000 quality management system.

3.5 Summary:

In this chapter, an attempt has been made to provide an introduction to quality. This included definitions of quality given by some scholars and by the ISO descriptions. It

also provided details regarding the most well known work of what are known as the quality gurus, whose work established the foundation for quality and ISO 9000 in this century. Finally, the chapter included the four phases of the development of quality that occurred before the end of the 19th century. In the next chapter, we will thoroughly investigate the different aspects of ISO 9000.

CHAPTER FOUR

ISO 9000

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ISO 9000

4.1 Introduction:

This chapter addresses ISO 9000 in detail. Firstly, it includes information about ISO the organisation itself including its structure, the technical committees (TC), and TC 176 which is responsible for developing ISO 9000. The chapter also covers the ISO 9000 family of standards, motives for ISO, ISO 9001 in detail, world growth of ISO registration, ISO implementation, and the registration process. In addition, it includes details of the benefits and limitations of ISO, ISO 9000 in the developing countries, and the new version of ISO 9000: 2000.

4.2 The International Organisation for Standardisation (ISO):[1]

The International Organisation for Standardisation (ISO) is a world-wide federation of the national standards institutions of 133 countries, located in Geneva, Switzerland. ISO was established in 1947 as a non-profit organisation to facilitate the exchange of goods and services and to develop co-operation between countries. The work of ISO results in the publication of thousands of international standards. In addition, ISO has many objectives, which translate its main goal of facilitating trade and transferring technology in the world. They are: to improve the quality of goods at a reasonable price, to improve health and safety, to make goods and services compatible and exchangeable, to simplify goods to improve usability, to reduce the number of models and thus reduce costs, and to increase distribution efficiency and ease of maintenance.

[1] Data included in this part are obtained from the International Organisation for Standardisation (ISO) (2000) Geneva, Switzerland (available at) *http://www.iso.ch/.*

4.2.1 ISO: Structure and Major Functions:

The ISO field of practice covers all but two technical fields. The first is the electrical and electronic engineering field, which is dealt with by the International Electro-technical Commission (IEC) Organisation, while the second is information technology, which is the responsibility of a joint committee between ISO and IEC. ISO is comprised of a General Assembly, Council, Central Secretariat, Policy Development Committee, Council Standing Committees, *Ad hoc* Advisory Groups, a Technical Management Board, Remco, Technical Advisory Groups and Technical Committees. Figure 4.1 illustrates the structure of ISO and its functions.

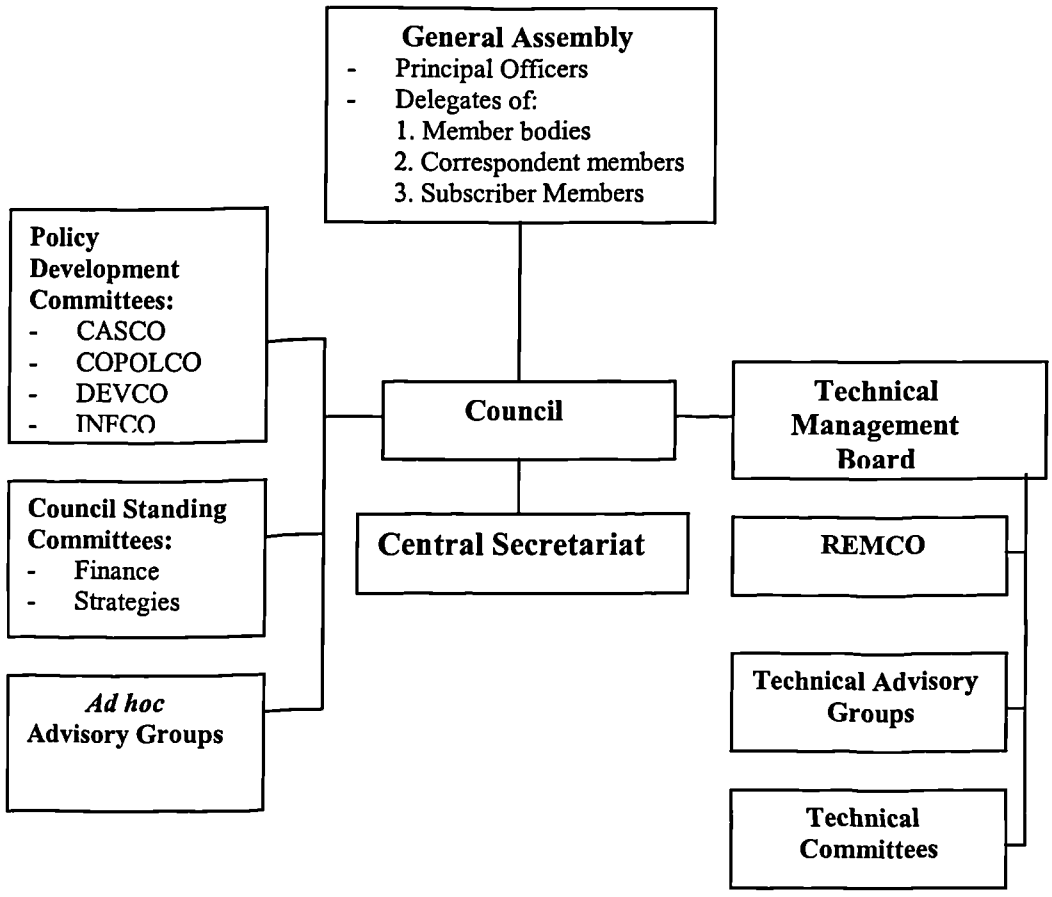

Figure 4. 1 The structure of the International Organisation for Standardisation (ISO) Source: ISO (2000) Geneva, Switzerland.

The part of ISO that is responsible for developing standards is the technical committees (TCs), the members of which are selected by the Technical Management Board. This board is responsible for planning and executing the technical works of ISO and reporting to the Council, as well as deciding on all matters concerning the technical committees. In addition to the Chairman and the Secretary, the board comprises 12 member bodies of ISO. In 1999, the board included only one member from a developing country, Colombia. The technical committees will be discussed in the following section.

4.2.2 Technical Committees:

The Technical Committees of ISO (TCs) are responsible for establishing standards or specifications for a certain product, service or work. There are three types of committees, the Technical Committee (TC), the Subcommittee (SC) and the Working Group (WG). Each TC, SC or WG is numbered in order of its establishment. The Technical Management Board appoints the chairperson of each of the 2000 Technical Committees, of which 218 are responsible for creating and amending international standards. TC 176 is responsible for the ISO 9000 quality management system and quality assurance. Each member body may participate in more than one TC, SC or WG. During 1999, ANSI of the USA participated in 581 Committees, followed by DIN of Germany participating in 509 committees and BSI of the UK, which participated in 455 committees of the ISO. Unfortunately, neither SASO nor any agency representing an Arab country participates in any technical committee, apart from ISIRI of Iran in the Middle East, which participates in nine committees.

4.2.3 Development of Standards:

As of 1999, ISO developed approximately 12 thousand standards as the result of the work of the Technical Committees (TCs) and Subcommittees (SCs) of the organisation. ISO international standards are voluntary, thus, each country may adopt any standard and consider it as its national standard by adding its abbreviation as a prefix to the name and number of the standard. SASO, for example, when it adopted ISO 9000, named it SSA GS ISO 9000, where SSA represents Saudi standards and GS stands for Gulf standards.

ISO standards are developed in six stages: proposal, preparatory, committee, enquiry, approval, and publication. A member body of ISO may propose a standard to be voted on at the relevant TC/SC, and, if approved, the standard will go to a working group in the TC, which will develop the technical aspects of and draft a standard for the preparatory stage. The committee stage is where the draft standard is registered, then discussed, amended and voted on, if necessary, until the TC reaches a draft international standard (DIS). The next stage is enquiry, where the DIS is distributed to all ISO member bodies for comments within five months and is then taken to the TC/SC for approval, after which, the standard becomes a Final Draft International Standard (FDIS). The FDIS is circulated to all ISO member bodies to be voted on, and if approved, the standard is then published in English and French. Table 4.1 shows ISO standards by sector of activity as of December 1998.

Table 4.1 ISO international standards (December 1998)

Sector of Activity	No. of Standards
Generalities, infrastructure and sciences	1,104
Health, safety and environment	440
Engineering technologies	2,694
Electronics, information technology and telecommunications	1,740
Transport and distribution of goods	1,279
Agriculture and food technology	820
Material technologies	3,511
Construction	248
Special technologies	114
Total	**11,950**

Source: ISO (2000) Geneva, Switzerland

4.3 The Origin and Development of ISO 9000:

In 1979, the Technical Management Board of ISO established the ISO/TC 176 (Technical Committee) to be in charge of producing a generic quality management system standard. At that time, several national standards institutions had already developed their national quality management systems. ISO/TC 176 had been working along with its SCs and WGs since 1979, until it produced the first version of ISO, the 9000 quality management system, in 1987. Marquardt (1997) and Pitkin (1995) claim that in 1959, the Department of Defence of the US established the MIL-Q9858 quality assurance programme. They add that by 1968, NATO had adapted the tenets of MIL-Q9858 as AQAP1, AQAP4, and AQAP9. Moreover, Fox (1994) claims that the origin of a quality system started with the US Space Programme to deal with purchasing contracts. NATO developed a standard for defence contracts as the Allied Quality Assurance Publications (AQAPs). The Ministry of Defence in the UK published this standard as DEF-STANs (Defence Standards), and in 1979, BSI adopted DEF-STANs as a national general standard, giving it the code BS 5750.

Therefore, based on Fox's (1994) claims, BSI 5750 was excluded from the NATO standards and consequently the standard became dominated by the Americans. On the other hand, Dargie (1999) believes that there was an expansion on the contribution of the developing ISO to include other standards institutions in the world and not just BSI and ANSI, and he mentions several international standards as the base for ISO 9000. Such standards include BS 5750 and BSI 4891 of the UK, ANFOR Z 50-110 of France, DIN 55-355 of Germany, NEN 2646 of the Netherlands, and several American standards: ANSI/ASQC Z-1.15, MIL-Q-9858 A, ANSI/ASQC C-1, and ANSI/ASME NQA-1. Similarly, ISO/TC 176 (ISO, 2000) contends that several institutions from different countries established ISO 9000 standards without specifying any countries in particular. They were, in fact critical of such standards, saying that they were not sufficiently consistent to be used in international trade and that their terminology was confusing. ISO/TC 176 claims that its extensive work since 1979 was the main base for the ISO 9000 of 1987.

The 1987 ISO 9000 family of standards was globally implemented and evaluated over time. Then, in 1994, ISO/TC 176 issued an amended ISO 9000 family of standards, which are valid until this year 2000. Since 1994, ISO/TC 176, national standards institutions and concerned parties of ISO 9000, such as auditors, consultants, scholars and quality managers, have worked in discussing and evaluating those standards. Before the end of 1999, the draft ISO 9000 standards of the year 2000 were issued to be discussed and voted on. A subsequent section of this chapter will examine the new draft of ISO 9000 standards that is expected to be published before the end of 2000.

4.4 The ISO 9000 Family of Standards:

The ISO 9000 family of standards includes two groups of standards, third party assessment standards and supportive standards. The first group of ISO standards is the subject of this study, and they are ISO 9001, ISO 9002 and ISO 9003. It also includes QS-9000 for the automobile industry and ISO 14000 family for the environment, neither of which is covered in this study. The second group of ISO comprises supportive standards, which provide guidelines for implementing the quality system, conducting audits, developing quality manuals and dealing with different aspects of the quality system, such as explaining and providing quality vocabulary.

4.4.1 Third Party Assessment Standards:

Third party assessment standards are those standards that are audited by the registration agencies to ensure compliance to those standards. The ISO 9000 standards under this category are ISO 9001, ISO 9002, ISO 9003, and QS-9000. ISO 14000 for the environment are third party assessment standards that are associated with the ISO 9000 series. ISO 9001, ISO 9002 and ISO 9003 quality management systems will be discussed in depth and covered thoroughly in this chapter, while QS-9000 and ISO 14000 will be discussed briefly in the following two sections.

QS-9000: Quality System Requirement 9000:

QS-9000 was developed by the three American automobile manufacturers; Ford, Chrysler and General Motors (GM). The process of its development started in 1988 to reduce redundancy of documentation and audit imposed by the above companies. In 1995, QS-9000 was officially introduced by the three manufacturers with the help of other interested parties, such as registration agencies, consultants and suppliers. The

three auto manufacturers now demand QS-9000 implementation from their clients' firms in the USA. Daniels (2000) mentions that up to the year 2000, there are 13,000 firms registered to QS-9000 in the world, among them 6,000 in the US and 700 in Canada. Fleischli (1997) and Shelley (1996) present the components of QS-9000, where it is divided into three sections. Section I contains the 20 clauses of ISO 9000, each followed by a statement of the special requirement of the auto industry. Section II consists of three elements; Production Part Approval Process, Continuous Improvement, and Manufacturing Capabilities. Section III includes five specific requirements of the auto manufacturers. They are Chrysler-Specific Requirements, Ford-Specific Requirements, General Motors-Specific Requirements, Truck Manufacturers-Specific Requirements, and Other Auto Industry-Specific Requirements.

The standard has not been officially recognised by ISO and therefore it is still a mainly American standard used within the US continent. However, it seems that QS-9000 is tailored for specific industry requirements and therefore fits the needs of the automobile industry. Reid *et al.* (1997) praise QS-9000, mentioning that in addition to the benefits of ISO 9000, the standard is of some advantage to the automobile industry. However, they do not specify the unique benefits of QS-9000 over ISO 9000, except that QS 9000 requires support functions such as purchasing, engineering, marketing, and shipment. These aspects are not covered in ISO 9000 standards, and many problems might arise for customers at these stages.

ISO 14000 Environmental Management Standards:

The ISO 14000 family of standards is concerned with establishing sets of standards that ensure a clean environment. The UK had its environmental standard, BS 7750, which

was published in 1991. In the same year, ISO formed the Strategic Advisory Group on the Environment (SAGE) to study the development of environmental management standards. In 1992, SAGE recommended that an ISO technical committee should be formed to develop such standards. The committee TC 207 was formed for the same purpose of publishing the ISO 14000 series of standards. The ISO 14000 series of standards is designed to assist organisations to meet environmental responsibilities by helping them to evaluate the environmental effectiveness of their activities, operations, production systems, products, and services. ISO 14000 includes 15 standards dealing with environmental management in two categories, and each category includes three sub-categories.[2] Nestel (1997) and Hormozi (1997) mention that ISO 14000 includes two categories: Organisational Evaluation and Product Development Evaluation standards. Organisational Evaluation standards include environmental management systems, environmental performance evaluation, and environmental auditing, while Product Development Evaluation standards include life-cycle assessment, environmental labelling, and environmental aspects in product standards. Beechner and Koch (1997) claim that it is possible to integrate ISO 9000 and ISO 14000 to help an organisation to achieve functional clarity. If the organisation already has ISO 9001, management should examine ISO 14000 clauses to see how to embed them into the existing ISO 9001 quality system. The draft ISO 9001:2000 (1999) includes a correspondence table between the clauses of ISO 9001:2000 and ISO 14001 (1996) for the purposes of compatibility between the two standards.[3]

[2] The ISO 14000 family of standards comprises the following standards; ISO 14001, ISO 14004, ISO 14010, ISO 14011/1, ISO 14012, ISO 14020, ISO 14021, ISO 14024, ISO 14031, ISO 14040, ISO 14041, ISO 14042, ISO 14043, and ISO 14060.
[3] *ISO / CD 2 9001:2000* (1999), Annex A, p.25-27.

4.4.2 ISO 9000 Supportive Standards:

There are a number of supportive ISO standards that are of great help to an organisation's quality system, and which are not assessed and audited, as in the case of the former standards. They help in defining and describing quality system elements and explain how to implement ISO 9000 in different sectors of activities. They also help firms to decide which ISO standard to implement in different sectors and situations. In addition, they guide an organisation in auditing its quality system, such as how to plan, manage and perform quality audit and how to select auditors. The supportive standards provide help in measuring equipment according to ISO requirements, and provide guidance in writing the quality manual of the organisation. Table 4.2 shows the ISO 9000 supportive standards that are not third party assessment standards.

Table 4.2 ISO 9000 supportive standards

Group 1: Quality Management and Quality Assurance Guidelines		
Standard	**Title**	**Purpose of the Standard**
ISO 9000-1 (1994)	Quality Management and Quality Assurance Standards – Part 1: Guidelines for selection and use	Provides guidelines of which standard of ISO series to be used in different situations and clarifies quality concepts
ISO 9000-2 (1993)	Quality Management and Quality Assurance Standards – Part 2: Generic Guidelines for the application of ISO 9001, 9002 and 9003	Helps the firm to implement ISO 9001, 9002 and 9003. It provides useful guidelines for implementing the 20 requirements of ISO
ISO 9000-3 (1997)	Quality Management and Quality Assurance Standards – Part 3: Guidelines for the application of ISO 9001 to the development, supply and maintenance of software	Helps the firm to implement ISO 9001 to computer software. It is an expanded version of ISO 9001 to include the computer software industry
ISO 9000-4 (1993)	Quality Management and Quality Assurance Standards – Part 4: Guide to dependability programme management	Helps the firm to produce products that are reliable and dependable. When dependability is important, the firm should consider this standard
ISO 10005 (1995)	Quality Management – Guidelines for quality plans	Provides guidelines to relate the quality system to the requirements of a certain product and provides a format for presenting quality plans
Group 2: Quality Management and Quality System Elements		
ISO 9004-1 (1994)	Quality Management and Quality System Elements – Part 1: Guidelines	Provides comprehensive explanation of quality system elements
ISO 9004-2 (1991)	Quality Management and Quality System Elements – Part 2: Guidelines for services	Helps the firm to establish a quality service system even if it is a manufacturing firm
ISO 9004-3 (1993)	Quality Management and Quality System Elements – Part 3: Guidelines for processed materials	Provides guidelines to establish a quality system for firms that process materials such as bulk products
ISO 9004-4 (1993)	Quality Management and Quality System Elements – Part 4: Guidelines for quality improvement	Explains how the firm could establish a continuous improvement programme, describing tools for improvement
Group 3: Guidelines for Auditing Quality System		
ISO 10011-1 (1990)	Guidelines for Auditing Quality Systems – Part 1: Auditing	Provides guidelines on how to plan and perform audits, and provides audit principals
ISO 10011-2 (1991)	Guidelines for Auditing Quality Systems – Part 2: Qualification criteria for quality system auditors	Explains how to select quality auditors, their qualifications, experience, and talents
ISO 10011-3 (1990)	Guidelines for Auditing Quality Systems – Part 3: Management of audit programme	Explains how to manage the auditing programme of a quality system
Group 4: Other Standards		
ISO 8402 (1994)	Quality Management and Quality Assurance – Vocabulary	Includes definitions of terms related to three aspects, quality, quality system and tools
ISO 10012-1 (1992)	Quality Assurance Requirements for Measuring Equipment – Metrological confirmation system for measuring equipment	Specifies requirements for the firm to measure equipment with accuracy level and provides the features of the conformation system for measurement
ISO 10013 (1995)	Guidelines for Developing Quality Manuals	Provides guidelines for preparation and control of the quality manual

Main source: (Arora, 1996), pp. 10-12.

4.5 The ISO 9000 Quality Management System:

ISO 8402 (1994:5-6) defines a quality system as "organisational structure, procedures, processes, and resources needed to implement quality management". The ISO draft 9000:2000 (1999:10-11) defines it as "interrelated or interacted elements to establish quality policy and quality objectives and to achieve those objectives". Therefore, a quality system has different components, involves different people and includes functions, resources, and processes that work together, employing certain policies and procedures to ensure the execution of quality management in an organisation.

The ISO 9000-quality management system (1994) includes three quality assurance standards; ISO 9001, ISO 9002 and ISO 9003, each of which comprises 20 requirements for the quality system of a firm. For a firm to obtain any of them, its quality system must be carefully prepared to meet the requirements of the desired standard, and be audited by a third party assessor to examine its compliance. When the firm fulfils the requirements of the standard, the registration agency will issue an ISO certificate that usually lasts for two years. In addition, the assessors will periodically ensure a firm's compliance to the standard by conducting surveillance visits, usually twice a year.

4.5.1 ISO 9001, ISO 9002 and ISO 9003:

ISO 9001 (1994): Quality Systems – Model for Quality Assurance in Design, Development, Production, Installation, and Servicing; it is a quality assurance model that examines an organisation's capabilities in design, development, production, installation, and servicing. The aim of this standard is to achieve customer satisfaction by preventing non-conformities during all stages from design to servicing.

ISO 9002 (1994): Quality Systems – Model for Quality Assurance in Production, Installation, and Servicing; it is similar to ISO 9001 in all its requirements and aims except that it excludes the design aspect of the organisation. Therefore, if a firm is not involved in design, this standard might be appropriate, although many firms with design functions are registered to ISO 9002.

The third standard is ISO 9003 (1994): Quality Systems – Model for Quality Assurance in Final Inspection and Test. It is limited by its function, which is restricted to final inspection and test, and is therefore little used by firms unless they are involved in inspection and testing functions as their business. Table 4.3 shows the degree of coverage of the above standards.

Table 4.3 Degree of coverage of the three ISO 9000 standards

Clause	Clause Title	ISO 9001	ISO 9002	ISO 9003
4.1	Management responsibility	♦	♦	□
4.2	Quality system	♦	♦	□
4.3	Contract review	♦	♦	♦
4.4	Design control	♦	×	×
4.5	Document and data control	♦	♦	♦
4.6	Purchasing	♦	♦	×
4.7	Customer-supplier product	♦	♦	♦
4.8	Product identification and traceability	♦	♦	□
4.9	Process control	♦	♦	×
4.10	Inspection and testing	♦	♦	□
4.11	Control of inspection, measuring, and test equipment	♦	♦	♦
4.12	Inspection and test status	♦	♦	♦
4.13	Control of non-conforming product	♦	♦	□
4.14	Corrective and preventive action	♦	♦	□
4.15	Handling, storage, packaging, preservation, and delivery	♦	♦	♦
4.16	Control of quality records	♦	♦	□
4.17	Internal quality audits	♦	♦	□
4.18	Training	♦	♦	□
4.19	Servicing	♦	♦	×
4.20	Statistical techniques	♦	♦	□

Key: ♦ Comprehensive requirement, □ Less stringent than ISO 9001 and ISO 9002, and × Element not present, Source: *ANSI/ ASQC Q 9000 –1* (1994) (ISO 9000) (Annex D) p. 17.

4.6 ISO 9000 World Registration:[4]

Mobil Oil Corporation conducted world surveys of ISO 9000 registration from 1993 until 1998, when the ISO of Geneva took over the process. The organisation does not issue the certificate of ISO 9000, nor does it involve itself in any kind of assessment. Therefore, the organisation does not have the actual number in its documents. Hence, data obtained concerning its surveys are submitted by world accreditation bodies and registration agencies voluntarily. The survey that was published in 1999 by ISO of Geneva included all previous years, data from 1993 until December 1998. Figure 4.2 shows the world growth of ISO 9000 registration between 1993 and 1998, While Figure 4.3 shows the six leading countries in ISO 9000 in December 1998.

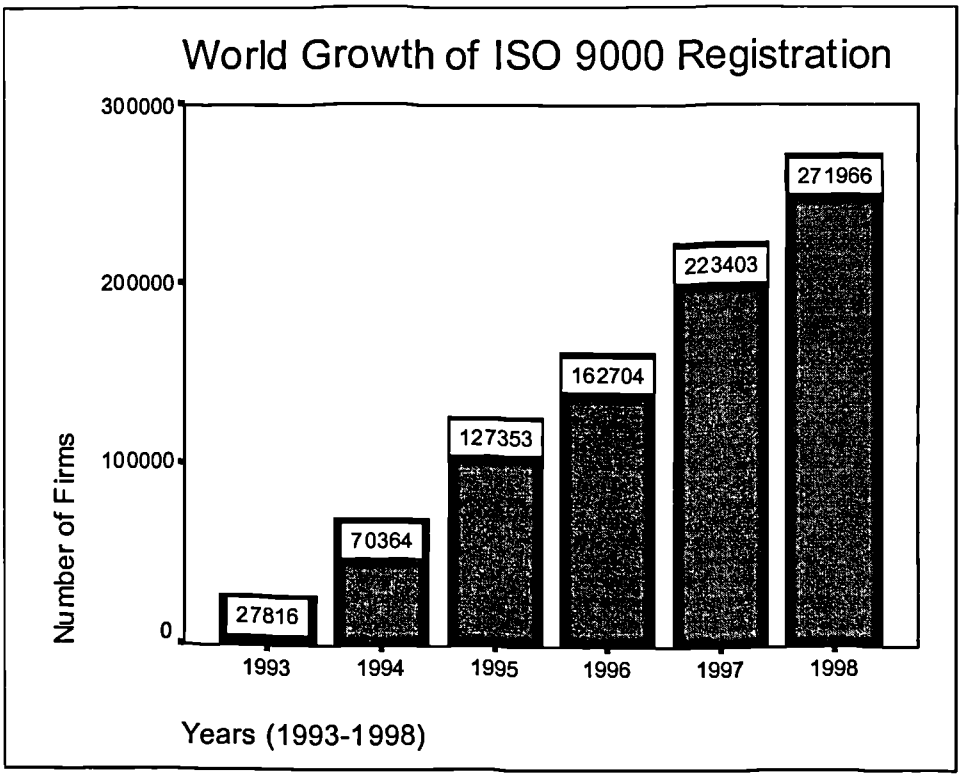

Figure 4.2 World growth registration of ISO 9000 (1993-December 1998)

[4] Data included in this section were obtained from: International Organisation for Standardisation (ISO) (1999) *The ISO Survey of ISO 9000 and ISO 14000 Certificates, Eighth Cycle,* Geneva, Switzerland.

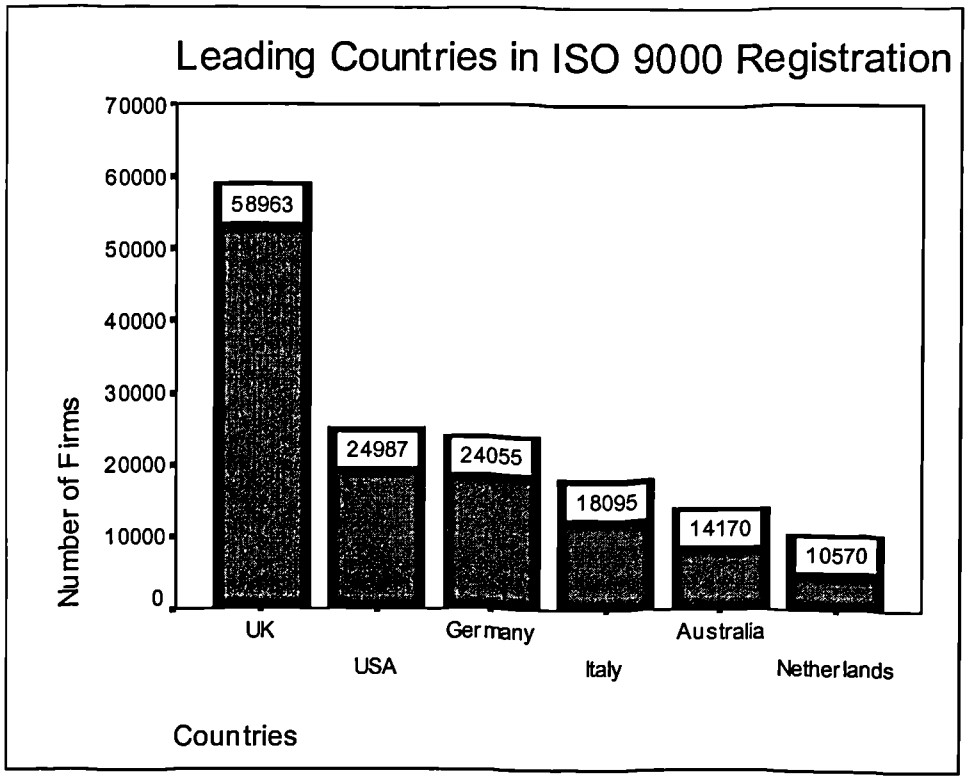

Figure 4.3 The six leading countries in ISO 9000 registration (1998)

Figure 4.2 shows that in 1993, the firms registered to ISO 9000 in the world numbered almost 28 thousand, and by December of 1998, the number had jumped rapidly in five years to reach approximately 272 thousand firms. The percentage change in five years was almost 1000% (977.73%), in other words, the registration had doubled almost ten times. This is a very high growth of registration in such a short period of time. As a matter of speculation, this growth was probably due to many reasons: some firms may have registered because they were under pressure from their partner or mother company or customers and sub-contractors. Other firms may have sought ISO to enhance the efficiency and reliability of the quality system, or merely for prestigious reasons and to imitate others.

On the other hand, Figure 4.3 shows that the number of ISO 9000 registered firms in the UK was higher than in the US and Germany combined, although the number of firms in general in the US might be substantially higher than in the UK. This might be the result either of government pressure or of a strong tendency for British firms to obtain ISO 9000. Registration to ISO in the developing countries, including Saudi Arabia, was substantially lower than in the industrial countries, and will be dealt with in a subsequent section.

In addition, the ISO survey includes registration to ISO 14000 for the environment. The survey showed that the registration to this standard has grown rapidly as well, from 257 firms in 1995 to 7887 firms as of December 1998, which means that it grew about 30 times in just three years. This high increase in registrations shows an increasing world concern for the environment, which includes aspects such as air pollution and recycling. The survey shows that Japan was more concerned than any other country about the environment. There were 1542 ISO 14000 registered firms in Japan, followed by 921 firms in the UK, then 651 firms in Germany, and 360 firms in Switzerland. It is important to recognise that Japan has limited resources and habitable areas, which makes its concern both logical and understandable as reflected by the fact that in 1997, Japan hosted a world conference on the environment and pollution.

4.7 Motivation for ISO 9000 Registration:

A firm might seek registration to ISO 9000 in the hope of improving the efficiency of its quality system since ISO 9000 includes 20 requirements that cover substantial components relating to this. ISO 9000 does not ensure good quality products directly. However, some companies might seek registration to ISO 9000 hoping that a good and

efficient quality system might lead to good quality production. Moreover, some companies seek ISO 9000 registration for the purpose of winning a contract, or bidding with the government or with the private sector. For some firms, ISO 9000 is just the beginning of applying a quality system prior to implementing TQM.

As Havard (1994) and Fox (1994) mention, the motive for ISO 9000 registration might result from the pressure of customers or suppliers. In some situations, customers or suppliers might require that their clients hold an ISO 9000 certificate as minimum proof of efficiency and reliability. In a related matter, some companies seeking to penetrate international markets might be asked to obtain an ISO 9000 certificate. Furthermore, it is possible that some firms seek registration for promotional and propaganda reasons. When they use ISO in their promotional campaigns and publications, it implies that they are reliable and established firms and thus ISO contributes positively to their reputation. However, some firms might seek ISO even if they do not think that registration is helpful for them and even if they see it as only a financial burden. In such cases, a firm may simply be imitating other competitors and show that their firm is as strong as their rivals are. In all cases, the bottom line is the hope to increase sales and consequently profits, which is the most important goal of any organisation aiming to stay in business and prosper.

The degree of importance of those motives for registration depends on each company's circumstances, such as sector of activity, size of firm, availability of resources, involvement in exports and its culture. In Sweden, Carlsson and Carlsson (1996) found that the most important reasons for ISO registration were that it constituted a step towards TQM, it satisfied international market demands, enhanced competition,

improved internal procedures, improved product quality, and satisfied domestic market demands, in ranked order. In Australia, Brown and Van der Wiele (1995) found the reasons to be to increase a firm's market share, to improve efficiency, to be considered for tenders, to improve customer service, and to serve as a basis for TQM, in ranked order. A survey of Vloeberghs and Bellens (1996) found that the most important reasons in Belgium were to improve efficiency and control, to meet demands from the customers, to improve quality image, to adhere to a corporate level decision, a move towards TQM, and to improve the quality of the product, in ranked order. These three studies show the various priorities of the firms involved in the surveys. However, such studies also show common reasons for registration to ISO, such as to improve the efficiency of the quality system, as part of a firm's TQM, to improve quality, and to meet customer demands including international marketing demands.

4.8 ISO 9001 (1994):

ISO 9001 (1994) will be used as a model since it is broader than ISO 9002 and ISO 9003. ISO 9001 comprises 20 clauses representing requirements for the quality system of the organisation. These requirements are briefly explained in the following sections.

Management Responsibility (Clause 4.1):

This clause includes the establishment of a quality policy that describes the attitude of a firm towards quality. The firm should define the authority, responsibility and chain of command that manage the quality system. A person, usually called a quality manager or a quality assurance manager, should be appointed to manage the quality function. Top management should provide the resources required for the quality system and establish the procedures for reviewing the effectiveness of the system.

Quality System (Clause 4.2):

The firm should develop a quality manual that describes the quality system elements, and develops procedures, work instructions and a format for implementing the quality policy. The clause also demands the establishment of quality plans for each product, process or project.

Contract Review (Clause 4.3):

The firm should review each order and tender to ensure that it has been defined and documented, and can be fulfilled. Procedures for the amendment of a contract should be established, and changes in a contract should be communicated through all channels in the organisation. Records of any contract reviews should be kept and maintained.

Design Control (Clause 4.4):

This clause includes requirements for designing a product and starts with the planning for development and design. The firm should identify and allocate resources for the design process and ensure effective organisational and technical interfaces. The definition and control of design inputs, outputs and interfaces, and the validation that the product will meet customer needs are also required. All design modifications should be reviewed, approved and documented.

Document Control (Clause 4.5):

The firm should ensure that documents are reviewed and approved by authorised personnel. Only updated documents should be available and obsolete ones should be removed. Changes in the documents must be authorised and recorded.

Purchasing (Clause 4.6):

The firm should evaluate its sub-contractors and monitor their performance periodically. Purchasing data should be clear and concise, and a record of the acceptable sub-contractors must be kept. The firm should develop procedures that allow the customer to verify the purchased products.

Control of Customer-Supplied Product (Clause 4.7):

The firm should examine incoming products to ensure their compliance to the specified requirements. Products should be maintained to prevent loss, damage or deterioration and when any of these occur, the incident must be recorded and reported to the customer. The firm should specify the responsible party for the product when it is still in the firm's possession.

Product Identification and Traceability (Clause 4.8):

A product should be identified and tracked at all stages of manufacturing from purchasing the materials through production, handling, storage, installation, and servicing. The firm should establish documented procedures for using the proper means of identifying products and batches.

Process Control (Clause 4.9):

The production, installation and servicing processes that affect quality should be controlled and documented. Suitable equipment and an appropriate working environment should be maintained to ensure proper process capability. The firm should comply with the relevant standards and quality plans, as well as monitor key

characteristics during manufacturing. Criteria for workmanship, using means such as illustrations or representative samples, should be established.

Inspection and Testing (Clause 4.10):

The firm should inspect and test incoming products and materials, as well as test products during their manufacture and at their final stages, to ensure compliance to the required specifications. A recall and retrieval system should be established for materials used for production in case any problems arise. Records for inspection and testing functions must be maintained.

Control of Inspection Equipment (Clause 4.11):

When the firm is using measuring and testing equipment, such equipment must be maintained and calibrated. The firm should ensure that the equipment is appropriate and safe to use. The frequency and extent of checking the equipment should be specified when the results of the equipment check are recorded.

Inspection and Test Status (Clause 4.12):

The status of the inspection and testing of products should be controlled and documented to show whether or not they have passed the test. During inspection, products should be identified by means such as tags, routing cards, labels, markings or similar methods. The firm should ensure that only products that have passed the test are sold and dispatched unless a concession agreement is made with the customer.

Control of Non-Conforming Products (Clause 4.13):

The firm should develop and document procedures for dealing with non-conforming products and keep them separate from other products. The non-conforming products should be dealt with by reworking them, using them for other alternatives, accepting them with or without concession, or by finally rejecting and scrapping them. The person or unit responsible for the non-conformity should be notified.

Corrective and Preventive Action (Clause 4.14):

This clause specifies the taking of corrective and preventive action relating to quality matters in the organisation. Problems or non-conformities should be corrected, their causes should be investigated and non-recurrence of such problems must be ensured. Preventive action should be taken to predict or detect any possible non-conformities or quality problems. The firm may be informed of such problems through techniques such as customer complaints, surveys, costs of repairs or warranty, sales figures, and audit reports.

Handling, Storage, Packaging, Preservation and Delivery (Clause 4.15):

The firm should establish documented procedures for the safeguard and preservation of products. Products should be handled, stored and preserved in a way that prevents damage or deterioration. The packaging and marking of goods should be appropriate to ensure conformity to specified requirements. After finally testing the product, the firm should make certain that it reaches the customers protected, if demanded by the contract.

Control of Quality Records (Clause 4.16):

The maintenance of quality records is demanded by most ISO clauses. However, this clause stipulates the establishment of records. Quality records such as standards, scrap rates, corrective costs and other elements should be maintained. They should also be identified, collected, indexed, accessed, filed, stored, and maintained, while old records should be disposed of. The records should be stored in a way that makes them retrievable and safe from damage or deterioration. The firm should choose an appropriate method of storing quality records, whether as hard copy or in electronic form.

Internal Quality Audit (Clause 4.17):

This clause demands that the firm establishes documented procedures for conducting internal quality audits. The purpose of an internal audit is to confirm that the quality system complies with the specified requirements of the desired standard. Internal auditors should be those who have no direct responsibility for the activity being audited. The findings of the audit reports should be discussed with the personnel concerned to take corrective action, and subsequent audits may be needed to verify the effectiveness of such measures.

Training Requirements (Clause 4.18):

All personnel who perform activities that are related to quality should be trained. Employees should be able to perform their responsibility within the quality system properly and effectively through training, education and experience. The quality system training requirements should be first identified then executed by qualified trainers, and the records maintained.

Servicing Requirements (Clause 4.19):

The firm should establish documented procedures for servicing when after sales servicing is required by the contract, or when there is a warranty on the product. The firm, therefore, should provide the required service or replacement. The quality should be verified and the procedures recorded.

Statistical Techniques (Clause 4.20):

The firm should determine, first, whether or not there is a need for statistical techniques and provide justification if the need does not exist. The firm should select the techniques that suit its needs and establish documented procedures for them. Which may include sampling inspection, Pareto diagrams and histograms among others.[5]

4.9 ISO 9000 Implementation:

Before implementing the ISO 9000 standard, the firm may use ISO 9000-1 (1994) for the purpose of selecting the appropriate standard, ISO 9001, 9002, or 9003. In addition, the firm may benefit from the use of other supportive standards as described in Table 4.2, such as other members of the ISO 9000; ISO 9004 series; the ISO 10011 standards for conducting internal auditing; and ISO 10013 for writing quality manuals. The process of implementing ISO 9000 involves taking several steps, beginning with the commitment and support of top management and the provision of financial resources, and ending in the registration process, although in reality, implementation never ends. Durand *et al.* (1997) expect the process to last between 3 and 18 months, while Arora (1996) puts the length of the process at almost 13 months. In implementing ISO 9000, the firm may proceed with the following steps or stages.

[5] For more of the statistical techniques, see Chapter five under qualitative and quantitative techniques (SPC), and see ISO 9004 (1994) Sub-clause 20.1.

4.9.1 The Commitment of Top Management to ISO 9000:

Clause 4.1 of ISO 9001 covers management responsibility, which includes top management commitment and the provision of the resources necessary for the implementation of ISO 9000. Almost all of the scholars who have been written about ISO implementation assert that top management commitment is probably the most important factor in the process of implementation (Durand *et al.,* 1997; Hockman *et al.,* 1994; Arora, 1996; Benson and Sherman, 1995; Lal, 1996; Al-Shabrawi, 1995; and Ho, 1995b). To illustrate the importance of top management commitment to ISO, Johnson (1997) considers it an absolute prerequisite in ISO implementation, arguing that without such commitment, no quality initiative can succeed.

Top management may contribute to the process of implementation of ISO 9000 in the organisation in significant ways, as described by Wilson (1996). He suggests methods of supporting the programme, such as developing and establishing vision, objectives, policy and strategy, assuring resources and success, monitoring implementation and eliminating barriers to implementation.

4.9.2 The Establishment of Implementation Teams:

Before planning for ISO 9000 implementation, the firm may form special committees or teams for the purpose of executing this process. Usually, there are two committees that deal with implementation; a steering committee and an ISO project team, but this may depend on the size of the firm and the availability of resources. In the case of a small firm, just one committee might be enough to implement the ISO. Durand *et al.* (1997) mention other teams, calling them quality system element teams, to carry out more detailed work involved in the implementation process. However, while this

system could be adopted in very large corporations, it could also lead to more bureaucracy.

The Steering Committee is also known as the Quality Action Council in some companies (Johnson, 1997). Consisting of the most senior managers, it is headed by the Chief Executive Officer (Arora, 1996) and includes the management representative for ISO who is usually the quality manager. It should be responsible for the overall planning of ISO 9000 implementation and the allocation of resources. In addition, the committee should approve the project definition, conduct a management review, and plan for the design, documentation, and implementation of the procedures as required by Sub-clause 4.1 of ISO 9001 (Durand *et al.*, 1997).

The second team for ISO implementation is the ISO Project Team, and it has the responsibility of carrying out the actual implementation of the ISO 9000 requirements. The management representative, who should be a member of the Steering Committee, usually heads this team. The team consists of middle managers from all functions and whose work influences the different elements of the quality system. Johnson (1997) argues that ISO requires top management to assign a management representative who has sufficient authority to be able to develop and monitor the elements of the quality system, and to establish a liaison with the registrar. Durand *et al.* (1997) present some of the responsibilities of this team, such as assessing current status, establishing project structure, educating project team members, identifying responsibilities for quality system elements, developing project plans, and choosing the registrar.

4.9.3 The Use of the External Consultants:

After the establishment of teams and management representatives for the implementation of ISO, the firm, especially a small one, may hire external consultants to help in developing the implementation process. Some other firms may rely on their own qualified employees for this purpose. Arora (1996) suggests that before hiring consultants, a firm should consider their costs, qualifications, and previous experience. Fox (1994) warns of the over-elaboration of the work of consultants who design a quality system in order to satisfy their clients, but succeed in complicating matters. He states that the work of consultants should be harmonised and co-ordinated with the firm and its culture so that the quality system suits the normal routine of the organisation.

4.9.4 The Assessment of Current Capability:

An assessment of the current quality system is useful to compare a firm's actual capabilities with the requirements of ISO 9000. One way to accomplish this evaluation is to conduct gap analysis. This stage of implementation called, initial status survey by Arora (1996), is an assessment of capabilities. In addition, Durand *et al.* (1997) suggest that by the end of the gap analysis, the firm should have identified three elements: the acceptable practices and documentation; the practices and documentation that need refinement; and the new procedures and documentation that need to be created. Once such elements have been identified, action plans should follow.

4.9.5 Education and Training for ISO:

At the beginning of ISO implementation, educational programmes for all employees, including top managers, should be conducted. Such programmes may disseminate general knowledge about ISO, such as its concepts and benefits, the changed processes,

and its cultural implications (Arora, 1996). Top mangers should receive training in quality system understanding (Johnson, 1997), in their role in the quality system, and in the effort required (Durand *et al.*, 1997). In addition, more specific training programmes may be provided to an ISO representative and his / her team, for instance internal auditors. They may receive instructions in documentation, devising a quality manual, calibration, internal auditing and measurements (Arora, 1996).

4.9.6 The Establishment of a Quality Management System:

This is probably the most important step in implementing ISO 9000 since it comprises the 20 clauses of the standard. Establishing the quality system elements requires a firm to design implementation procedures for ISO 9000 clauses that start with management responsibility (Clause 4.1) and end with the use of statistical techniques (Clause 4.20). In designing such elements, the firm may use other supportive standards, such as ISO 9004-1 (1994), as useful guidelines for establishing the quality system. In addition, ISO 9000-2 (1994) may provide help in applying ISO 9000 in the organisation.

When designing the procedures for establishing the quality system elements, Durand *et al.* (1997) suggest some criteria for such a process. The procedures should comply with the requirements of the relevant standards and satisfy quality plan intent. They should also be efficient business-wise, compatible with other elements, and acceptable by the employees who perform the function. The requirements of 20 ISO 9001 clauses are explained in section 4.8.

4.9.7 Documentation of the Quality System Elements:

Although ISO 9000 involves a substantial amount of documentation, Arora (1996) argues that it particulary requires the documentation of areas where its absence may affect quality in a negative way. The objective is to ensure that the documentation of each element in the quality system is developed, reviewed, and approved (Durand *et al.*, 1997). ISO 10013 (1995) Guidelines for Developing Quality Manuals distinguishes between three levels of documentation; quality manual, quality procedures and work instructions. The task of documentation at each of these three levels may take up to one year (Hockman *et al.*, 1994). It should be noted that Goult (1997) and Callison and Nash (1998) consider the records themselves to be the fourth level of documentation. Figure 4.4 shows the established three levels of ISO 9000 documentation.

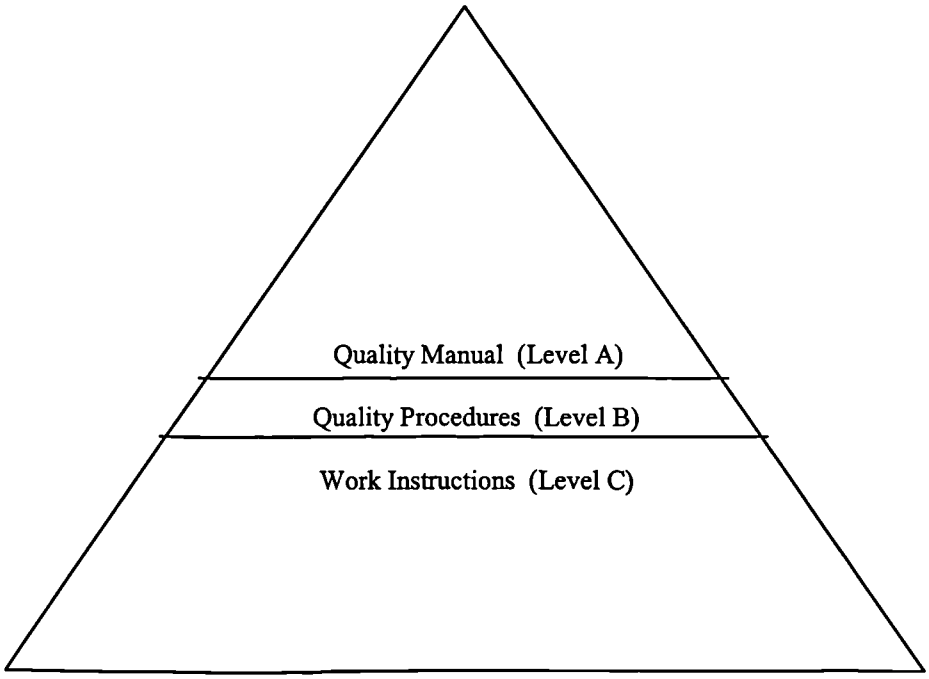

Figure 4.4 Levels of ISO 9000 documentation
Source *ISO 10013 (1995) Guidelines for Developing Quality Manuals*, p.7.

The quality manual describes the quality system elements, states the policy and objectives of the quality system, and shows the responsibilities and authorities of employees related to quality (Lal, 1996; Arora, 1996). In addition, it demonstrates management commitment to quality, serves as a cross-reference between the quality system and ISO standard, and functions as a reference document to the registrar as well as to outside entities, such customers and shareholders (Johnson, 1997).

ISO 10013 (1995) includes guidelines for developing a quality manual without giving rigid directions, leaving the firm to decide on the development of the manual to suit its work environment. In writing the quality manual, the layout may follow the sequence of ISO 9000 clauses or may follow the workflow of the organisation. ISO 10013 (1995) Clause 7.7 and Benson and Sherman (1995) recommend the use of the first method because the manual will be more organised, more efficient, and will be easier for auditors to follow. Fox (1995) and Callison and Nash (1998) claim that the quality manual should normally be approximately 30 pages in length. Table 4.4 presents the contents of a typical quality manual.

Table 4.4 Typical contents of the quality manual

Contents of the quality manual
Title and table of contents
Scope and field of application of the manual
General overview of the manual
An introduction to the firm and the manual
Quality policies
Quality objectives
Description of the structure, the responsibilities and the authorities in the firm
Definitions of special terms that may be included
Description of the quality system elements
Guide to the quality manual, if appropriate
Development of an appendix that includes data necessary to the manual

Source: *ISO 10013 Guidelines for Developing Quality Manuals* (1995), p.4.

The second level of documentation consists of quality system procedures. These describe the way the management system functions, outlining the activities of the individual departments and the linkage between them (Goult, 1997; Arora 1996). They are cross-functional procedures that have been written by employees who are carrying out the work; the documentation is then approved by the employees' supervisor, and are usually accompanied by flow charts (Callison and Nash, 1998). Quality procedures and policies are important to ensure that employees know their tasks and that management maintains control. Moreover, they can be used as reference materials for personal training (Johnson, 1997; Lal, 1996).

Work instructions, the third level of documentation, describe how the tasks are performed in the different departments of the organisation. The detailed information can be taken from the procedures and translated into specific instructions on how they should be implemented. Arora (1996) claims that work instructions should include drawings, manufacturing instructions, process specifications, testing and packaging methods, and calibration instructions. Callison and Nash (1998) suggest that before writing work instructions, a flow diagram of the work process should be drawn, and the person who writes the instructions should observe the actual execution of the tasks.

Quality records are considered by Goult (1997) and Callison and Nash (1998) as the fourth level of documentation but it is recognised that records are not documents, according to ISO 9000. Others, such as Arora (1996), include records as an additional element to the documentation process and not as a level by itself. Records, according to ISO 9000, provide objective evidence of any activity that has been accomplished. Callison and Nash (1998) claim that quality records are the actual forms and documents

that have been used, and the forms that the control system recommends to be used. Furthermore, Goult (1997) mentions some examples of records as sales orders, receiving inspection data, shipping documents, audit reports, training records, and preventive actions.

4.9.8 Implementing ISO 9000 in the Organisation:

At this stage, the firm has already planned and established the quality system, trained its employees, and established documentation. Since the quality system is ready for implementation, management should start implementing ISO 9000. Management should periodically review the quality system and ensure its compliance to ISO requirements as demanded by Sub-clause 4.1.3 (Management Review). At all stages of implementation, training and education should be provided as required and should not end with the establishment of the quality system.

4.9.9 Performing an Internal Quality Audit:

The firm should ensure that the requirements of ISO 9000 are complied with through internal audits as a requirement of Clause 4.17 of ISO 9001. A person who is not directly responsible for the activity being audited should perform the internal audit. The firm may use the ISO 10011 series for auditing the quality system (3 parts).[6] Internal auditing should be performed inside the firm against ISO 9000 requirements, in this case, or it could be against any other standard or procedure.

Internal auditing starts with the planning of the audit programme through selecting the team, determining the scope, identifying information sources, developing an audit plan

[6] For more information concerning such standards, see Table 4.2 for details of ISO 10011, parts 1, 2 and 3.

and formulating checklists (Middleton, 1997). The next step is to execute the internal auditing where by the representative of the department being audited must attend the auditing process to facilitate the auditors (Lal, 1996). The execution of the audit will be through observation and questions, verifying record keeping, and selecting records for examination (Arora, 1996). The result of the internal auditing, together with details of non-conformities found in the department are then reported to management. This report usually includes the scope of the audit, the standard against which the audit was carried out, the non-conformities found, recommendations for corrective actions and the report distribution list (Middleton, 1997; Arora, 1996). Follow-up and corrective measures should be taken to ensure that non-conformities or discrepancies have been corrected and will not recur.

4.10 The Registration Process:

Registration to ISO 9000 involves a third party assessment of the firm to examine its compliance with the requirements of ISO 9001, 9002 or 9003 quality management system elements. The firm, after implementing ISO 9000 and performing internal auditing, may seek registration for ISO 9000 through such third party assessment. The first step in the registration process is to select the registrar, who may or may not perform a pre-assessment audit, but will perform the formal audit, and conduct surveillance assessment. The next sections present the registration process stages in more detail.

4.10.1 Choosing the Registrar:

The choice of a registration agency depends on a number of criteria including its accreditation, costs, previous experience, reputation, knowledge about the particular

industry and its auditing procedures. The accreditation of the registration agency is to ISO / IEC Guide 62 (1996): General Requirements for Bodies Operating Assessment and Certification / Registration of Quality System. This standard has requirements for the registration agency in matters such as its quality system, records, documentation, internal audits, confidentiality, and its personnel. In addition, ISO 62 has requirements for the registration process, such as application, preparation for assessment, assessment, and surveillance visits. In the UK, registration agencies should be registered to the European standard EN 45012: General Criteria for Certification Bodies Operating Quality System Certification in order to conduct quality system auditing. EN 45012 is parallel to ISO 62 and includes similar sections regarding the registration agency organisation and its registration procedures. Moreover, in the UK, the United Kingdom Accreditation Service (UKAS) is the regulating agency of registrars, while RAB, the Registrar Accreditation Board, is the regulatory body in the Unites States. Once a registration agency is accredited in the UK, UKAS grants it the use of the UKAS logo in its stamps, which in turn are used for firms registered to ISO 9000.

Each registration agency has assessors working under its umbrella and on its behalf. In the UK, the accreditation of the auditor is administered by the Institute of Quality Assurance (IQA). The scheme governing the accreditation of auditors is called "International Register of Certificated Auditors" (IRCA). Under this scheme, the auditor must meet some requirements to be eligible. These include academic qualifications, work experience, quality experience, auditor training, auditing experience, and a code of conduct under the reference IRCA/102 that must be observed when practising the assessment.[7]

[7] Scottish Quality Management Centre (SQMC) (1997) *Auditing / Lead Auditing Course*, Section 10, p. 10-01.

Since ISO 9000 is not mandatory, there is no legal obligation on a firm to contract an accredited agency. However, the choice of an accredited agency over an unaccredited one might be wise since the former has complied with the requirements of ISO 62 (1996), which mandates integrity, fairness, confidentiality and professionalism of the agency. Weightman (1997) prefers the reliance on an accredited registrar because, he claims, its status might be vital to the value of the certificate. He adds that when choosing a registration agency, the firm should evaluate each one in terms of its fees, previous experience, financial security, validity of its certificate, and its internal operations such as competence and confidentiality. Fox (1994) suggests that a firm might choose the registrar who is recommended by its own industry or customers, has experience in its specific sector and size, and who is perhaps recognised internationally.

4.10.2 The Pre-assessment Audit:

The pre-assessment audit is conducted when a firm is confident that its quality system complies with ISO 9000 requirements. ISO 62 (1996), which governs the work of registration agencies, does not demand a pre-assessment audit. Wilson (1996) supports this and mentions that some organisations demand it while others do not. A pre-assessment audit is a trial assessment that is conducted either by the registration agency or by a consultant depending on the firm's wishes. Hockman *et al.* (1994) recommend that this audit is not to be performed by the registrar to ensure neutrality and integrity and to avoid any conflict of interests. Potts (1997) mentions some benefits of the pre-assessment audit, such as the identification of major system deficiencies, the improvement of the chance to pass the formal assessment, and the possibility of reducing the overall costs of formal auditing.

4.10.3 The Formal Assessment:

The formal auditing procedures for ISO 9000 are governed by ISO 62 (1996), taking into consideration other ISO standards such as ISO 10011 (3 parts), which governs the auditing programmes and the selection of auditors. This assessment is a third party audit to one of the ISO 9000 series (9001, 9002 or 9003). Some of the auditing procedures are required by ISO Guide 62 (1996), others are not. Therefore, the relevant clause or sub-clause of the standard will be included between brackets during this section.

The registration process starts with the dual signing of an application between the registrar and the firm, stating the scope of registration and the agreement of the firm to comply with the requirements of registration and to supply the necessary information (3.1.2.1). The firm then provides its quality manual and information on its quality system and documentation (3.1.2.2). The next step is audit planning, which entails the preparation of the assessment activities, the nomination of the audit team and informing the firm of the team names (3.2).

The assessment starts with an opening meeting to introduce the audit team, explain objectives, review the assessment programme and confirm logistical arrangements. The team will then proceed to the assessment of the quality system against the ISO 9000 requirement (3.3), recording deficiencies through objective evidence (ISO 10011-1). In a closing meeting, the lead auditor will present the assessment report to the firm, showing the non-conformities (3.4.1). Each non-conformity item is included in a separate Non-Compliance Report (NCR).[8] The registrar should make a decision, based

[8] Scottish Quality Management Centre (SQMC) (1997) *Auditing / Lead Auditing Course*, Section 14.

on the nature of the non-conformities, to grant the certification and to make it conditional for correcting any non-conformities within 3 months, or not to grant the firm any certification at all (3.5).

After granting the ISO certificate, the firm will have the right to use the logo of registration to ISO 9000 in its advertising or publications, but absolutely not on its product. ISO 9000 registration is for the quality system, therefore, the firm cannot use the ISO logo on its products as this may mislead customers. If the firm does use it on its product, the registration agency should correct this action in the following ways: withdrawal of the certificate, publication of the transgression and pursuing legal action if necessary (ISO 62, Clause 3.7).

4.10.4 Surveillance Visits:

To ensure the continual compliance of the firm to ISO 9000 requirements, ISO 62 Clause 3.6 demands the periodic assessment of the firm in annual surveillance visits. However, the majority of registration agencies may have two visits a year (Arora, 1996). The certificate of ISO may be withdrawn as a result of the decision of the assessor during the surveillance visits if the firm does not comply with ISO 9000.

4.11 Benefits of ISO 9000:

In addition to the improvement in the efficiency of the quality system, Arora (1997) claims that ISO 9000, helps to maintain consistency in the quality of products and services by identifying non-conformities and by demanding preventive or corrective actions. Another benefit of ISO 9000 implementation is the increase in customer satisfaction by improving the customers' perception of the organisation in terms of its

image, culture, and performance, thus encouraging their loyalty (Laszlo, 1996; Arora, 1996; Kanji and Asher, 1996). In addition, many customers may prefer suppliers who are registered to ISO 9000 since they have a competitive advantage over those who are not registered (Pitkin, 1995b). By registering to ISO 9000, a firm could reduce the audits performed by customers (Johnson, 1997). In a related marketing benefit, Johnson (1997) and Arora (1996) claim that another important advantage of ISO lies in access to international markets and improving the image and credibility of the organisation in the international arena, which in turn opens up new markets and opportunities.

Moreover, implementing ISO may reduce costs, as Fox (1994) considers the cost-effective quality system as being the only objective reason for seeking ISO 9000 registration. In answer to the question of whether ISO could reduce the costs of products, Arora (1996) claims that an organisation could achieve economies in production because quality systems will be controlled from beginning to end. Consequently, the firm may reduce costs in time because less effort will be spent on rework. Yung (1997) agrees that registration to ISO will help in efficiency improvements and consequently achieve cost reductions. Another benefit of ISO concerns the clarification of the authorities and responsibilities of employees by Clause 4.1. This may improve morale and communication among employees (Arora, 1996). Finally, Yung (1997) claims that ISO 9000 provides quality awareness among the internal staff of the organisation.

In a study on Turkish industry, Erel and Ghosh (1997) found that the most significant benefits of ISO were increased quality awareness, standardisation of the quality system,

and increased sales and exports, in ranked order. In Australia, Van der Wiele (1995) found that the most significant benefits were improved quality awareness, improved awareness of problems, improved management control, improved customer service and improved quality of products. Improving efficiency was the most important benefit in the UK, based on Buttle (1997), followed by improving the awareness of problems, better management control, the use of ISO as a promotional tool, and finally, an increase in customer satisfaction. In addition, Huarng (1998) studied the benefits of ISO in small and medium-sized enterprises in Taiwan and found that ISO 9000 provided significant benefits of internationalisation, quality improvement, increased sales and reductions in costs. In a recent study of Hong Kong, conducted by Lee *et al.* (1999), the most important benefits of ISO were clear work procedures, improved quality, improved team spirit, better control of subcontractors, increased efficiency, and fewer customer complaints. In another study of Australian firms (Beattie and Sohal, 1999), the most significant benefits were found to be improved procedures, production improvements, customer satisfaction and an improvement in staff morale. From these studies, it can be concluded that the common benefits of ISO include improvements in awareness of quality and of problems, a more efficient quality system, better customer service and satisfaction, better work procedures and an improvement in product quality.

4.12 Limitations of ISO 9000:

ISO 9000 was intended to be a TQM system that could be audited by a third party assessor and therefore it must comprise certain elements whereby an auditor can examine compliance by the firm to such criteria. Consequently, there are limitations to ISO 9000 that arise by virtue of its nature. In addition, there are elements that could be

added to ISO clauses, but which can be neither verified nor audited by the assessors. Thus, even if attempts are made to modify it, ISO 9000 will still remain limited.

The first limitation of the ISO 9000 series of 1994 lies in not dealing with the final customers; it just deals with the customer-supplier relationship. Therefore, the final consumer's issues were not covered in the standard, such as investigating whether customers were satisfied or whether their needs were identified. In a survey of 962 Australian and 379 New Zealand firms, Terziovski *et al.* (1995) found that there was no positive relationship between ISO 9000 registration and customer satisfaction. Moreover, the ISO 9000 of 1994 does not mention continuous improvement explicitly.

In addition, ISO 9000 does not address factors such as employee involvement, teamwork, management commitment, and quality costs (Yung, 1997). Furthermore, it does not guarantee the manufacturing of a good quality product, although it furnishes a reliable environment for its production. ISO 9000 also provides some requirements for the quality system but does not address the quality of the product itself. Another limitation is that it does not deal with the safety issues in a factory.

It is also argued that ISO is not concerned with the business results of firms, such as their financial indicators. Moreover, it is different from other TQM models, such as the Baldrige Quality Award of the USA and the European Quality Award EFQM, which both consider business results to be a complement to the success of the quality system. If the firm has a good quality system but cannot sell its products, those two models consider this as a deficiency. Iizuka (1996) claims that ISO 9000 does little to address the activities that produce a high quality product and ISO design requirements cannot

ensure a high quality product if a design is very complex and includes advanced technology requirements.

Those limitations might reduce the importance of ISO 9000, but implementing the standard does not mean that the firm cannot implement any other element that is needed for its quality system. Many firms implement a TQM programme that includes ISO 9000 as a major component. In turn, such firms will comply with ISO 9000 as a minimum requirement and seek other TQM elements. ISO auditors do not usually ask firms not to include any additional elements in their quality systems; they merely ask for ISO 20 requirements only. In addition, any limitations to ISO 9000 that can be audited and verified might be added in subsequent versions of ISO. During 1999, ISO distributed the new draft of ISO 9000 for the year 2000, to be commented upon by its members. Therefore, the year 2000 could see improvements in ISO, and it will be evaluated again and a next version might be issued 5 years later. However, if the required elements cannot be verified or audited, then this is a characteristic of ISO that cannot be changed.

4.13 ISO 9000 in the Developing Countries:

The level of ISO 9000 registration in developing countries reflects the state of their industrial and technological positions. The better the industrial and technological standard of any developing country, the more its industries are concerned with the efficiency of their operations and the quality systems of their factories. In 1961, the ISO organisation established DEVCO: a committee within ISO for the developing countries for the purpose of helping them in the field of standardisation and related areas, such as quality management in general and ISO 9000. DEVCO is trying to

provide developing countries with the necessary measures to overcome their problems in the field of standardisation. However, the burden of development and progress remains on those countries, despite the fact that they lack the infrastructure not only in standardisation but also in all fields of industry.

The developing nations have been striving to implement ISO 9000 in increasing numbers in order to access important markets in Europe, and North America. However, there is still a need for a credible infrastructure in such countries for ISO 9000 registration (Lal, 1996). In terms of the registration agencies, these states have national agencies that are unknown outside their countries, and in many cases are not accredited to ISO Guide 62. Consequently, the firms in those countries rely on well-known foreign agencies that are more credible and reliable across the world. Arora (1996) and Lal (1996) mention that ISO has established a recognised scheme among the accreditation bodies. Known as Quality System Assessment Recognition (QSAR), it is designed to ensure the world recognition of any certificate issued by any accreditation body. QSAR is based in Geneva, along with other ISO committees that issue guidelines for the registration process. Therefore, any developing country that is a member could use the symbol of QSAR, which is internationally accepted. However, this scheme is probably not effective since its use is limited, at least it has not been used in any of the 22 Arab countries, among which Saudi Arabia is one.

In addition, developing countries still rely on the industrial countries for training and certifying their assessors, as is the case of SASO in Saudi Arabia, which certifies its auditors through the Institute of Quality Assurance (IQA) in the UK. Moreover, the training agencies in ISO 9000 in the developing countries still rely on the industrial

countries for personnel and materials. The number of firms that are registered to ISO 9000 in the developing countries is still small compared to the industrial countries. All Arab countries, for example, have fewer than one thousand firms registered compared to more than 58 thousand firms in the UK in December 1998.

4.13.1 ISO 9000 Registration in Saudi Arabia:

Based on the eighth cycle of the annual survey of ISO 9000 in the world,[9] until 1993, Saudi Arabia had only four firms registered to ISO 9000 and by 1998, the number had reached 280 firms. Figure 4.5 shows the growth in ISO registration in Saudi Arabia.

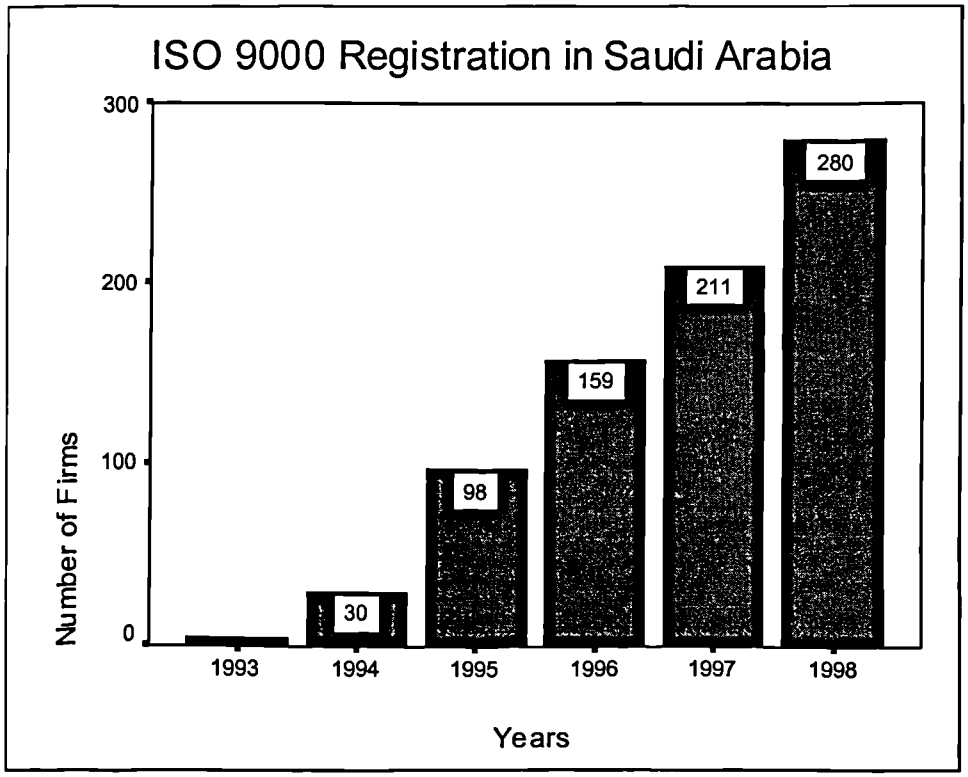

Figure 4.5 Growth of ISO 9000 registration in Saudi Arabia (1993-1998)

[9] International Organisation for Standardisation (ISO) (1999) *The ISO Survey of ISO 9000 and ISO 14000 Certificates, Eighth Cycle*, Geneva, Switzerland.

Figure 4.5 shows that ISO registration in the Kingdom has risen rapidly ten times or 1000% in five years; a percentage which shows a fast growing commitment to ISO 9000 in Saudi Arabia. In order to see the significance of ISO 9000 registration, we should compare this number to the total number of firms in Saudi Arabia, as shown in Figure 4.6.[10]

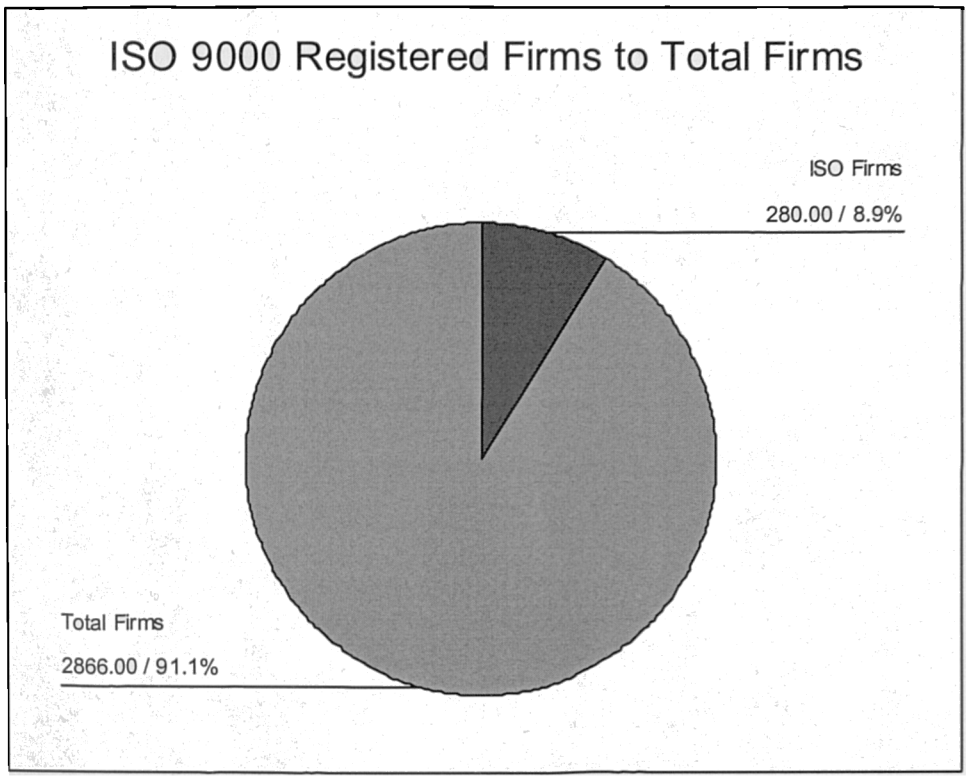

Figure 4.6 ISO registered firms in Saudi Arabia to total firms (1998)

Figure 4.6 shows that in 1998, ISO 9000 registered firms in the country represented almost 9% of the total firms in the country. The fact that this percentage is generally small could be due to a number of reasons. It might be because ISO is not mandatory and not many firms in the country are involved in international marketing. In addition, Saudi firms reflect the industrial and technological environment in the country, which is

[10] Statistics about total Saudi firms are obtained from: Ministry of Industry & Electricity (1999) *Development of the Industry in 100 Years 1319-1419 A.H*, Riyadh, Saudi Arabia.

not as developed as in the Western countries. However, a comparison with Saudi Arabia and other Arab countries might show the relative position of Saudi Arabia among countries that share similar circumstances. This comparison is shown in Figure 4.7.

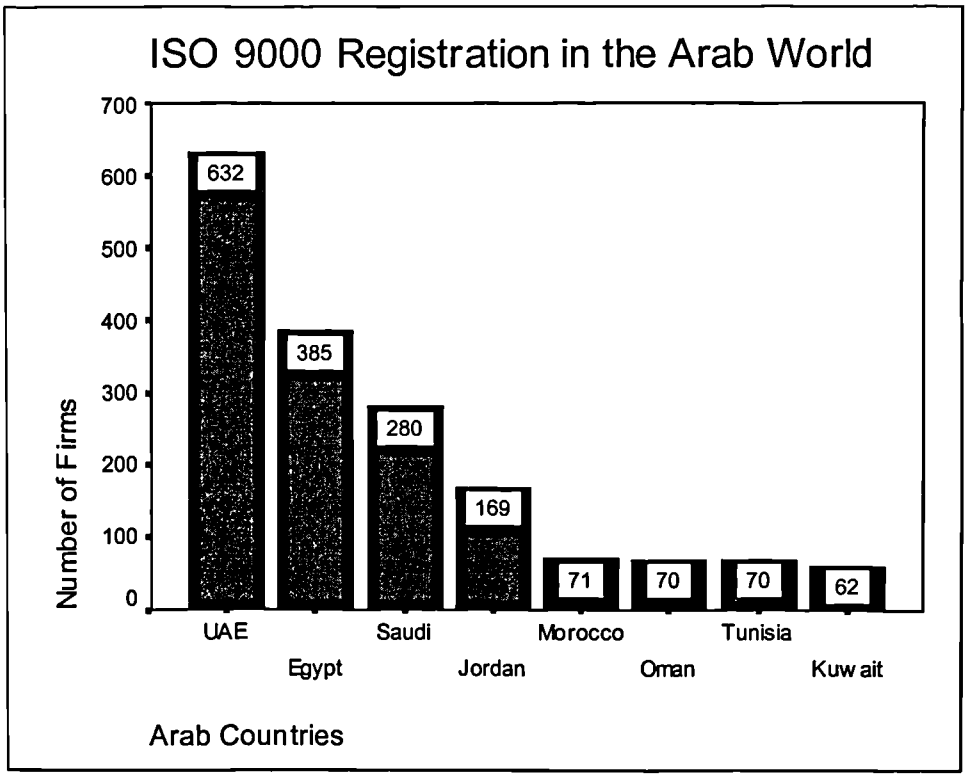

Figure 4.7 ISO registration in Saudi Arabia and other Arab countries (1998)

Figure 4.7 shows that Saudi Arabia ranks third among the leading eight Arab countries in ISO 9000 registration. The Figure also shows that the UAE had 632 firms followed by Egypt with 385 firms registered to ISO 9000. However, those two countries have a large number of foreign companies, and this factor contributes to their higher proportion of ISO registration. In 1998, Saudi Arabia had only 362 foreign companies, which is a comparably small number. All aspects of ISO 9000 implementation and registration in Saudi Arabia will be examined in detail in this study.

Concerning ISO 14000, which deals with the environment, the ISO survey (1999) shows that only one Saudi firm registered to the standard in 1997. The country is no different from the developing countries where there are no strict laws and their firms are not made sufficiently aware of the environment. Among the Arab countries, UAE ranked first with nine firms, followed by Egypt with eight firms, and Jordan came third with only two firms. These numbers are still small and are not expected to grow rapidly, at least in the foreseeable future.

4.14 The Next Version of ISO 9000: 2000:

During 1999, the Technical Committee TC 176 of ISO issued the new versions of ISO 9000: 2000 standards, to be discussed and voted by the end of 2000. They consist of three standards: ISO 9000, ISO 9001, and ISO 9004. It is expected that once those standards are amended and agreed upon, they will be published before the end of 2000. The firms that are already registered to the ISO 9000 of 1994 will have three years to shift to the new ISO of 2000. Therefore, until the end of 2003, the ISO of 1994 and of 2000 may still co-exist up to January 2004, when all firms should adopt the new version only (Zuckerman, 2000; West *et al.*, 2000). Those standards are the result of the work of many international organisations and the contributions of many experts in the field of quality systems and quality assurance. As of 1999, TC 176 had 56 national standard organisations as participating members (P) meaning that they can vote. These include many of the Western countries, Japan, China and two Arab countries: Algeria and Egypt. TC 176 includes 19 observing members who cannot vote but are permitted to participate in discussions and receive all relevant materials. Among these are three Arab countries: Saudi Arabia, Syria and Tunisia. In addition, TC 176 includes 28

organisations that are interested in quality and standards and who may participate in discussions, but have no voting rights. Such organisations include the Arab Management Society (AMS), the American Society for Quality (ASQ), the European Organisation for Quality (EFQ), the Asian Productivity Organisation (APO) and some technical committees of ISO (ISO, 2000). The new revisions of ISO 9000 have several objectives, as stated by the chair and three members of the US Technical Advisory Group for the TC 176. These are: providing compatibility with the existing quality system; providing structure for management emphasising customer orientation; accommodating all sizes of firms; connecting business processes to the quality system; and providing simple, understandable standards (Cianfrani *et al.,* 1999).

TC 176 has proposed three standards: ISO 9000, ISO 9001, and ISO 9004, to replace the versions of 1994, while ISO 9002 and 9003 will be eliminated. The three standards are still called Committee Draft (CD) until the TC 176 members have approved them after possibly revising them. Once they are approved, they will become Final Draft Standards (FDS) which will require 75% of all member bodies of the ISO to publish and to adopt them. The USA has rejected ISO CD 2[11] 9000, but has approved both ISO CD 2 9001 and ISO CD 2 9004. The Technical Advisory Group (TAG) of the U.S; that was formed by some American quality organisations, voted against ISO 9000 on a number of grounds. These include the fact that the order of terms was not listed alphabetically, the model for the quality management system is complicated, there are two definitions of quality, which is confusing, and many definitions in ISO 9000 are not consistent with ISO 9001 and ISO 9004.[12] In addition, TAG of the US in its March

[11] Number 2 that follows CD, represents the second committee that is responsible for developing ISO standards inside TC 176.
[12] *Quality Progress* (1999) Details Presented on U.S Disapproval of ISO 9000: 2000 Revisions, Vol. 32, No. 10, October, pp. 18-24.

2000 meeting voted to oppose not just ISO 9000: 2000 but also opposed ISO 9001:2000 as well, and provided its amendments to those standards.[13] Therefore, the ANSI of the US will probably reject both ISO 9000 and ISO 9001 of 2000 during ISO voting for the standards, while the position of the other world bodies is not yet known to the researcher.

ISO CD 2 9000 (2000) was named Quality Management Systems – Fundamentals and Vocabulary and was intended to replace ISO 8402 on the terminology and ISO 9000-1. This standard comprises four sections: scope, normative references, fundamentals for quality management systems and definitions of quality terms. In addition, ISO 9000 includes seven models related to quality. However, these are rather complicated and they do not ease the understanding of the concepts they seek to explain.

The other standard is ISO CD 2 9004: 2000 Quality Management Systems – Guidelines for Performance Improvement, designed to replace ISO 9004-1(1994) if approved. This standard, as in the case of its predecessor of 1994, provides useful guidelines for the establishment of a quality system. It includes similar elements to the new ISO 9001: 2000, but with explanation on how to establish those elements. This standard is not for third party assessment, but rather helps a firm to implement ISO 9001 as a supportive standard. ISO 9004: 2000 is substantially larger than the former ISO 9004-1, comprising 73 pages with a thorough coverage of ISO 9001: 2000. Each element of the standard includes its counterpart ISO 9001 element inside a triangle so that the reader can refer to the quality element being explained. This standard, if approved,

[13] *Quality Progress* (2000) U.S. TAG Votes to Oppose Drafts of ISO 9000 and ISO 9001 Standards, Vol. 33, No. 5, May, pp. 28.

might be of crucial importance not just for implementing ISO 9001, but also as educational TQM material for firms and educational institutions.

4.14.1 ISO CD 2 9001: 2000:

ISO CD 2 9001: 2000 Quality Management Systems – Requirements is the third standard that has been proposed by ISO TC 176. If approved, this standard will replace three former standards, ISO 9001, 9002 and 9003 of 1994. This standard might relieve a firm of the confusion of having to choose between the three former standards. In addition, it will impose restrictions on firms that implement ISO 9002 although they have design functions. At present, it is reasonable to have one standard, but when the firm under assessment does not have the element included in the standard, it may provide justification that its work does not require such a feature.

The new ISO 9001: 2000 includes most of the elements of the previous ISO 9000: 1994 and incorporates some new ones. It includes an introductory clause (0), 8 other clauses, and an annex. The main objective of this standard is to achieve customer satisfaction (Clause 0.1), which did not exist in the previous standard, thus placing more emphasis on the final customer. To accommodate the sector of activity differences, the standard includes the possibility of reducing its own scope to fit the activity of the firm. This is beneficial in certain cases, for example if the firm has no design activity, it could then reduce the scope of ISO 9001 to exclude design. Moreover, ISO 9001: 2000 includes a process model for a complete quality management system that starts with determining customer requirements and ends with achieving customer satisfaction (0.2). For firms that implement ISO 14001 and ISO 9001, this standard offers compatibility to implement the common subjects of both standards in a shared manner (0.3). The word

'supplier' is replaced by the word 'organisation' to reduce the confusion between the firm and its suppliers (3). Unlike ISO of 1994, this standard emphasises final customer satisfaction inside the quality system, including meeting customer requirements in the quality system as it is supposed to be (5.2). In addition, legal requirements and internal communications that affect quality are introduced (5.3 and 5.6.4).

In this standard, training is included in its larger context inside the resource management section in Clause 6. This also includes the selection and qualification of personnel in quality-related positions. In meeting the demands of many quality managers in the industries, the standard includes new subjects such as health, safety, and ethics in the work environment in a sub-section (6.5). The design of products in this standard is placed under the broader term "product realisation", which includes customer-related activities, purchasing, and manufacturing activity (7). Moreover, ISO 9001: 2000 introduces the measuring of quality system efficiency in the firm, making the measurement of customer satisfaction an important tool (8.2.1.1). Like the previous standard, it includes internal auditing as well (8.2.1.2). Furthermore, the new standard includes the word verification to replace the word inspection, which is a more generic term relating to manufacturing and non-manufacturing products and services. Like the old standard, ISO 9001: 2000 covers the non-conformity, which occurs as a result of the verifying and inspection function. The standard ends with the correspondence between ISO 9001 and ISO 14001 elements so those firms registering to ISO 9001 and ISO 14000 may deal with the shared clauses once.

In an assessment of this standard, Lamprecht (1999) and Zukerman (1999) praise ISO 9001: 2000 for including important new elements such as its emphasis on customer

satisfaction and the inclusion of improvement processes. In this context, Conti (1999) mentions that the standard is a step forward towards customer satisfaction assurance and not just product quality assurance. However, he criticises the standard for being limited in this manner and for being unable to provide help in how to attract customers or how to understand market expectations. However, these functions could be considered as a marketing strategy, which ISO is not supposed to cover in detail.

Since the new ISO includes communication and information requirements, Zukerman (1999) claims that this standard describes what a firm needs in order to develop the communication and information system required to enter the knowledge age. In addition, Lamprecht (1999) argues that when implemented wisely, a firm will benefit from most of its stipulations. However, the standard includes repetitions and therefore could have been shorter. He gives an example of redundancy where, 'continual improvement' is repeated in clauses 1.1, 4.0, 5.4, 5.5.1, and 5.6.1. Moreover, the standard contains elements that are difficult to audit, such as legal requirements. In addition, he claims that firms might need substantial human and financial resources to implement the changes in order to reach the standard. Moreover, Conti (1999) recommends the use of the new ISO 9004 with ISO 9001 as a complement to establish a TQM system in the organisation. Finally, Russell (2000), although praises the new standard, acknowledges that some of its requirements are not easy to audit without specifying certain clauses, which poses a challenge to ISO auditors.

4.15 Summary:

This chapter included a comprehensive coverage of ISO 9000. It started with some brief information about the ISO organisation itself. It also included a presentation of

the ISO 9000 family of standards, as well as and the other supporting standards. In addition, the chapter covered ISO 9000 quality management systems, and explained thoroughly ISO 9001. It included coverage of ISO in the developing countries, ending with an introduction to the new ISO 9000 of 2000. The next chapter will cover TQM.

CHAPTER FIVE

TOTAL QUALITY MANAGEMENT

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TOTAL QUALITY MANAGEMENT

5.1 Introduction:

This chapter is committed to TQM, including a definition of the concept, a description of the origin of TQM, an explanation of TQM elements, a discussion of problems with TQM, TQM and ISO 9000, problems with TQM, and difficulties with quality in the developing countries

5.2 Definition:

The concept of Total Quality Management (TQM) has become increasingly important and is currently gaining global momentum. ISO 9000 is simply an attempt to establish a TQM system in an organisation to include elements that constitute a quality system. TQM means that all parts of the organisation should participate in establishing a system that contributes to the quality of the product. This definition includes certain elements that start with determining customer needs and continue even after the products have been supplied to the customers. Many writers and quality scholars have produced definitions of TQM that agree with the previous meaning. However, they differ in their identification of those elements that constitute TQM.

ISO 8402 (1994:6) defines TQM as "a management approach to an organisation, centred on quality, based on the participation of all its members and aiming at long-term success through customer satisfaction, and benefits to all members of the organisation and to society". The new draft, ISO CD 2 9000: 2000 (1999:12) defines TQM as "the quality management of an organisation comprising the entire

organisation". The standard adds the aim of TQM as a note, which contains the same definition of the previous standard, and uses the phrase 'all interested parties' as the beneficiaries of TQM, which includes employees, stakeholders and customers. Al-Sulimani and Sharad (1994) focus on customers and teamwork in their definition of TQM as "a co-operative form of doing business that relies on the talents and capabilities of labour and management using teamwork to continually improve quality, economy and productivity to the complete satisfaction and delight of the customer". Feigenbaum's (1991:835) definition of total quality control, which is the name that has been used for quality management, concentrated on all groups or functions, continuous improvement and customer satisfaction. His definition was that total quality control is "an effective system for integrating the quality-improvement efforts of the various groups in an organisation so as to enable marketing, engineering, production, and service at the most economical levels which allow for full customer satisfaction". Jeffries *et al.* (1996:15) follow the same pattern in defining TQM as "a comprehensive and integrated way of managing any organisation in order to meet the needs of the customers consistently and achieve continuous improvement in every aspect of the organisation's activities". In addition, Ho's (1998) definition requires that everyone in the company, including customers and suppliers, is involved in continuous improvement for the purpose of meeting customers' expressed and implied requirements with the full commitment of top management.

5.3 The Origin of TQM:

There is no agreement among scholars on who first used the term TQM. Macdonald (1998) claims that the Trade and Industry Department first used the term in the UK in 1983, when they launched a national quality campaign, and that by the late 1980's, the

term was being widely used in the USA. Martinez-Lorente *et al.* (1998) recognise that the elements that constitute TQM were being used by world industries prior to the 1980's. However, the exact date of the establishment of the term TQM is not easy to identify. Nevertheless, they claim that the use of TQM in literature began in the late 1980's, reaching its peak in 1993. On the other hand, other scholars such as Bendell (1991), Stevens (1994) and Morehouse (1996) consider Feigenbaum to be the originator of the total quality management concept when his work on on total quality control was published in 1956, followed by the publication of a book bearing the same title. In his book, Feigenbaum discussed the need for a comprehensive look at quality at all stages and in all functions of the organisation, and it was this that constituted TQM.

5.4 TQM Elements:

Unlike ISO 9000, TQM has no specific elements or components that have been agreed upon by scholars or practitioners in the field of quality management. Dahlgaard *et al.* (1998) contend that there is no standard recipe for a good TQM process. Each writer has selected the components that may reflect his or her background, field of interests, or the nature of the organisation and its circumstances. However, there is an agreement on some of the elements that are considered to be crucial to the establishment of TQM in the organisation. Table 5.1 presents these TQM elements, based on the views as presented in their writings. In addition, Al-Sulaimani and Sharad (1994) consider TQM elements to consists of top management commitment, customer focus, all employee involvement, training and education, communication and preventive actions.

Table 5.1 TQM elements

Saraph *et al.* (1989)	Bregman & Klefsjo (1994)	Ho (1995a)	Ahire *et al.* (1996)	Black & Porter (1996)	Rao *et al.* (1997)
Management leadership	Top management commitment	Leadership	Top management commitment	Quality culture	Leadership
Training	Decisions on facts	Commitment	Customer focus	Strategic quality management	Customer focus
Supplier management	Customer focus	Total customer satisfaction	Training	Quality improvement	Information & analysis
Product design	Focus on process	Continuous improvement	Supplier quality management	People & customer management	Strategic quality planning
Process management	Continuous improvement	Total involvement	Benchmarking	Operational quality planning	Human resource development
Quality data & reporting	Employees involvement	Training	SPC	External interface management	Quality assurance
Role of quality department		Ownership	Internal quality information	Supplier relations	Supplier relations
Employee relations		Reward & recognition	Employee involvement	Teamwork	Quality results
		Error prevention	Employee empowerment	Customer satisfaction	
		Teamwork		Communication	

Table 5.1 shows that as yet, there is no consensual opinion regarding what constitutes TQM. However, the most common elements agreed upon by scholars are top management commitment, customer focus, quality data and information, employee involvement, training, and continuous improvement. Some writers include SPC, preventive actions and benchmarking as independent components while others do not mention them at all, perhaps assuming that such elements may be included under improvement. ISO 9001 (1994) treats SPC as a separate clause, although it does not specify details of what constitutes SPC. The draft ISO 9001 of 2000 (1999) does not mention SPC explicitly.

In addition, there are other TQM models and awards in quality matters, such as the European Foundation for Quality Management (EFQM) model of the European

Community, The Malcolm Baldrige Award of the USA and The Deming Prize of Japan. Table 5.2 presents the key elements of EFQM (2000), the Baldrige Award (2000) and the TQM presented by British Standards Institution as BS 7850 Part 1 (1992).

Table 5.2 The TQM model (BS 7570) and quality awards components

BS 7850 Part 1 (1992)	**EFQM Excellence Model (2000)**	**The Baldrige Award for Performance Excellence (2000)**
Top management commitment	Leadership	Leadership
Customer satisfaction	Policy & strategy	Customer & market focus
Quality losses	People (Employees)	Strategic planning
Participation by all	Partnership & resources	Information & analysis
Process measurement	Processes	Human resource focus
Continuous improvement	Customer results	Process management
Problem identification	People results	Business results
Alignment of corporate objectives & individual attitudes	Society results	
Personal accountability	Performance results	
Personal development		

From Table 5.2, it can be seen that these three models closely follow the description in the previous literature concerning the components of TQM. BS 7850 Part 1 (1992) is not a quality award; it just provides suggestions for the organisation on what constitutes TQM. On the other hand, the EFQM model was established in 1988, determining the criteria for awarding firms for business excellence in the European Community. The Baldrige award was established in 1987 representing the criteria to promote awareness of quality and excellence, to be presented to three American companies each year. One point here is that these two awards include business results as a criterion for success thereby considering good product quality alone as not being enough to establish success.

The following sections include a brief explanation of some of these TQM elements. These are: top management commitment, quality culture, employee involvement,

training and education, benchmarking, and statistical process control and qualitative tools.

5.4.1 Top Management Commitment:

Top management commitment to TQM, ISO or to any other matter in an organisation is a milestone providing all types of support for its success. As seen from the previous section, all those who write about TQM and quality awards, consider top management commitment and leadership as essential components. In addition, ISO 9001 (1994) starts with management responsibility (Clause 4.1), placing top managers in charge of stating their objectives, assigning a quality manager, providing resources and reviewing the quality system. The new draft ISO 9001: 2000 (1999) addresses management responsibility (Sub-Clause 5.1), stating the same responsibilities of the previous standard and adding the fulfilment of customer requirements. Evans and Lindsay (1993) stress that, senior managers should be the leaders of TQM and should provide support, vision, and recognition to all employees. If top management does not consider TQM as its first priority in the long run, employees might lose their enthusiasm. Hradesky (1995) considers that the failure of many TQM programmes is due to a lack of commitment from top managers in the organisation. Moreover, Oakland (1996) maintains that the commitment of management to the concept must be a constant purpose and must embrace all departments, as well as the customers, suppliers, and subcontractors. In addition, Dean and Evans (1994) contend that TQM should be planned as a strategic matter reflecting the needs of customers, shareholders, suppliers, and employees. They emphasise the need for ongoing assessment to ensure that progress is made towards the long-term goals and objectives of the organisation.

A commitment from top management to TQM, in the view of Hradesky (1995), means applying certain functions. Firstly, the major activities of the organisation should be integrated under the umbrella of TQM after developing the Critical Business Success Factors (CBSFs). Secondly, top managers should be involved in TQM by participating in the CBSFs and values, and chairing resource committees to review and supervise the different teams. Thirdly, utilisation of time should be devoted to TQM by top management and members of the organisation. Fourthly, resources should be made available based on the size of TQM projects and their potential benefits. Juran (1988b) argues that top managers' participation in managing quality in the organisation should exceed words such as commitment or involvement and be manifest as actual performance. He suggests that top managers should participate in the process of quality management by performing some important functions. Firstly, they must establish and deploy quality goals and policies. Secondly, they should provide the resources needed for quality performance. Thirdly, they must participate in quality improvement teams and stimulate improvements. Fourthly, they should provide problem-oriented training to employees. Finally, they should establish and review reward and recognition systems.

5.4.2 Quality Culture:

Jeffries *et al.* (1996) define the culture of the organisation as "all the interactions which take place between people, their relationships, and the feeling engendered by their behaviour". The culture of the organisation has good or bad ingredients, as Wai-Kwok and Wai-Kwok (1995) mention, claiming that in most cases the culture has originated from the founder members of the organisation. Quality culture is, then, driven from the general attitudes and perception of the employees towards quality. Batten (1994) talks

about total quality culture as "the concentration of all people and resources in a never-ending quest for greater quality and service in every dimension of the organisation".

Dean and Evans (1994) state that in order for the organisation to implement TQM, its culture must be changed so that employees will be able to cope with the new requirements of implementing TQM. However, changing the culture is easier said than done in the view of Wai-Kwok and Wai-Kwok (1995), who emphasise that change should be the first priority of top management to ensure that all employees contribute to teamwork and problem-solving. To create a total quality culture, they suggest that the organisation should value its customers and meet their needs, that it should focus on improvement based on customer needs and an ever-changing environment, and use teamwork to change the culture. In addition, Dahlgaard *et al.* (1998) provide their suggestion for establishing a quality culture by instilling the creation of quality consciousness in all employees. To achieve this, the firm may make quality developments through group situations, by motivating employees to make decisions related to quality, and by working with quality questions in a deeper way, that relies on attitudes and values.

Batten (1994) emphasises that an organisation should rely on its people for transformation, rather than on statistical analysis that has become, in his opinion, "endemic to TQM". He suggests some pointers for building a total quality culture: employees should have clearly defined goals and expectations; they should seek growth with open and sharp minds; and they should expect the best from every dimension of life. In the view of Hradesky (1995), a firm may foster cultural changes by implementing values and beliefs towards quality. In his opinion, an organisation may

display top management commitment to quality, develop values towards quality and communicate them to employees as well as offer incentives for implementing them. The organisation can also train its employees to develop those values, and then measure and report the results of implementing cultural changes associated with TQM.

When implementing TQM, employees may resist any new changes, but this can be overcome by creating a quality culture in the organisation. Wai-Kwok and Wai-Kwok (1995) believe that resistance to change stems from middle managers in particular, since TQM involves additional tasks for them. A study of quality culture problems in UK companies by Adebanjo and Kehoe (1998) supports these claims. They found that 48% of respondents mentioned that middle managers were responsible for resistance to change.

5.4.3 Customer Focus:

The customer is the driving force of the organisation and the quality objective is to meet customer needs and demands. ISO 9001 (1994) deals with customers in a supplier-customer relationship. However, the new draft ISO 9001: 2000 (1999) makes the customer the focal point of its model for the quality management process, starting with determining customer requirements and ending with customer satisfaction. Griffiths (1990) defines quality as meeting customer requirements and therefore considers the customer as the driving force of the whole quality process. Evans and Lindsay (1993) consider the customer as the most important element of TQM and they maintain that any characteristics that create a positive perception of quality will eventually increase customer satisfaction. In addition, Roberts (1999) argues that being a customer-

oriented firm is critical to the success of the TQM programme and should be treated as the focal point of the decision-making process.

The attributes that may be considered in the product are presented by Pitkin (1995a) in what he called "SURPASS", an acronym for the following product attributes: Styling; Usability; Reliability; Performance / Price; Availability; Serviceability, and Supportability. Westcott (1998) adds components of customer satisfaction in the product, such as being accurate, timely, responsive, reliable, competent, courteous, accessible, able to communicate, possessing customer knowledge, creditable, secure, of good appearance, having range of offerings, and being price sensitive.

For the purpose of determining customer needs, Evans and Lindsay (1993) suggest the use of customer surveys and focus groups as well as feedback from the customers. Munro-Faure and Munro-Faure (1993) add functional analysis and Quality Function Deployment (QFD). In addition, Griffiths (1990) stresses the need for establishing a customer focus at the beginning of the quality effort and conducting a customer-needs assessment directly with customers.

Quality Function Deployment (QFD) conveys the needs of the customers to the organisation and translates those needs into features or technical specifications at each stage of product development. Lockamy and Khurana (1995), Ansari and Modarress (1994), and Tottie and Lager (1995) claim that Mitsubishi initiated QFD in Japan in 1972. Lockamy and Khurana (1995) further maintain that QFD is beneficial to an organisation in the following areas: better customer satisfaction; shorter lead times due to fewer engineering changes; and better linkages between various design and

manufacturing stages. In addition, it helps to reduce the number of product components and to create a better work environment through horizontal integration of functions.

Curry (1998) mentions that implementing QFD involves four steps: creating a multi-disciplinary team, determining customer needs, generating ways that the organisation could meet those needs, and preparing for action. Once those needs are determined, Bregman and Klefsjo (1994) suggest that a firm might translate them into product and process characteristics. In turn, such characteristics would become the major input in the process-planning phase, as Ansari and Modarress (1994) contend, and finally in the production-planning phase to set the process parameters that will ensure that customers' needs are met.

The customer-supplier relationship is covered by Clause 4.7 of ISO 9001 (1994) and explained in Chapter three. When dealing with suppliers, Dean and Evans (1994) make some suggestions for this relationship. Those are: that the purchasing decisions should be based on quality as well as cost; that there should be a reduction in the number of suppliers; that long-term contracts should be established; and that co-operative relationships developed.

Westcott (1998) argues that customer satisfaction consists of five levels. Level one represents a dissatisfied customer, where the customer has probably departed forever. Level two refers to marginally satisfied customers, defined as casual customers whereby any supplier could meet their needs. Level three encompasses basically satisfied customers: the customer is borderline but uncommitted. Level four refers to a delighted customer who is a return customer. Level five represents the committed

advocate customer who is loyal, appreciative, and tells others. In addition, Hradesky (1995) presents measures of customer satisfaction. These include customer complaints, market share, customer survey results, customer interviews results, customer satisfaction index, customer returns, and warranty cost as a percentage of sales.

5.4.4 Employee Involvement:

TQM requires the involvement of all employees and their commitment to the success of the programme, working together as components for one system. For the achievement of employee involvement, firms may use teamwork, suggestion systems, empowerment of the employees to act in quality matters and communication across the organisation. ISO 9001 (1994) does not mention employee involvement nor its components. However, the draft of ISO 9001: 2000 (1999) covers communication as part of the quality system.

Evans and Lindsay (1993) argue that the concept of TQM will be effective only when all employees are involved, thus emphasising the need for horizontal integration and co-operation among the departments that are treated as components of one system. Dean and Evans (1994) contend that individuals in the TQM organisation should work in a team structure to ensure co-operation, using techniques that help to facilitate communication and co-operation; techniques such as quality circles, self-directed teams, and steering committees. In the view of Munro-Faure and Munro-Faure (1993), an organisation should ensure that the employees commit themselves to the concept of TQM through communication, training and education.

The second point in employee involvement is empowerment, which means providing the employees with more power to solve quality problems. Dean and Evans (1994) claim that empowerment is a practice of participation and involvement, but to a higher degree, and may contribute significantly to the quality of products and services. Hradesky (1995) suggests methods of empowering the employees. The first is to provide expectations, such as when management gives clear goals and objectives and expects employees to achieve them. The second method is to provide guidelines for the employees to follow. Thirdly, employees should be authorised to act within the boundaries of decisions. Fourthly, managers should provide employees with the tools to achieve expectations.

The third point in employee involvement is communication. Oakland (1996) states that there is a need for strategic communication systems, while Jeffries *et al.* (1996) stress the need for an effective communication system in the organisation, since TQM communication is broader than the ordinary communication system. Employees in a TQM organisation need timely, accurate information to help them make decisions that affect the quality of their work. For an effective communication system, Griffiths (1990) and Jeffries *et al.* (1996) mention some requirements. Firstly, the communication system has to ensure a two-way dialogue and not be simply a vehicle to pass on the orders of senior managers. Secondly, the system of mixed media should encourage employees to present their ideas and express their feelings freely. Thirdly, a good communication system is one that encourages dialogue between the different departments at all levels of the organisation. Fourthly, the system should encourage departmental newspapers or newsletters to convey information to all parts of the

organisation, such as quality news in the organisation: quality reports, charts, results, new standards, pictures and other quality-related information.

The fourth point in employee involvement is teamwork. Hradesky (1995) considers this as a critical element of TQM, saying that teams usually accomplish more than do individual workers. A study conducted by Lawler (1996) in the US of the Fortune 1000 found that there was a strong correlation between the adoption of employee involvement and TQM. In addition, Dean and Evans (1994) emphasise that TQM relies on the interdependence of different parts of the organisation, and teams are of major importance to co-ordinate those different parts. Generally, there are four types of teams and committees for quality. The first is the Steering Committee that includes the top managers who are responsible for making policies to implement TQM. The second are Problem-Solving Teams that solve quality-related problems faced by the organisation. The third are Quality Circles; autonomous work groups that are self-directed in handling quality matters. The fourth are Cross-functional Teams, which consist of employees from different departments of the organisation who co-ordinate to solve inter-departmental problems.

5.4.5 Training and Education:

Training and education are two important elements, not just for TQM success but for all activities of any organisation. For firms that implement ISO 9000, Clause 4.18 of ISO 9001 (1994) demands training programmes for quality, and the new ISO 9001 of 2000 covers training as well in Sub-Clause 6.2.2. Evans and Lindsay (1993) assert the need for training at all levels of the organisation, and especially in quality awareness and the special skills required for TQM programmes and quality improvement. Training in the

view of all quality scholars, is a vital aspect of implementing quality and requires a commitment of financial resources. Moreover, Oakland (1996) considers training as the most important factor in improving quality, claiming that training programmes should then be assessed and reviewed to examine the contributions and effects of such programmes. He suggests a systematic approach to TQM training where all levels are responsible for training and which contains the main elements of error / defect / problem prevention, reporting and analysis, investigation, and review.

Before providing training programmes, firms may diagnose training needs as Jeffries *et al.* (1996) suggest, by identifying of the skills and knowledge that employees lack and which should be delivered. When implementing TQM, Griffiths (1990) suggests that a firm needs to conduct orientation and educational programmes before training to clarify its mission, objectives, and goals, and to inspire all employees. Tenner and DeToro (1992) stress the need to include education programmes when introducing TQM, suggesting that employees be made aware of the key elements of TQM and of the benefits of applying the concept and their roles and contributions to TQM programmes. In addition, Kanji and Asher (1993) contend that firms might educate their employees in TQM both in academic institutions and by taking courses in fields that are helpful in implementing TQM, such as technology management, information technology, finance, engineering, and so forth. They also suggest that firms educate their employees in organisational development in subjects such as vision, leadership, quality costs, benefits, motivation, quality culture, and understanding.

Training for quality may include programmes dealing with elements of process improvement, such as team skills, communication, interpersonal relations, and team-

building training. Process analysis programmes can include measurement systems and data analysis. In addition, training programmes can cover problem-solving techniques, SPC, benchmarking, customer care, TQM implementation, quality costs and design for manufacturing. The firm may design training for its middle managers in leadership and in how to build a quality environment.

5.4.6 Benchmarking:

Benchmarking involves systematic documented function for the purpose of comparing products, services, functions, or processes of the firm to other best practices in the industry. Moreover, the firm may benchmark one department against another excellent one, internally. ISO 9001 (1994) does not mention benchmarking, however, ISO 9001 of 2000 includes it under analysis of data for improvement (Sub-Clause 8.4). On the other hand, BS 7850 Parts 1 and 2 (1992) consider benchmarking as a non-numerical tool for implementing TQM in the organisation and define it as "measure your process against those of recognised leaders". In addition, Ahire *et al.* (1996) consider benchmarking as a TQM construct or separate element, while Oakland (1996) claims that there is a clear link between benchmarking and TQM. In establishing who initiated benchmarking, Spendolini (1992), Munro-Faure and Munro-Faure (1993), Dean and Evans (1994) and Zairi and Ahmed (1999) claim that Xerox was the first firm to use benchmarking as a systematic documented function, comparing itself to Japanese manufacturers in 1982.

Spendolini (1992) states some reasons for benchmarking, such as strategic planning, forecasting, producing new ideas, comparing products or processes, and goal-setting. Munro-Faure and Munro-Faure (1993) claim that benchmarking makes a firm

understand the key success elements of the competition, alerts it to the best practices in the field, helps it to set high standards for itself, and helps it to gain inside information about competitors. Camp (1989) adds benefits such as meeting customer requirements and being competitive. Moreover, Evans and Lindsay (1993) describe the benefits of benchmarking for the employees and claim that they may be motivated because they are targeting goals that have been achieved by others and they will be less resistant to change since the ideas come from other competitors.

Dean and Evans (1994) classify benchmarking into competitive and generic. Competitive benchmarking means comparing a firm's products to those of its competitors, while generic benchmarking means comparing processes. Spendolini (1992) adds internal benchmarking and Camp (1989) adds functional benchmarking, which means selecting the best function in any firm that is superior, regardless of its where its mother company is the best or not. Finally, Zairi and Ahmed (1999) add performance and strategic benchmarking.

Camp (1989) classifies the steps for implementing benchmarking into five phases. Firstly, there is the planning phase, which includes establishing the criteria of benchmarking, the identification of partners, and determining data collection methods. Secondly, there is the analysis phase, where the firm analyses its internal performance and compares it with the best practices of others. Thirdly, there is the integration phase, which requires the firm to communicate benchmarking findings, gain acceptance, and establish functional goals. Fourthly, there is the action phase, whereby the company develops plans, implements them, and then watches the progress. Fifthly, there is the maturity phase, which signifies that leadership has been accomplished and that the new

practices have been fully integrated into the system. Zairi (1996) mentions that benchmarking should be looked at from a broader perspective as targeting continuous learning and prevention of complacency using the Deming approach of Plan, Do, Check, and Act. In addition, Sheridan (1993) suggests that an organisation should link benchmarking to strategic objectives, starting from the executive level downward, and include employees whose jobs are directly related to the benchmarking criteria.

Furthermore, Zairi (2000) suggests considering the use of online benchmarking through the internet as a mean of incorporating it into modern business environment. He emphasises that the online benchmarking may not replace the conventional one but it would be a necessary element in the new era of the information society. In this type of benchmarking, the team conducting benchmarking should acquire certain skills in addition to their basic knowledge of investigation. He demands them to use the internet tools to access information; to be able to digest and distil large amount of data; to be skilled in designing the proper methods for collecting information; to have the ability to judge the validity and credibility of data; and to have the analytical skills to interpret the information.

5.4.7 Statistical Process Control and Qualitative Tools:

Statistical Process Control (SPC) and qualitative tools have been used in quality matters in industry. SPC was included in ISO 9001 (1994) (Clause 4.20) without specifying certain tools. BS 7850 Part 2 (1992) includes both SPC and qualitative tools as supportive tools and techniques for implementing TQM in a firm. A study conducted by Scheuermann *et al.* (1997) found that manufacturing sectors, service industries and hospitals, all used both SPC and qualitative tools, which means that those techniques

are widely adopted for quality matters in all sectors. Xie and Goh (1999) contend that most techniques are used in the manufacturing industry while the service industry uses them to the least extent.

ISO 9004 (1994) states some areas for using statistical tools in the firm (Sub-clause 20.2). These areas are: market analysis, product design, dependability and durability, process control and process capability, quality levels in sampling plans, data analysis, process improvement, and safety and risk analyses. Oakland (1996) argues that statistical tools should be used by the people who actually work in the process, and with top management commitment and support. ISO 9004 (1994) (Sub-clause 20.2) suggests some sophisticated statistical techniques, such as design of experiments, analysis of variance, tests of significance and acceptance sampling. The new ISO 9001 of 2000 suggests tools for risk assessment: product, service, or process failure mode and effects analysis, design of experiments, and relationship diagrams (Sub-Clause 7.3.1). However, the more common techniques are shown in Table 5.3 along with qualitative tools that could be used for improving quality.

Table 5.3 Quantitative (SPC) and qualitative tools

Techniques	**The Purpose**
Part 1: Quantitative Techniques	
Control Chart (Run chart)	To detect if there are normal variations in the process or out of control conditions
Scatter diagram	Establish the fundamental relationship between two variables
Pareto diagram	Help to identify the major factors affecting quality losses
Histograms	Determine the frequency of occurrence of certain sets of data
Part 2: Qualitative Tools	
Affinity diagram	Organise large number of variables into groups
Brainstorming	Generate and evaluate a list of ideas
Cause-and-effect diagram	Identify the relationship between the causes of problems and their effects
Flow charts	Describe the flow of the process
Tree diagram	Break the entity into its basic elements

Source: BS 7850 Part 2 (1992), p. 7.

5.5 Benefits of TQM:

The benefits of implementing TQM depend on many factors, such as the way it has been incorporated, the resources available, the selection of TQM elements appropriate to the firm's needs, and the environment in which the firm is operating, among others. Therefore, it is possible that a Non-TQM firm may demonstrate a better quality system and better quality product than does a TQM firm. However, it may be argued that improving the quality system of the organisation can be expedited through the implementation of TQM elements. Chong (1998) argues that TQM may provide a fundamental way of conducting business, which makes the organisation more competitive and viable, and that TQM is a passion for change and improvement. In addition, Jeffries *et al.* (1996) state some advantages or benefits as a result of implementing TQM. They claim that it could achieve profitability through meeting customer needs, enhancing job security, reducing costs, creating an innovative approach, an enjoyable working environment, a promising future, and a situation where everyone in the system is accountable.

Oakland (1990) and Fox (1995) mention some benefits of adopting TQM in the organisation. Firstly, employing the concept will enable a firm to meet the requirements of the market. Secondly, since TQM deals with all aspects of the organisation, top quality performance might be achieved in the organisation as a whole. Thirdly, measuring performance facilitates the removal of any non-productive activities. Fourthly, the organisation will understand competitors through benchmarking: an important tool of TQM. Fifthly, a teamwork approach to problem-solving is developed. Finally, TQM may enable the organisation to have a reliable communication system and to achieve continuous improvement.

A study by Radovilski *et al.* (1996) was undertaken for 235 companies that had implemented TQM. The study showed that implementing TQM contributed to those companies in a quantifiable way, and it revealed that profit, market share, and productivity were increased by approximately 21%, 9% and 20% respectively. In addition, implementing TQM reduced defects by 24% and reduced the costs of achieving quality by 20%. Although these figures are encouraging, this study however needs to be validated by further research. Moreover, it can be argued that those improvements occurred because of the implementation of TQM, although other factors may also have contributed to the success of those companies.

5.6 Implementing TQM:

Jeffries *et al.* (1996) claim that the implementation of TQM requires investments of time and money to provide training in and raise awareness of TQM. They recognise that its implementation may be difficult or confusing and may need time to be understood and to then be implemented gradually. They recommend that the changes in employee attitudes and culture occur at the beginning of the implementation process. Kanji and Asher (1993) suggest four stages for the process of implementing TQM. Firstly, there is the preparation stage, which involves the collection of information relating to quality performance and matters. The vehicles for output, in their view, could be steering groups, a quality vision, and executive-led projects. Secondly, top management commitment and understanding and the output of this stage is expected to be local steering groups and departmental quality improvement plans. Thirdly, schemes for improvement, which involve the development of quality improvement programmes, relate to issues such as customer needs and problem-solving measures. The output of this process could comprise projects, internal customer agreements, and quality

improvement plans. Fourthly, there is critical analysis, which involves obtaining information about quality improvement plans. The outcomes of this stage are expected to be as in the Deming approach; Plan, Do, Check, and Act.

In addition, BS 7850, Part 1 (1992) provides some requirements when implementing Total Quality Management. They are: creating an appropriate organisational structure, implementing process management concepts, measuring performance and recognising achievements systematically, introducing improvement planning techniques, and providing training. Hradesky (1995) presents steps for the successful implementation of TQM in an organisation. Firstly, the company needs to establish Critical Business Success Factors; in other words, the elements that are most important to the success of the organisation in terms of customer satisfaction, growth, competitiveness, and profitability. Secondly, it should work to change the culture of the organisation through the implementation of values and beliefs for quality. Thirdly, the company should establish internal customer satisfaction agreements inside the organisation in order to define departmental missions, customer satisfaction requirements and measurements of customer satisfaction. Fourthly, it needs to match its human resource capabilities with the functional needs of the organisation. Fifthly, it also needs to design training programmes that will help to raise awareness of TQM and provide techniques for implementing TQM. Finally, it should apply appropriate supporting technical tools, such as ISO 9000, SPC and QFD.

Radovilski *et al.* (1996), in their study on the implementation of TQM in 235 companies, stipulated certain points. These are: management should embrace all elements of TQM, they should provide sufficient training to the employees, develop

communication programmes ensuring that all channels of communication between different parts of the company are effective, and develop standards to control the quality costing system.

5.7 Measuring Performance:

An organisation may measure its performance regarding quality by using any means suitable for its operations. ISO 9001 (1994) does not explicitly include measurement although internal auditing is used for this purpose. On the other hand, the ISO 9001 of 2000 covers it in Sub-Clause 8.2. BS 7850, Part 2 (1992) stresses the need for developing a measuring system for quality improvement appropriate to the operations of the organisation. The system includes objective data-based measurements, measurements at unit, department and cross-functional levels; and any trends should be interpreted statistically after which the results should be compared to base line levels, reported and reviewed.

One key measure of performance is through audits; in other words, first party, second party or third party-assessments. An organisation may use internal auditing against any piece of standard or procedure, or may be audited by its suppliers in second-party assessment to avoid the fear of bias of internal auditors. Third party assessment may be involved during the registration to ISO 9000 quality management system. In addition, the organisation may use the European self-assessment model (The EFQM Excellence Model) to measure its performance against its requirements. Hradesky (1995) considers that reliance on internal self-assessment is a pitfall, and claims that internal personnel may lack both the objectivity and the skills to conduct an assessment. Evans and

Lindsay (1993) maintain that an organisation should constantly, in an accurate and timely manner, measure quality improvement against standards and competitors

In order to carry out the assessment, Dean and Evans (1994) suggest the need for certain elements of data, such as customer identification, marketing surveys, product performance, competitor performance, and financial and cost analyses. Oakland (1996) believes that measuring performance is a very important factor when comparing and identifying opportunities. Therefore, there is a need for non-financial indicators and measurements. He contends that the Deming approach of Plan, Do, Check, and Act in measuring systems is appropriate, but four basic questions should be asked: Why? What? Where? and How? In order for the organisation to measure TQM programme success, Shearer (1996) suggests beginning with a base line to measure against and that each measurement should relate to variations and not to people. In addition, he recommends measuring costs of value-added and non value-added activities, as well as strategic outcomes of TQM, such as customer satisfaction, as a way of evaluating the performance of the programmes.

Hradesky (1995) prefers quantitative tools rather than qualitative ones for obtaining a clear and decisive picture. He recommends tools not just to measure quality, but also for success, such as SPC, feedback on customer satisfaction, inventory accuracy levels, reject and scrap rates, production rates and adherence to schedule, absenteeism and turnover and elapsed times. Moreover, BS 7850, Part 2 (1992) stresses that measuring quality should be related to the losses inflicted by poor quality. These encompass, the losses associated with customer dissatisfaction that may be measured through survey, feedback, changes in revenue, and customer complaints. Bland *et al.* (1998:44) define

the cost of poor quality as "the difference between the actual operating cost and the operating cost if there were no failures in its systems and no mistakes by its staff". BS 7850, Part 2 (1992) includes that quality losses may be associated with process inefficiency arising from labour, capital, materials, manufacturing, waiting times, process adjustment, cycle times, delivery, and size of inventories. Thirdly, there are the losses of quality that are sustained by society as a result of damage caused by pollution and waste disposal.

5.8 Pitfalls and Problems with TQM:

When implementing TQM, it may seem a deceptively easy process, and one that will change the state of the organisation substantially. However, the reality is that TQM may not contribute significantly if not properly implemented or if the resources are not sufficient or if there is a lack of commitment, or perhaps for other reasons. Evans and Lindsay (1993) mention two pitfalls when implementing TQM: a change in the behaviour, processes and attitudes of employees; and heightened expectations as they wait for a miracle to happen as a result of TQM. In solving such problems, they suggest that management train its employees and start with simple expectations, document any improvements, and review progress periodically. In addition, Shearer (1996) talks about the empowerment associated with TQM and how it might give employees more power, which might cause matters to get out of control. Therefore, steering committees should be established to review suggestions made by employees and to establish a balance between employees' fears of reprisal and managers' fears of losing power and control.

The commitment and support of top management is vital to the success of any project, not just of TQM. Blackiston (1996) warns about an over delegation of power by top management placing the burden for change on workers and blaming them for any failure. Instead, they demand that, senior managers should tackle the important issues of TQM. Similarly, Hradesky (1995) argues that top managers might not commit themselves to TQM in the belief that it is just a passing interest. Therefore, they do not appreciate commitment and will delegate their responsibilities to their subordinates. Consequently, implementing TQM requires leadership, and it is recommended that top managers be trained and understand their role in and commitment to TQM.

Dealing with customers may lead to pitfalls in implementing TQM. Blackiston (1996) contends that companies do not listen to the customer enough, nor do they appreciate that the customer is one very important aspect of TQM. In addition, Hradesky (1996) talks about the internal customer and mentions that some organisations lack internal customer satisfaction because of the absence of an agreement between the different departments in the organisation. He claims that without this agreement, departments might operate at the same level as they did prior to the implementation of TQM. On the other hand, Ackoff (1992) criticises the fact that concentration is solely on the final customers. He recommends that the organisation to give attention to all its stakeholders; final consumers, creditors, suppliers, employees, and the public. He argues that making the customer the company's most important stakeholder is wrong and that the most important asset is the workforce. He suggests that there should be a good working environment that provides fun, excitement, challenges, and opportunities for advancement. In his view, once such a good environment has been provided, managers should not worry about quality; the employees will take care of it themselves.

In addition, Blackiston (1996) presents two pitfalls of TQM: that some companies choose the wrong strategy or the wrong tool or select only one quality tool. Moreover, Hradesky (1995) mentions another shortcoming of TQM, which is the absence of strategic planning to guide the organisation in developing a mission, a vision, and values. Ackoff (1992) argues that the failure of TQM is usually due to the lack of system orientation in the organisation, and recommends that TQM should be embedded into it. When each department in the organisation is merely trying to improve its performance independently, this can also lead to failure. He mentions that improvement in quality requires the management of interactions between all components of the system, not just an improvement in each separate part.

Radovilski *et al.* (1996), in their study of TQM implementation, found that the problems facing the respondents were lack of management commitment to quality improvement, poor communication between departments that were implementing TQM, and the perception of TQM as one campaign rather than a real, working system. The first two problems in their study support the two claims mentioned earlier by Ackoff (1992): a lack of top management commitment and poor communication between the departments. Another study conducted by Tamimi and Sebastianelli (1998) surveyed 188 quality professionals in the US to identify the barriers to TQM. The study revealed that the most important barrier to TQM is that management compensation is not linked to achieving quality goals. Another barrier is that the best practices of competitors are not benchmarked. Moreover, employees are not trained in quality improvement skills nor in problem identification and problem-solving techniques. Finally, they found that employees showed resistance to change when introducing TQM.

5.9 TQM and ISO 9000:

As mentioned in the previous chapter, ISO 9000 of 1994 includes 20 clauses to establish a quality system that can be audited by third party assessors. However, ISO 9000 has and will always have limitations in any future amendments since it includes limited and verifiable components. Therefore, firms may go beyond the ISO 9000 clauses and establishing a broader quality system towards TQM is important, although there are no specific elements that establish TQM. Many writers in quality literature have discussed the relationship between ISO 9000 and TQM and whether they are complementary to or contradict each other.

Laszlo (1996) considers ISO 9000 and TQM to be fundamentally different approaches in that ISO implementation is more related to line workers, while TQM is more concerned with top management. In addition, the focus of ISO is on proving compliance and gaining certification, while TQM focuses on continuous improvement and achieving customer satisfaction. Yung (1997), in differentiating between ISO and TQM, claims that TQM is broader and deeper than ISO 9000. ISO 9000 is only for external assessment needs in order to achieve customer satisfaction and is not concerned with costs, while TQM is for internal organisation and goes beyond customer satisfaction. In addition, ISO 9000 emphasises comprehensive guidelines on a quality system, while TQM is concerned more with the human factors.

Firms may implement ISO 9000 and go beyond its requirements to a more comprehensive approach in order to implement TQM, implying that the organisation may choose the best tools to achieve TQM. Fox (1994) considers ISO 9000 by itself as not enough for a sufficient quality system, since it guarantees neither the manufacturing

of a good quality product, nor customer satisfaction. Therefore, he recommends ISO 9000 as a complementary part of a more comprehensive TQM programme in the organisation. Corrigan (1994) considers that ISO 9000 and TQM should supplement each other, and suggests that an organisation integrates ISO 9000 into its TQM programme from the beginning as this may accelerate the TQM process and give quality an immediate role in strategic planning.

Arora (1996) contends that ISO 9000 is a pillar in a company's approach to TQM since it includes important elements of the latter, such as training and SPC. In addition, he claims that ISO 9000 and TQM are not alternatives to each other but ISO 9000 is an essential part of TQM. In agreement with those claims, Lal (1996) mentions that TQM is an approach to quality that goes beyond ISO 9000. He adds that ISO and TQM are not different alternatives to each other, and are not mutually incompatible. ISO 9000, as he states, builds a strong foundation for a TQM culture, emphasising customer needs, all employee involvement, and making continuous improvements. He suggests that the developing countries first implement ISO 9000 to create stability and consistency in the organisation's work. Once registration has been achieved, he recommends that the organisation could choose the tools of TQM that enhance employee motivation and operational efficiency. Iizuka (1996) feels that the deficiency in ISO 9000 is an external quality assurance on a voluntary basis, which might not substantiate an internal comprehensive management system. Therefore, he suggests that firms might go beyond ISO 9000 to what he calls "the Japanese way of TQM".

Ho (1994) writes extensively and organises annual conferences on the ISO 9000 and TQM relationship. He argues that an organisation could implement ISO 9000 as a first

step, and then implement TQM by developing a quality manual, then aim for continuous improvement by taking the organisation towards TQM. In addition, he developed a TQM model (Four S's) that includes ISO 9000 as its first component (S1). The second component is people; the involvement of all employees including commitment, training, teamwork, leadership, and motivation among others (S2). The third part focuses on improvement tools, such as affinity diagrams, benchmarking, flow charts, tree diagrams, and others (S3). The final component is customer satisfaction through meeting their needs and requirements by improving that availability, delivery, reliability, maintainability, and cost effectiveness (S4). Similar to this model, Ho (1995b; 1996; 1999) developed TQMEX as a model for total quality management, and which may represent a development in his thinking about the incorporation of ISO in the TQM of the firm. The model consists of five components. The first is the Japanese 5-S's scheme: organisation, neatness, cleanliness, standardisation, and discipline. The second is Business Process Re-engineering and the third is implementing Quality Circles. The fourth is registering to ISO 9000, while the fifth component of the model is Total Productivity Maintenance, which requires covering the entire life of the equipment in terms of planning, manufacturing and maintenance.

Following the suggestion of TQM models that incorporate ISO 9000 inside TQM, Oakland (1990) provides a model that includes management commitment, teamwork, SPC tools, and a quality system (ISO 9000). On the other hand, Mahoney (1995) offers a trilogy model or quality trinity comprising three components: the Baldrige National Quality Award model of the US; ISO 9000; and the Deming Prize model of Japan. He claims that a mix of the three models could be sufficient for a reliable quality system in an organisation. To justify these claims, he mentions the reasons for choosing the three

elements together. The Baldrige model is strong in human factors, and places great importance on leadership, human resources, and customer satisfaction. The ISO 9000 standard excels in combining both statistics and behaviour, while the Deming Prize is very broad, and includes 100 items in 10 dimensions. In addition, Zhang (1999) agrees with all previous scholars that firms should go beyond ISO 9000 to incorporate other elements of quality, and he emphasises some scientific techniques without mentioning TQM. Reflecting his engineering background, he suggests implementing Quality Function Deployment, and when applying SPC, firms may consider Statistical Process Control Diagnosis (SPCD), and Statistical Process Control Diagnosis and Adjustment (SPCDA). SPCD is an advanced technique that provides the reason for an abnormality in quality, while SPCDA provides the solutions; Zhang (1999) proposed both techniques.

To investigate the benefits of implementing both ISO and TQM instead of only TQM, Rao *et al.* (1997) conducted a study of firms implementing TQM in the USA, India and China. They found that ISO 9000 firms in those countries had better quality management practices and results than the firms that were not registered to ISO. To study ISO 9000 vs. TQM in the industry, Sun (1999) analysed data obtained by the London Business School and Chalmers University of Technology, covering 20 countries in the world. He found that implementing ISO 9000 alone did not contribute much to quality improvement in the organisation. However, implementing both ISO and TQM contributed the most.

Based on the previous discussion, it may be concluded that ISO 9000, because of its nature as a third party assessed system, is limited. Even after the amendments of 2000,

ISO 9000 will remain limited because it has a limited number of clauses that should be verifiable by the assessors. Therefore, a firm may consider ISO 9000 as a basis for a quality system and go beyond that to choose a combination of quality tools that are appropriate for their operations. Each firm has its unique situation that is influenced by external and internal factors, such as sector of activity, financial position, competition, employees and other elements. If a firm goes beyond ISO 9000 and implements other tools, then it makes no difference if it calls that new system TQM or not.

5.10 Problems in Quality Management in the Developing Countries:

The state of quality management in developing countries cannot be separated from their mainstream economic and industrial development. The problems encountered in their quality management arise from a lack of infrastructure and advanced technology. Sandholm (1999) mentions factors impeding the improvement of quality in the developing countries as low purchasing power, a shortage of goods, foreign exchange constraints, an incomplete infrastructure, inadequate leadership, and insufficient knowledge. Bruun and Mefford (1996) believe that customer expectations of quality in such regions are low, thus causing some problems in those countries. Firstly, the export abilities of firms in those countries are affected by quality when competing with other goods manufactured by more developed nations. Secondly, local workers lack the required efficiency and skills in performing their jobs. Thirdly, using traditional inspection techniques in the plants of developing countries leads to inefficient and high cost operations. Mersha (1997) argues that the Sub Saharan African Countries are faced with a number of problems that hinder the implementation of TQM. They are: government interference and control; a shortage of goods; foreign exchange constraints; insufficient infrastructure; and local capital scarcity. In addition, Goonatilake (1988)

claims that the reason for the low quality of products in the developing countries is due to the lack of qualified production managers because of the negligence in providing industrial engineering and management education. However, attributing the problems of quality to the paucity of production managers might not be accurate since the problem is broader, and also includes a lack of skilled labour. In exploring quality problems in the Libyan industry, Targaghia (1996) discovered shortcomings such as a lack of knowledge about quality techniques, an absence of strong incentives for good quality, poor materials, poor specifications, and poor equipment.

The case of the Middle East, which includes Saudi Arabia, is generally better than the African countries or the least developed countries. Saudi Arabia does not have most of the problems mentioned in the previous paragraph, except for a lack of advanced technology and a shortage of skilled, Saudi workers. Aly (1995) mentions that the implementation of TQM in the Middle East is not spreading fast enough, and claims that the reasons for this are because of bureaucracy, traditional cultures, and a lack of sufficient training and education.

To overcome the quality problems in the developing countries, not only the companies but also the governments should intervene to provide solutions, as Sandholm (1999) claims. He mentions fields of progress for quality at national level as: standardisation, certification, export inspection, legislation, national promotion, education and training, external assistance, institutional infrastructure, and professional societies. Mersha (1997) suggests that governments in the least developed countries should provide an appropriate environment that has a reasonable infrastructure for the industry as a whole. On the other hand, Bruun and Mefford (1996) suggest taking some measures inside the

organisation to overcome quality problems in the developing countries. They emphasise the need to implement TQM elements, such as continuous improvement, quality-driven goals, SPC, supplier relations, and worker involvement. Most importantly, they recommend that TQM programmes in developing countries should be accompanied by changes in the culture and attitudes of the local workforce. Similarly, Madu (1998) asks for a cultural transformation in the developing economies in order to make changes within organisation for better quality and performance. In achieving transformation, he suggests that companies adopt long-term planning and develop human resources through education, training, enrichment of jobs, and awareness-raising programmes. Most importantly, management has to assure employees that the transformation is healthy to the organisation in the long run.

5.11 Summary:

This chapter briefly covered TQM, since some of its components are implemented jointly with ISO 9000 and a number of the firms are implementing the concept of TQM. The chapter included a definition and presented the argument about the origin of TQM. It examined the elements that are considered as comprising TQM by many scholars. In addition, the chapter covered the implementation of TQM, its benefits, its associated pitfalls and problems and the relationship between ISO and TQM. Finally, the chapter ended with a brief presentation of the problems of quality management in the developing countries. The next chapter will address the methodology of this research.

CHAPTER SIX

RESEARCH METHODOLOGY

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6.1 Introduction:

The design of this research is determined by the nature of the research problem, the objectives of the study, and the different circumstances surrounding the researcher. They include the following:

- The availability of financial and other resources;
- The degree of accessibility that the researcher has in the developing countries;
- The time constraint imposed on the researcher by the awarding agency, which is limited to three months for a period of data collection; and
- The considerable distance between Scotland and Saudi Arabia.

In this chapter, the research methodology of this study is presented. It includes research objectives and questions, research design, research strategy, the collection of data, questionnaire development, pilot test, research population, distribution of the questionnaire, data analysis techniques, and the validity and reliability of scales.

6.2 Research Objectives:

The objectives of this study are related to the research problem, which is the need to investigate the quality management systems and ISO implementation among ISO 9000 registered firms in Saudi Arabia, and are as follows:

- To determine the general characteristics of ISO 9000 registered firms in Saudi Arabia.
- To study the performance of ISO 9000 registered firms in complying with the quality system elements.

- To determine the differences, if any, between Total Quality Management firms (TQM Firms) and Non-TQM firms in complying with these elements.
- To examine the degree of compliance among ISO 9000 registered firms in Saudi Arabia to some of the ISO clauses.
- To investigate all possible aspects of the implementation of ISO 9000 in Saudi Arabia.
- To investigate the registration process to ISO 9000 in Saudi Arabia.
- To investigate the plans of ISO 9000 registered firms in Saudi Arabia after ISO implementation.
- To evaluate ISO 9000 in general in the country including satisfaction of firms with ISO 9000 and ISO vs. TQM.
- To investigate the role of the Saudi Arabian Standards Organisation (SASO), Chambers of Commerce and the Saudi Government in ISO implementation.

1.1 Research Questions:

This research will answer questions related to the implementation of quality system elements and ISO 9000 among ISO registered firms in the manufacturing sectors in Saudi Arabia. The first question to be answered is what are the characteristics of the ISO 9000 registered firms in the manufacturing sectors in Saudi Arabia? In terms of size, sector, standards of registration, periods of registration to ISO and extent of their involvement in exports. Moreover, what percentage of Saudi employees has a main remit for quality as a proportion of the total number of employees? What are the relationships between those characteristics, such as employees in quality-related roles by size of firms; size by type of ownership; and degree of export by sector and type of

ownership? What percentage of firms implemented TQM in addition to ISO 9000? And finally, where are those firms geographically located in Saudi Arabia?

The study will also answer questions regarding the implementation of the quality system elements. For example, how well have ISO 9000 registered firms performed in their compliance to quality system elements? This question encompasses people issues, customer focus, product issues, tools for quality improvement, quality culture and measuring performance in the organisation. In addition, among ISO 9000 registered firms, is there any significant difference between TQM and Non-TQM firms in complying with quality system elements or not?

What degree of compliance to some of the ISO clauses did ISO 9000 registered firms achieve? These clauses include management representation, internal auditing, documentation and surveillance visits, among others. In addition, the study will answer questions concerning ISO implementation in Saudi Arabia, for instance, how strong was the commitment of senior managers to ISO? What were the motives for registration? How did firms plan for ISO? To what extent did firms rely on external consultants? How much does ISO implementation cost? What were the ISO training programmes adopted and who provided training for ISO? How helpful were certain factors in implementing ISO and what were the problems of ISO implementation? How did firms deal with ISO documentation, especially the quality manual? Who wrote the quality manual? How did firms write their quality manual? What were the problems associated with the quality manual and were respondents satisfied with it or not?
In addition, the study will examine issues surrounding the process of ISO registration. How did firms choose their registration agencies? Which registration agencies operate

in Saudi Arabia? What were the factors influencing the choice of registration agency? And why did firms not choose SASO? How did registration agencies perform pre-assessment audit, formal auditing, and surveillance visits? What are the problems with the registration agencies, and how great was the satisfaction with registration agencies?

Questions related to the evaluation of ISO 9000 implementation in the country will be explored. What were the benefits of ISO implementation? How did the benefits compare to the costs of implementation? How great was the level of satisfaction with ISO 9000? How did firms evaluate ISO alone and ISO vs. TQM; how did firms evaluate ISO clauses? Did respondents feel the need to amend ISO clauses? Is ISO sufficient to establish a quality system or is a combination of ISO and TQM needed?

Moreover, the study will investigate the prospects for the future beyond ISO and the role of SASO and the Saudi Government in implementing ISO 9000. What will firms do after ISO 9000? Will they renew registration to ISO when it expires? Are they going to register for ISO 14000 or other standards? Are they going to implement TQM if they have not implemented it already? Are firms using ISO as a promotional tool? What was the role of SASO in implementing ISO in the country? What was the evaluation of respondents of SASO's role in implementing ISO and does the Government demand an ISO certificate in its contracts and tenders?

6.3 The Purpose of the Research Method:

Churchill (1995) classified research design based on its purpose into three types: exploratory, descriptive, and causal. Exploratory design is concerned with discovering ideas about and gaining insights into the research problem, and it involves a literature

review, experience survey, focus groups, and analysis of selected cases. Descriptive design is about the frequency of an occurrence or the relationship between two variables. Causal research is concerned with the study of cause and effect relationships. Ghauri *et al.* (1995) classified research design into descriptive, explanatory, forecasting, and guidance of activities. Gill *et al.* (1997) classified surveys into descriptive surveys and analytical surveys. The purpose of this research is exploratory since it is mainly about investigating the quality management systems and ISO 9000 implementation.

6.4 Cross Sectional Design:

Based on the available time, the research may take either the form of a cross-sectional or longitudinal type of study. Saunders *et al.* (1997:77) define the former as "the study of a particular phenomenon (or phenomena) at a particular time". In addition, they acknowledge that business studies are usually subject to a time constraint, and could use both quantitative and qualitative techniques. Easterby-Smith *et al.* (1991) argue that cross-sectional design helps to describe economically the features of a large number of populations, and it often employs surveys. Moreover, de Vaus (1996) and Babbie (1998) claims that this type of research is the most common design in surveys. Churchill (1995) argues that cross-sectional is the most familiar and common design of surveys, and the most important type of descriptive design because of the number of times it is used in comparison to other methods. He adds that cross-sectional studies have two advantages; they give a snapshot of the variables at a specific point in time, and the sample will represent the known universe.

The second type of study is longitudinal, whereby the changes in a phenomenon are measured over a period of time as Saunders *et al.* (1997) describe it. Therefore, a

longitudinal study would require the presence of the researcher in Saudi Arabia for a longer period of time and substantial financial support, neither of which are available. In addition, the longitudinal type of research is difficult due to the restricted access that the researcher would have in order to investigate inside the firms. Therefore, the cross-sectional type of study will be used for collecting data in the country.

6.5 Research Strategy:

As has already been mentioned, choosing the appropriate research methodology depends on several elements in the study. The success of the research depends on the way in which primary data are collected, analysed, and produced. Bell (1993) argues that studying the pros and cons of each approach will help the researcher to choose the most appropriate type, based on the circumstances surrounding the research. Wilson (1996) mentions that choosing any method depends on the nature of the research questions and therefore no single method can be considered the best. Bell (1993) contends that choosing the appropriate research method is influenced by the amount of available time the researcher has. There are different approaches to research, such as experimental, survey, and case study. This particular research is carried out using the survey strategy in order to explore the quality systems and ISO implementation.

6.6 The Chosen Strategy (Survey Research):

Fink (1995a: 1) defines the survey as "a system for collecting information to describe, compare or explain knowledge, attitudes, and behaviour". The methodology adopted for this research is the survey research since it is an inexpensive way of collecting data and the results can be generalised. Gill and Johnson (1997) argue that surveys are strong in population validity and reliability. They add that results could be generalised

with a high degree of confidence since the method involves the careful, random selection of samples. Moreover, they claim that using highly structured questionnaires, which produce quantifiable data, would be more reliable. They argue that the more structured the methodology, the better the replication will be, consequently, the more reliable it will be. Babbie (1998) claims that survey research is useful in describing the characteristics of a large population. The main purpose of the survey, as Easterby-Smith *et al.* (1991) mention, is to obtain information about the population. Saunders *et al.* (1997) argue that the survey is very common in business studies since it allows the collection of large amounts of data from a small population in an inexpensive way. Babbie (1998) agrees with Easterby-Smith *et al.* (1991) that, survey research could be the most frequently used mode of observation in social sciences.

6.7 Collection of Secondary Data:

Secondary data are usually obtained from books, periodicals, governmental and official publications, theses, dissertations, and other similar sources. Rummel and Ballaine (1963) mention that secondary sources comprise data that are collected by other parties and not by the researcher directly. Saunders *et al.* (1997) argue that secondary data are usually used in the case study and survey types of study, but they could also be used in experiments. Churchill (1995) stresses the need to start with secondary data in the research process, demanding that only when the secondary data are diminishing, could the researcher proceed to the primary data.

Saunders *et al.* (1997) classify secondary data into three categories. The first is documentary secondary data, which include written documents such as reports, minutes, transcripts of speeches, books, and journals; and unwritten documents,

including films, pictures, drawings, and video recordings. The second category is survey-based secondary data, which have been collected by other researchers. The third category of secondary data is multiple-source secondary data; they include a combination of the previous two types before the researcher uses them.

Churchill (1995) and Ghauri *et al.* (1995) argue that the most obvious advantage of secondary data are the savings in time and money. Ghauri *et al.* (1995) add that secondary data enable the researcher to compare the different research methods in order to select the most appropriate method of collecting the primary data. Saunders *et al.* (1997) argue that secondary data are a money-saving method of collecting data and they helping in a comparison with other secondary data that have been collected by the researcher. They add that secondary data are a very useful tool in helping the researcher to answer the research questions.

Robson (1993) argues that when collecting administrative records as secondary data, the researcher should take some factors into consideration. He maintains that the quality of the records must be assessed in order to avoid unnecessary duplication in data collection, and using sampling from the administrative records. Saunders *et al.* (1997) suggest that the researcher check the validity and credibility of the secondary data.

In this research, secondary data were collected from a number of sources that the researcher considered reliable and credible. Saudi Government sources, such as those of the Ministry of Industry, the Ministry of Commerce and the Ministry of Finance, drawn to obtain the information relevant to the thesis. Secondary data from SASO and the chambers of commerce in the country were obtained as well. Moreover, many books, articles, theses and dissertations that related to quality and ISO 9000 were

analysed for pertinent details. In addition, the University of Stirling possesses some important databases that include thousands of specialised journals that are available through its computer networks. These networks include Info-Track, Emerald, BIDS and Pro-Quest which includes the ABI network of UMI (University of Michigan). Finally, the researcher, as a member of two quality societies: the American Society for Quality (ASQ) and the Quality Management Division of ASQ, benefited from their wealth of publications and records of the proceedings of quality conferences in the field of quality management.

6.8 Collection of Primary Data:

Rummel and Ballaine (1963) mention that primary sources are data that are directly collected and for the first time by the researcher. Ghauri *et al.* (1995) argue that when secondary data are not sufficient to answer the research questions, the researcher should collect primary data. They add that the methods of primary data collection include surveys, observation, and interviews. The collection of primary data in this research was carried out using three methods: a handout questionnaire, interviews and a postal questionnaire. In the firs of these, fully structured, self-administered questionnaires were given to quality managers in ISO 9000 registered firms in the manufacturing sectors in Saudi Arabia (Arabic version in Appendix A and English version in Appendix B). The second method involved face-to-face interviews with three of two SASO officials (Bas-ham, 1998; Al-Hammadi, 1999 and Al-Henaihin, 1998). The third method involved a postal questionnaire to the lead assessors of the registration agencies operating in Saudi Arabia (Appendix C). The three responding assessors were Alyah (1999), Bounds (1999) and Price (1999).

6.9 The Use of the Questionnaire:

This study was mainly carried out through self-administered questionnaires. In praising this method, Wilson (1996) argues that on advantage of questionnaires is that they are a comparatively cheap method of collecting primary data. He comments that the researcher could ask closed or open-ended questions when preparing the questionnaires. In addition, Saunders *et al.* (1997) argue that questionnaires are often a tool for surveys, and since they have standardised data, it is easy to make comparisons, and they are generally authoritative. In addition, they praise the questionnaire method since it allows the researcher control over the research process in which data can be acquired directly without other sources of data supply being relied on. However, Saunders *et al.* (1997) argue that the questionnaire method was open to criticism for not covering as wide a range of research as do qualitative' s. Babbie (1998) contends that questionnaire is a cheaper and quicker procedure than interviews, and more appropriate when dealing with sensitive issues because it offers respondents more autonomy and confidentiality.

The researcher did not use interviews or case studies, which would have provided more in terms of triangulation of the data. This qualitative approach in addition to the quantitative data collection, could have probably answered the 'how' questions of the research in more detail. Saunders *et al.* (1997) praised using a qualitative approach in order to reveal and understand not only the 'what' and the 'how' but also to explore the 'why' questions. Although Robson (1993) thought that interviews constitute a flexible and adaptable way of findings things out, he criticised them for being time consuming and in some fields it is difficult to obtain co-operation. There are several reasons for the researcher not having adopted this method. Firstly, there was a time constraint, since the researcher was limited by his funders to three months for the data collection

which was barely enough time to distribute the questionnaires and collect them. Secondly, interviews would have required large financial resources so that the researcher could administer them, resources that were not available. Thirdly, accessibility to the individuals was probably not easy since they had already answered the questionnaire, and were therefore reluctant to agree to giving more detail in interviews. Finally, the researcher included some of the strategies provided by respondents such as the benchmarking strategy of the Eastern Petrochemical Company (Figure 8.2), which might answer the 'how' questions, although in limited instances.

6.11. Questionnaire Development:

This section deals with questionnaire development and includes questionnaire design, questionnaire format, sources of ideas in writing questions, scales of measurement, types of questions and Arabic translations of the questionnaire.

6.11.1 Questionnaire Design:

The researcher observed the advice given by Rummel and Ballaine (1963), that questionnaires should be long enough to cover the essential elements of the research, but not too long to the degree that the respondents might consider them as too time-consuming. They maintain that short questionnaires have a better chance of being answered, and consequently, the response rate will be higher. However, they recommend that the researcher should design questionnaires that will secure adequate data, and distribute a larger number to offset any possible low return rate. Alreck and Settle (1995) argue that when designing the questionnaire, the researcher should observe three attributes: questionnaires should be focused on the topic; the questions should be short enough to convey the meaning; and the questions should be simple and

clear. Sheatsley (1983) contends that when designing the questionnaire, the researcher should meet the objectives of the research, obtain the maximum accurate information, and accomplish that within the available time and with the resources at hand.

The researcher, in this study, has tried to carefully structure the questions in order to achieve the required objectives and eliminate any bias. The researcher observed the problems mentioned by Bell (1993) and Churchill (1995) concerning the use of proper wording. Bell (1993) argues that the researcher, when designing questions, should avoid ambiguous or imprecise questions, double questions, leading questions, presuming questions, hypothetical questions, and offensive or sensitive questions. Churchill (1995) agrees with Bell's (1993) point of view regarding wording problems, and adds that the researcher should avoid implicit alternative questions, generalisations and estimates. Fink (1995b) believes that the researcher should avoid negative questions when asking respondents about their agreement, since negative questions require deep logical thinking. Babbie (1998) suggests that the items in the questionnaire should be clear, relevant to the research problem and that the shorter the items the better. In addition, respondents must be competent enough to answer the questions. He recommends that the researcher, when designing questionnaires, avoids double-barred questions, negative questions, misinterpreted items, as well as biased terms and items.

The researcher tried to follow the requirements in framing the questions that have been mentioned by Converse and Presser (1986) and Churchill (1995). Converse and Presser (1986) advise the use of simple common language and short questions so as not to obstruct the purpose of the question. Churchill (1995) argues that the researcher, when

designing questions should use simple interesting opening questions, a progression from broad questions to narrow ones, and ask sensitive or difficult questions later on. Furthermore, the researcher followed the recommendations of Bourque and Fielder (1995), that when designing questions, questions should be specific, abstract terms and jargon avoided, and that the questionnaire should start with easier questions progressing to more complicated ones and present questions in a logical order. Sheatsley (1983) recommends some points when writing the questionnaire, such as making questions simple because complicated and difficult questions might not elicit an opinion, and avoiding long questions, double-barred, false premises, vague, and overlapping questions.

6.11.2 Questionnaire Format:

In this research, there were two questionnaires, as mentioned earlier; the primary and more significant one was directed at the quality managers, while the secondary smaller one was to the lead assessors. The primary questionnaire in this study takes the form of structured questions (closed-ended questions), for the most part, since they have many advantages over unstructured questions (open questions). Alreck and Settle (1995) claim that many researchers in survey design prefer structured questions because they clarify the different dimensions of answers; data are easily compared among respondents; there is accuracy in recording; they can be easy to answer; and the analysis of data is easier. Oppenheim (1992) agrees with Alreck and Settle (1995) in preferring the use of a structured questionnaire rather than an unstructured one. He claims that structured questionnaires require little time; incur low costs; involve no extended writing; are easy to process; they are easy for a comparison among variables; they are easy when testing specific hypotheses; and they involve less training for interviewers.

In support of the previous claims, Wilson and McClean (1994) argue that closed questionnaires are quick to answer, easy to code and show no discrimination based on articulate and inarticulate responses. Fink (1995b) agrees with the previous writers as to the advantages of closed-ended questions, arguing that they produce standardised data that can be analysed statistically, and the answers have a better chance of being more reliable and consistent over time. Babbie (1998) also praises closed-ended questions for being easy to process and analyse, and suggests that those questions should be exhaustive, meaning that the researcher should include all possible alternatives. Bourque and Fielder (1995) argue that it is preferred that closed-ended rather than open-ended questions are used because respondents might be unwilling to write answers and therefore may lose interest in the questionnaire itself. They add that closed-ended questions in the self-administered questionnaire should include all potential information the respondents might need, since no help is provided.

On the other hand, the second type of questionnaire that was directed at the lead assessors was designed in the form of open-ended questions (Appendix C). The purpose of the questionnaire was aimed to clarify some points that were mentioned in the primary questionnaires to the quality managers. The researcher, after analysing the primary questionnaire, found that some aspects needed to be explained by the assessors. Therefore, open-ended questions were posted to those assessors operating in the country. The open-ended questions were appropriate in this case since the researcher needed clarification, which required them to write and explain. Moreover, only 10 copies of the questionnaires were distributed, which meant that the analysis of such data would be relatively easy and would not require any statistical analysis.

6.11.3 Sources of Ideas in Writing Questions:

The design of the questionnaire was based on a review of the literature surrounding ISO 9000 and total quality management, thus the main assistance in designing the questionnaire was driven by the literature review, making it of vital importance (Gill *et al.*, 1997). In addition, the ISO 9001's 20 clauses were used in developing the questionnaire. The researcher also investigated previous studies in ISO 9000 and TQM and used them in addition to the literature review when designing the questionnaire.[1] ISO 62, governing the work of the registration agencies, was used in designing the questions related to that nature either in the primary questionnaire or in the questionnaire posted to the assessors.

6.11.4 Scales of Measurement:

Alreck and Settle (1995:113) define a response scale as "merely a representation of the categories or continuum along which respondents arranged themselves". The researcher mainly used a 5 point-Likert scale. The use of scales instead of forced questions, such as yes / no questions, helps in ascertaining the degree of agreement or the extent to which the respondent evaluated or did something. Moreover, the use of a scale assists in establishing numeric results to be substituted for interval or ratio scales. Such results could be used for statistical analysis, such as the case of the non-parametric tests, in measuring differences and correlation. Those tests include the Mann Whitney

[1] The previous studies included those of Buttle (1997), Earl and Ghosh (1997), Taylor (1995a), Terziovski *et al.* (1995), Ahire and O'Shaughnessy (1998), Withers and Ebrahimpour (1996), Van Der Wiele and Brown (1997), Scheuermann *et al.* (1997), Vloeberghs and Bellens (1996), Williams (1997), Quazi and Padibjo (1997), Idris *et al.* (1996), Buttle (1996), Brown and Van Der Wiele (1995), Sullivan-Taylor and Wilson (1996), Honey (1994), Meegan and Taylor (1997), Cebeci and Beskese (1998), Lackritz (1997), Chelsom (1997), Galagan (1992), Modarress and Ansari (1989), Ebrahimpour and Withers (1992), Lee (1995), Ali (1994), Lascelles and Dale (1989), Saraph *et al.* (1989), Dixon (1996), Ebrahimpour *et al.* (1997), Carlsson and Carlsson (1996), Krasachol *et al.* (1998), Naidu *et al.* (1996), Taylor (1995b), Sathori (1994), Tsiotras and Gotzmani (1996), Taylor and Meegan (1997), Jones *et al.* (1997), and from Zeccardi (1988).

test, the Sign test, and the Kruskal Wallis test. Without the use of scales, the calculations of those tests would have been almost impossible. Anderson *et al.* (1983) mention that the Likert scale has a number of advantages, such as being easy to accomplish, it makes fewer assumptions, and it can be evaluated through standard techniques of item analysis, factor analysis and reliability analysis. The researcher was successfully able to employ factor analysis in motives for ISO registration and in benefits of ISO implementation by using ordinal scales of 5 points.

In general, the researcher used three types of scales; the interval scale, the nominal scale and the ordinal scale. The first scale, the ratio or interval scale, uses numbers to represent the degree of the scale, asking respondents to state the number only. It was used for number of employees working mainly on quality-related matters and for assessing the costs of implementing ISO 9000. The second scale was the nominal scale, where a number does not mean the difference between the alternatives; each number is merely a form of identification for the alternative. The researcher used this scale in many questions, such as for yes / no questions and when asking about certain categories such as types of ownership, extent of involvement in export, and types of ISO 9000 series. The third scale was the ordinal scale, which establishes an ordered relationship between persons or objects being measured. On this scale, a number represents the degree of doing or agreeing on something. With the case of the Likert scale of 5 points, the researcher used number 5 to represent the strongest agreement and number 1 to represent the weakest agreement. In the questionnaire, the researcher used the 5 point Likert scale in the majority of the questions, though in one question a 3-point scale was used. In this study, higher scales such as 7 or 9 point scale types were not used, since such scales require a large number of cases, which was not appropriate in the case of

ISO 9000 registered firms in the manufacturing sectors in Saudi Arabia, which consists of approximately 140 firms.

6.11.5 Types of Questions:

Questions are usually classified into three types; behavioural, attitudinal and classification questions. Behavioural questions seek factual information, such as the occupation of respondents or how often they do something. Attitudinal types of questions ask what respondents thought of something. The third type of question is classification, which seeks to group respondents according to age, social class and type of house (Hague, 1993). In the primary questionnaire, directed at quality managers, the researcher used all three types of questions. Behavioural type questions were used whenever the frequency of doing something required investigation, as in the case of the questions that investigated quality system elements. For example, Question 7 (Appendices A and B) asked the respondents how often they performed quality culture functions; Question 13 sought the frequency of firms using methods of inspecting products; and Question 19 asked if they had quality teams and committees.

The attitudinal type of question was used extensively in the questionnaire, investigating the degree of agreement or disagreement of respondents regarding certain issues. Question 33 asked respondents about their opinion as to the importance of 19 motives for ISO registration. Another question (number 42) asked respondents about the extent of their agreement with statements concerning their registration agencies. In addition, Question 53 investigated the opinions of respondents concerning customer-supplier relations under the ISO scheme.

The classification questions were the third type that was used in the primary questionnaire addressed to the quality managers. In Question 2 about the sector of the firm's activity, the researcher specified many sectors and respondents were asked to indicate under which sector they operated. Question 5 asked about the type of business based on ownership; respondents were asked to classify their firms under one of four types. Another classification question (number 6) asked in which category of export each firm considered itself to be involved.

6.11.6 Arabic Translation of the Primary Questionnaire:

The official language in Saudi Arabia is Arabic, although English is used broadly in business and commerce. Consequently, the researcher decided to translate the primary questionnaire, directed at quality managers, into Arabic. The researcher and a bilingual Arabic/English quality manager carefully performed the translation of the questionnaire (Appendix A). The newly published Arabic version of the ISO 9000 series was used to help in the translation process, which was of great assistance to the researcher. Based on the best knowledge of the researcher, no Arabic-language books or materials on ISO 9000 have been published. The researcher took into consideration the technical idioms included in the questionnaire, which required precise and careful translation. Upon completion of the translation, an experienced Assistant Professor in the Department of English at the Teachers' College in Jeddah reviewed and approved the translation as ready for distribution.

6.12 Pilot Test:

Wilson and McClean (1994) emphasise the need to conduct a pilot test and consider the findings. By doing so, the questionnaire will be favourably received by the respondents

as well as offer the researcher the necessary accurate information. They argue that pilot testing should include all aspects of questionnaire design, such as appearance, the covering letter, instructions, question layout, and the time taken to complete it. Bell (1993) suggests that the researcher, when conducting a pilot test, could ask certain questions, such as how much time the questionnaire takes to answer; if the instructions are clear, and whether or not there is any ambiguity in the questions. They may also ask if respondents are likely to have any objections to answering any of the questions; whether or not there are any major elements that have not been covered; if the layout appropriate; and finally, they may ask for any comments.

The researcher reviewed the questionnaire in two stages; firstly it was reviewed by academics, then secondly, by quality managers of ISO 9000 registered firms. The first stage was achieved through a review by academics at both the University of Stirling and the King Abdul Aziz University in Jeddah. Based on their comments, the researcher made any recommended changes. Following this, the researcher distributed the questionnaires to 7 quality managers in the city of Jeddah, asking for their opinion on them. After reviewing the questionnaires, the researcher had a face-to-face meeting with those quality managers and elicited their comments and ideas, which were subsequently taken into consideration in the final draft of the primary questionnaire directed at ISO 9000 registered firms in Saudi Arabia.

6.13 The Research Population:

In this research, the population surveyed consisted of the quality managers of ISO 9000 registered firms in the manufacturing sectors in Saudi Arabia. All firms in the manufacturing sectors were surveyed. In addition, the lead assessors of the registration

agencies were sent a small questionnaire, as mentioned earlier. After obtaining the lists of ISO registered firms, the researcher found that the number in the manufacturing sectors was close to 140. Therefore, it was decided that instead of using sampling procedures, the whole population would be targeted. Finding the names of ISO 9000 registered firms was not an easy process since no governmental or other agencies had any lists of such names. When contacted, the ISO organisation in Switzerland did not have the names either. However, Passer (1998), of ISO in Geneva, suggested that the researcher contact the headquarters of the agencies to enquire if they operated in Saudi Arabia. As a result, it was discovered that there were 11 registration agencies operating in the country, including SASO. Consequently, the researcher contacted these agencies and obtained lists of ISO 9000 registered firms in Saudi Arabia.[2]

6.14 Distribution of Questionnaires:

The researcher had two alternatives for distributing questionnaires; postal or delivery and collection. Saunders *et al.* (1997) and Churchill (1995)[3] mention that the delivery and collection of the questionnaire differs from the postal distribution in some aspects. It involves higher costs, has a higher response rate, takes more time, and works better in a smaller sample. As the population of ISO 9000 registered firms in the manufacturing sectors was almost 140 firms, it was considered a small size. In addition, the cost of the fieldwork was provided by the grant agencies, the Saudi Cultural Bureau in the UK and the King Abdul Aziz University in Saudi Arabia. The duration of the data collection

[2] Appendix E includes some of the correspondents with the registration agencies. The lists containing the names of firms, included confidential information such as names of personnel and telephone numbers, therefore, such lists were not included in this thesis.

[3] See also SPSS Inc. (1999) SPSS Training Course Library, Survey Design, Chapter 2: Mode of Data Collection, p.14.

was determined to be three months[4] as standard time but this could have been extended if necessary. Therefore, the researcher decided to use the delivery and collection distribution method to ensure the highest possible response rate because of the small size of the population in general.

The researcher obtained two supporting letters, one from the Saudi Cultural Bureau in the UK, and the second from the Faculty of Economics and Administration at King Abdul Aziz University in Jeddah (Appendix E). These letters endorsed the legitimacy of the research and encouraged firms to co-operate with the researcher. In addition, such letters ensured confidentiality in that only the researcher would see the questionnaires. Moreover, a covering letter was included with both the Arabic and English versions of the questionnaire, giving directions and ensuring the strictest confidentiality. Each respondent was provided with the two versions so as to choose the more appropriate one to answer. Regarding the second questionnaire, which was directed at the assessors, the researcher used the postal distribution method. 10 questionnaires were posted to the 10 registration agencies, excluding SASO, accompanied by the same two supporting letters from the Saudi Cultural Bureau and the King Abdul Aziz University.

6.15 Response Rate:

Of the 140 questionnaires that were distributed to the quality managers, the researcher received 97 completed questionnaires, giving a response rate of 69.3%, which was considered to be satisfactory. Bobbie (1992) argues that a 50% response rate is adequate, 60% is good and 70% is very good. Saunders *et al.* (1997) expect the

[4] The data collection for this research was carried out during the months of September, October, November, and ended at the beginning of December 1998.

response rate of the delivery and collection method to be between 30-50%. Among the 97 questionnaires that were received, the researcher considered 83 questionnaires to be usable while 14 questionnaires were rejected. The usable questionnaires represented almost 60% of all returned questionnaires. The response rate is shown in Table 6.1. (Appendix D includes the names of the 83 ISO 9000 registered firms)

Table 6.1 Response rate among ISO 9000 registered firms in Saudi Arabia

Description	Number	%
Distributed questionnaires	140	100.00
Received questionnaires	97	69.29
Usable questionnaires	83	59.29

Regarding the questionnaires that were sent to the assessors of the registration agencies operating in Saudi Arabia, the researcher received only 3 responses. Out of 10 questionnaires, this meant a 30% response rate, as expected from the postal type of questionnaire (Sauders *et al.*, 1997; Churchill, 1995). Nevertheless, this questionnaire was of minor importance as it was sent after data analysis just to clarify some points that were mentioned by the quality managers.

6.16 Data Analysis Techniques:

When analysing the data, the SPSS for Windows computer programme was used. The researcher used several statistical techniques to help in interpreting the results of the primary questionnaires of quality managers in the survey. These were mainly descriptive statistics, measuring variation, measuring association, and factor analysis, and are presented in the following points.

Descriptive Statistics:

These are the basic statistical computations used in interpreting quantitative data. They compute summary statistics that describe the typical values or central tendency and how data are spread around those values (Norusis, 1998). In this data analysis, the descriptive statistics tools used were frequency scores, mean, standard deviation, minimum and maximum. In addition, cross-tabulations were used to show the distribution of variable (s) to other variable (s).

Measuring Variation:

Measuring variation tests gauge any significant difference between groups or variables. The researcher used statistical tests for nominal and ordinal data, mainly since the data were on those scales in general. These tests are known as Non-Parametric tests. Table 6.2 shows the measures of variance tests used in the data analysis.

Table 6.2 Measures of variance statistical tests used in the study

No	Type of Comparison	Scale	Type of Test
1	Comparison between two groups in the same variable	Nominal	Two-sample Chi-square test
		Ordinal	Mann-Whitney U test
2	Comparison between three or more groups in the same variable	Nominal	k-sample Chi-square test
		Ordinal	Kruskal-Wallis one-way Anova
3	Comparison between the two variables across different measures	Ordinal	Paired-Samples Sign test

Source: Diamantopoulos and Schlegelmich, 1997, p.175.

In this section, some examples of the use of the analysis of variance will be presented. One example of the Chi-square test was in the case of the comparison between TQM and Non-TQM firms in their use of teams and committees for quality since that question was on a nominal scale. The Mann-Whitney test was adopted, for example, in comparing TQM with Non-TQM firms in terms of quality culture since the question

was on an ordinal 5 point-scale. An instance of the Kruskal-Wallis One Way Anova test, was when comparing the registration agencies (9 agencies) based on their client's levels of satisfaction. In addition, an example of the Paired-Sample Sign test was to compare between two variables: top management demanding ISO vs. the quality department demanding ISO implementation.

Measuring Association:

Correlation measures the strength of the association between a dependent and an independent variable (Hair *et al.*, 1995). When one variable changes, the other changes as well. If both variables increase or decrease together, then we have a positive correlation, but if one increases and the other decreases, it means that we have a negative correlation. Correlation coefficients range from –1 as being a perfect negative correlation, to +1 as a perfect positive correlation. The researcher used the Sperman correlation coefficient that measures the association between variables on an ordinal 5 point Likert type scale. This test was used to measure the correlation between the extent of export and international marketing motives. Another type of correlation that was used in this research was Bartlett's test of sphericity to measure the correlation among variables in the two cases of factor analysis that were used. Those cases related to motives for registration and benefits of ISO implementation. The third type of correlation was Cronbach's alpha to test the reliability of the scale in the questionnaire.

Factor Analysis:[5]

Factor analysis is an advanced statistical technique that has two purposes. The first purpose is data reduction from many factors into a smaller number. The second

[5] For a thorough explanation of factor analysis, see factor analysis of motives for ISO registration in Chapter nine.

purpose is to try to gather into groups a number of factors that are related to each other and share common features. The researcher used factor analysis in two cases; in motives for ISO registration and in benefits of ISO 9000 implementation. In these instances, there were 19 and 20 variables respectively, which were reduced into groups that included variables sharing similarities. To be sure that data were suitable for the factor analysis, the Kaiser-Meyer-Olkin (KMO) test was performed and the results in both cases were acceptable: .613 and .853, respectively. In another test of correlation among variables in factor analysis, Bartlett's test of sphericity was used and was significant in both cases.

6.17 Validity and Reliability:

Validity and reliability are two aspects of survey design that ensure that the research instrument achieves the objectives set by the researcher. Easterby-Smith *et al.* (1991) and Babbie (1998) mention that the instrument is valid when it measures what it is supposed to measure, while reliability means that the instrument yields the same responses over time when administered to the same individuals.

Validity of the Research Instrument:

Litwin (1995) specifies five types of validity when testing a survey instrument. They are: face, content, criterion, and construct. Face validity relates to the instrument being reviewed by any normal individual, while content validity refers to reviewing by experts. Criterion validity is a measure of how well the instrument compares to either another instrument or to a predictor. Construct validity is a theoretical long-term evaluation of the survey instrument with respect to how meaningful it has been after years of experience. The researcher in this study used a content type of validity. As

explained earlier in this chapter, the questionnaire design went through several stages. First, a thorough literature review was carried out, which included previous studies on ISO and quality management and ISO 9001 of 1994. Such literature constituted the first draft of the questionnaire. Secondly, the supervisor reviewed the questionnaire and necessary changes were made. Thirdly, a panel of academics in Stirling and Jeddah reviewed the questionnaire. Fourthly, 7 quality managers performed pilot testing on the questionnaires. Those stages rendered the questionnaire valid based on the best efforts made by the researcher.

Reliability Analysis:

Litwin (1995) specifies three methods of reliability assessment; test-retest, alternate-form and internal consistency. Test-retest requires that the same respondents answer the questions at two different points in time to see how stable the responses are in order to know how reproducible a set of results is. The correlation coefficient is calculated and should be more than 0.7. The second method is alternate-form, which requires the use of differently worded items to measure the same attributes. The third method of reliability is internal consistency, which was used by the researcher. In this research, the reliability of the scales used in the questionnaire is assessed by an internal consistency statistic, Cronbach's coefficient alpha. Internal consistency is based on the idea that items comprising a scale should show high levels of internal consistency. The higher the correlation among items in each scale the greater is the alpha value. High correlation implies that high scores on one question are associated with high scores on the other questions. Cronbach's coefficient alpha is related to scale length; the longer the scale, the higher the alpha value and alpha ranges from 0 to 1. A scale of 5 points should bring an alpha of more than .70, which means that the scale shares about half of

its variance with a hypothetical alternative scale. The minimum recommended level of alpha is often .70, however .50 or .60 are still accepted.[6] Table 6.3 shows Cronbach's coefficient alpha of the reliability of the scales in the questionnaire.

Table 6.3 Cronbach's coefficient alpha of the reliability of scales used in the questionnaire in Appendices A and B (for scale questions with 4 items or more only)

Question No.	No. of Items	Subject of question	Coefficient alpha
7	4	Quality culture	.7002
8	4	Top management commitment to quality	.8776
10	9	Measuring customer satisfaction	.8338
12	4	Identification of products during inspection	.6408
17	5	Managing non-conformity	.6684
20	4	Line workers involvement in quality	.8291
21.A	7	Qualitative tools	.7850
21.B	7	Quantitative tools (Statistical Process Control)	.7429
26	5	Relations with suppliers	.7054
27	7	Measuring the performance in the organisation	.7286
28	6	Quality records	.6862
32	6	Statements related to ISO 9000 implementation	.6916
33	19	Motivations for ISO 9000 registration	.7992
36	5	Reasons for not choosing SASO	.6401
37	9	Factors influencing the choice of the registrars	.6820
42	7	Statements related to the registration agencies	.8377
52	8	Statement related to quality manual	.5646
53	7	Managing suppliers under ISO 9000 scheme	.5011
57	15	Factors contributed to implementation of ISO	.6731
58	20	Benefits of ISO 9000 implementation	.9397
59	7	Evaluation of ISO 9000	.3993
60	10	Problems with ISO implementation	.6752

From Table 6.3, it can be seen that the coefficient alpha figures are generally acceptable, as only on three scales the alpha value was below .60. Other scales in questions show high alpha values of more than .60 and even higher than .80 and .90. Those figures show solid indications that the scales (generally 5 point scales) used in the questionnaire listed in the table are reliable scales of measurement. However, Question 59 shows an alpha value of around .4, which means moderate coefficient but

[6] SPSS Inc. (1999) SPSS Training Course Library, Survey Design, Chapter 10: Scales: Reliability and

not low. The researcher speculated that the reason for the moderate alpha in Question 59 was because the 7 items included in this question are not correlated with each other, and they could have been separated into different questions. However, the researcher combined them out of the necessity of compiling a shorter questionnaire.

6.18 Summary:

This chapter covered the research methodology of this study. It included research objectives and questions and presented the purpose, as well as the design and the strategy of the research. In addition, the chapter covered the collection of secondary data and the collection of primary data through the survey research. The aspects of research development were included in this chapter, and the translation and distribution of questionnaires were also presented. The reliability and validity of the scales of used in the questionnaire were also covered. The next chapter begins the data analysis and discussion, covering the characteristics of ISO 9000 registered firms in Saudi Arabia.

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validity, p.16.

CHAPTER SEVEN

CHARACTERISTICS OF FIRMS

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CHARACTERSTICS OF FIRMS

7.1 Introduction:

This chapter begins the data analysis and discussion, covering nine characteristics of ISO 9000 registered firms in Saudi Arabia. They are: sector of activity, size of firms, number of employees in quality-related positions, ownership of firms, involvement in export, scope of registration, period of registration, firms with TQM programmes, and the distribution of firms among Saudi cities and regions.

7.2 Registration by Sector:

The first point in the characteristics of firms in the survey is the sector of activity of ISO 9000 registered firms. The questionnaire included 15 sectors for the firms to choose from and they could also specify others. The results are presented in Table 7.1.

Table 7.1 Classification of ISO 9000 registered firms by sector of activity

Sector of Activity	**Frequency**	**%**
Chemical & Petrochemical	24	28.9
Metal Products	9	10.8
Foodstuffs	7	8.4
Building Materials	7	8.4
Petroleum Products	6	7.2
Paints Manufacturing	6	7.2
Medical Supplies	4	4.8
Electronics	4	4.8
Aluminium Cans	3	3.6
Furniture	2	2.4
Paper Products	2	2.4
Cables	2	2.4
Pipes & Vessels	2	2.4
Electrical Products	2	2.4
Plastic Products	1	1.2
Automobile	1	1.2
Glass Manufacturing	1	1.2
Total	**83**	**100.00**

From Table 7.1, it can be seen that chemical and petrochemical products ranked first with 24 factories, representing 28.9% of the total of 83 factories that were surveyed. The chemical and petrochemical firms depend on petroleum products as an input to their products and Saudi Arabia is the largest oil producer in the world. Metal products came second with 9 factories (10.8%). Foodstuffs and building materials came third in the population both with 8.4%. Petroleum and paints factories came fourth, representing 7.2% each, after which came medical supplies and electronics, each with 4 factories, representing 4.8% of the total number of firms in the survey.

There were 3 aluminium can factories, representing 3.6% of the total survey, followed by furniture, paper products, cables, pipes and vessels, and electrical products factories, each with 2 factories, representing 2.4% each of the total. Finally, plastics, automobiles and glass factories, with one factory each, made up 1.2%. Some other sectors were not represented among the ISO 9000 registered firms in Saudi Arabia. Pharmaceuticals, textiles and clothes, perfumes and cosmetics, and carpet and rugs were not among the factories under study, although these sectors have factories in Saudi Arabia and were mentioned in the questionnaire.

For the purpose of clarification as to sector of activity, metal products factories include scaffolding and framework, storage tanks, steel rolling, and steel fabrication. Among the foodstuff factories, there are edible oils, soft drinks, dairy products, and mayonnaise producers. The building materials sector includes producers of sanitary wares, ceramic and wall tiles. In the electronics sector of activity, factories produce aerospace accessories and components, power generation, and industrial turbines. In addition, the three aluminium can factories manufactured cans for soft drinks. Electrical products

include electrical appliances and accessories for power and telecom cables, while the furniture sector includes one factory of steel office furniture. Finally, the automobile sector includes one factory for assembling Mercedes Benz cars in Jeddah.

The Saudi Basic Industries Corporation (Sabic) has 12 firms, representing 14.5% of the total number of firms in the survey. Petrochemical activity in Sabic involves the majority of 9 out of the 12 firms, representing 75% of the Sabic total, followed by metal products with 2 factories (16.7%), and finally, one factory producing atmospheric gases representing 8.3% of the Sabic firms in the study. It should be mentioned that Sabic has 19 factories, 3 of which are in Bahrain while the remaining 17 are in Saudi Arabia. The previous statistics are based on the 12 Sabic firms included in the survey.

In comparing the findings of registration by sector with other studies, Vloeberghs and Bellens (1996) found that in Belgium, chemical factories represented the majority of firms (24%), and this finding is similar to the case of Saudi Arabia (Table 7.1). The reason might be due to the need to hold an ISO 9000 certificate in order to export chemical and petrochemical products to the world, and to the fierce competition in this sector. Krasachol *et al.* (1998) found that in Thailand, rubber and plastic firms came first, then chemical and petrochemical firms came second, along with the electrical and electronic sector. Erel and Gosh (1997) found that in Turkey, construction materials came first and chemicals came fourth. Taylor (1995a) found that textile firms came first with 34% in the UK.

7.3 Registration by Size:

The size of the firms in the study was determined by the total number of employees working in each firm. The questionnaire included six classifications that were combined into four groups during the analysis. The results of the size of ISO 9000 registered firms in the study are shown in Table 7.2 and Figure 7.1.

Table 7.2 Size of firms (by number of employees)

Number of Employees	Frequency	%
1-100	18	21.7
101-300	33	39.8
301-500	15	18.1
500 or more	17	20.5
Total	83	100.00

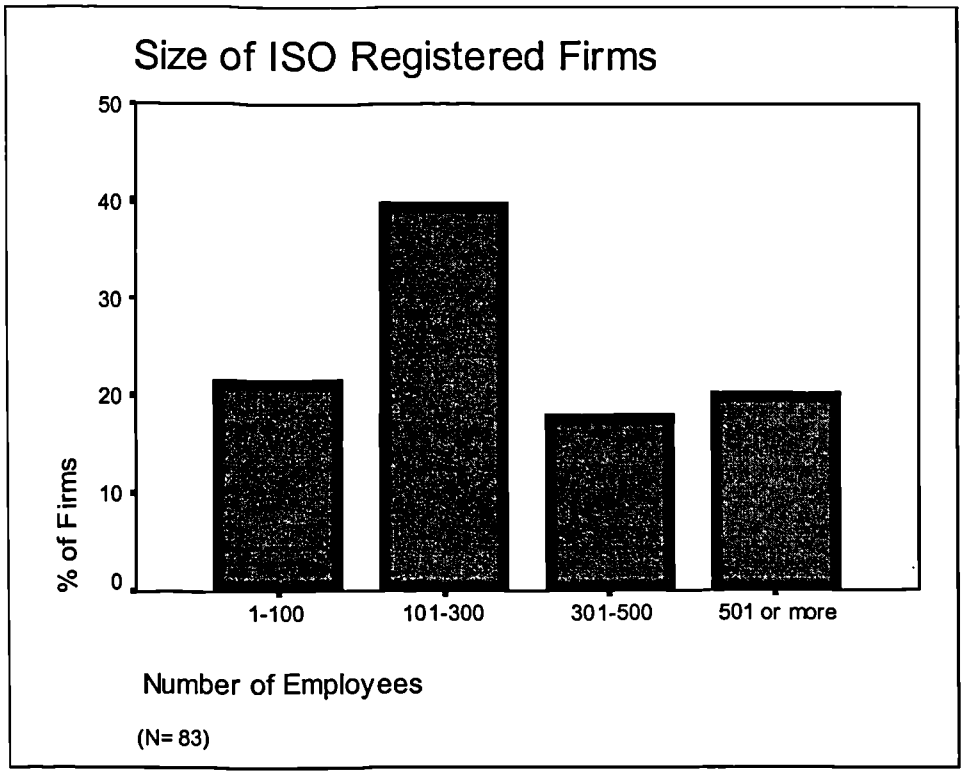

Figure 7.1 Size of ISO 9000 registered firms (by number of employees)

Table 7.2 shows that there were 33 firms with employees numbering between 101 and 300, representing a considerable percentage of 39.8%, followed by the smallest factories in the population with 100 employees or fewer, numbering 18 firms (21.7%). Firms with more than 500 employees came third with 20.5%, whereby Sabic companies represented the majority. Finally, ISO 9000 firms with 301-500 employees came last representing 18.1% of the total number of firms in the study.

Comparing these findings on the size of ISO 9000 registered firms in Saudi Arabia with the study of Erel and Gosh (1997) when surveying Turkish firms. They found that the substantial majority of ISO 9000 firms in Turkey (46.1%) had more than 500 employees, followed by firms with 200-500 employees (35.5%), 100-200 employees (13.2%), 50-100 employees (3.9%); then the smallest firms with fewer than 50 employees came last (1.3%). The same case was found by Krasachol *et al.* (1998) in Thailand, where the majority of registered firms had more than 500 employees, followed by medium-sized firms, then small firms. Taylor (1995a), in the UK, found that medium-sized firms represented the majority (30%), followed by large firms (24%), then small firms (11%).

Saudi firms were distributed closely among all sizes (Table 7.2) except for the size 101-300 which, had almost double the number of the others. The findings in Saudi industry were similar to those of Stathori (1994) when surveying Greek firms. She found that small and large firms accounted for 28% each, while medium firms represented 44%. In Malaysia, Idris *et al.* (1996) found similar results with the majority of firms being medium sized (50%), but large firms (33%) were almost double in number compared to small firms (17%).

7.4 Employees in Quality-Related Positions:

This study investigated the number of employees in quality-related positions. Recognising that it is sometimes hard to specify what quality-related positions are, this question asked for numbers of employees who perform major functions related to quality matters, such as quality manager, quality inspectors, internal quality auditors, reliability engineers and so forth. The question required a classification of those employees, whether or not they were Saudi nationals since this matter is of great importance. In the literature review, the existence of Saudi labour in the private sector is minimal. Table 7.3 shows the number of Saudi and non-Saudi employees in quality-related positions.

Table 7.3 Saudi employees vs. non-Saudi employees in quality-related positions (groups)

Employees	**Saudi**		**Non-Saudi**	
	Freq.	**Valid %**	**Freq.**	**Valid %**
None	21	32.8	2	3.1
1-5	32	50.0	30	46.9
6-10	4	6.3	16	25.0
11-20	1	1.6	9	14.1
21-30	2	3.1	3	4.7
31 or more	4	6.3	4	6.3
Total	**64**	**100.00**	**64**	**100.00**
Mean	1.1094		1.8906	
Std deviation	1.3228		1.2230	
No. of missing values	19		19	

Table 7.3 shows that approximately one third of the firms in the study did not have Saudi employees in quality-related positions at all, representing 32.8% of the total. Those with 1-5 employees in both Saudi and non-Saudi categories the percentage was almost the same, with 50% and 46.9% respectively. In the other categories in the table,

we notice that non-Saudi employees represent a larger percentage than did the Saudi employees in quality roles. The overall mean of Saudi employees while 1.11 and the mean for non-Saudi employees was 1.89; a substantial difference between the two categories in favour of the non-Saudi employees. In addition, the very large number of missing values may indicate the sensitivity of this issue, where respondents were reluctant to address this matter since Saudi industries have been criticised for not hiring more Saudi nationals.

For further clarification of the existence of Saudi employees, Table 7.4 shows Saudi and non-Saudi employees in quality-related positions by total number and not in groups. The table shows that the total number of employees performing functions related to quality was 1193 across all the firms in the study. The 728 majority were non-Saudi (61%), while the 465 Saudi employees represented the remaining 39%. These percentages, however, do not represent reality Saudi industry as a whole. Al-Dakheil (1994) claims that the private sector in Saudi Arabia employed 92% non-Saudis and 8% Saudis, with the exception of the semi-private sector (Sabic and others) which employed 32% non-Saudis and 67.5% Saudis.

Table 7.4 Saudi vs. non-Saudi employees in quality-related positions (By numbers)

Employees	**Sum**	**Valid %**	**Mean**	**Std. Deviation**
Saudi	465	39	7.2656	20.9142
Non-Saudi	728	61	11.3750	20.3871
Total	**1193**	**100.00**	**---**	**---**

In this study, the relatively higher percentage of Saudi employees in quality (although not the majority) is influenced by the 12 Sabic firms and some others that are a mix of

government and private ownership, such as Petrolube. Such firms employ a majority of Saudi nationals since they are under government influence. Some examples of Sabic firms that participated in the study include the Saudi Methanol Company[1], which employs 80% Saudis, Safco[2] (77%), the Al-Jubail Fertilizer Company[3] (70%), and the Arabian Petrochemical Company[4] (71.3%). As of 1999, Sabic had 70% Saudi employees working in its firms.[5]

In support of the previous section, concerning the employment of Saudi nationals by Sabic and the other firms in the study, a cross-tabulation was carried out. The results of this cross-tabulation are shown in Table 7.5 and Figure, which show the distribution of Saudi and non-Saudi employees in Sabic and other firms. .

Table 7.5 Percentage of Saudi employees in Sabic vs. other firms

Type of Firms	% of Saudi Employees in Quality-Related Positions						Total
	Non	1-5	6-10	11-20	21-30	31 or more	
Sabic	---	22.2	---	11.1	22.2	44.4	100.00
Others	38.2	54.5	7.3	---	---	---	100.00

[1] Saudi Methanol Company (Ar-razi) (1998) *Annual Report*, Al-Jubail: Saudi Basic Industries.
[2] Safco (1996) *Annual Report 1996*, Dammam, The Kingdom of Saudi Arabia.
[3] Al-Jubail Fertilizer Company (Samad) (1998) *Annual report*, Al-Jubail, The Kingdom of Saudi Arabia.
[4] Arabian Petrochemical Company (Petrokemya) (1994) *Annual Report*, Al-Jubail, The Kingdom of Saudi Arabia.
[5] Ministry of Industry & Electricity (1999) *Development of Industry in 100 Years 1319-1419 A.H*, Riyadh, The Kingdom of Saudi Arabia, p. 108.

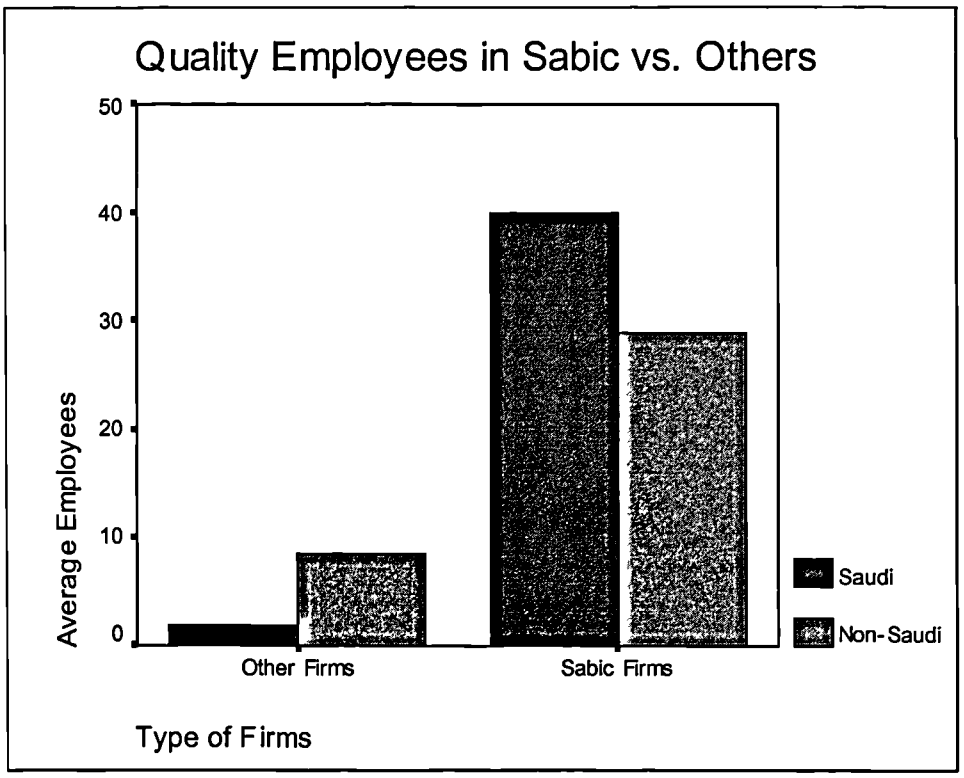

Figure 7.2 Employees in quality-related positions in Sabic vs. other firms

From the second column of Table 7.5, we can see that all Sabic's firms employ Saudi nationals. We also found that Sabic has a higher percentage of employees. Conversely, in the third column, it can be seen that substantial percentages (38.2%) of other firms do not have any Saudi employees. Moreover, in the category of 11-20 employees, we see that Sabic employed 11.1% while other firms employed none. In the category of 21-30, *Sabic had 22.2% while in the largest category, of 31 or more,* Sabic had the highest percentage of Saudi employees (44.4%). Therefore, the conclusion of this section is that Sabic firms were substantially more involved to employ Saudi nationals than other firms.

7.4.1 Employees in Quality-Related Positions and Size of Firms:

The purpose of this section is to find out the average number of quality employees in each size of ISO 9000 registered firms. Although four categories of sizes of firms were used previously, the researcher grouped the firms into three categories to be used in each subsequent relationship in this study to increase the success of the statistical computations that require a greater number of cases. Table 7.6 shows the distribution of Saudi and non-Saudi employees in quality, using compared means. Figure 7.3 shows this distribution in a cluster graph.

Table 7.6 Average employees in quality-related positions by size of firms

No.	Sizes of Firms (Number of Employees)	Quality Employees (Averages)		
		Saudi	Non-Saudi	Total
1	1-100	1.2500	4.1250	5.3750
2	101-300	2.1154	11.3077	13,4231
3	301 or more	17.7273	16.7273	34.4546
Total		**7.2656**	**11.3750**	

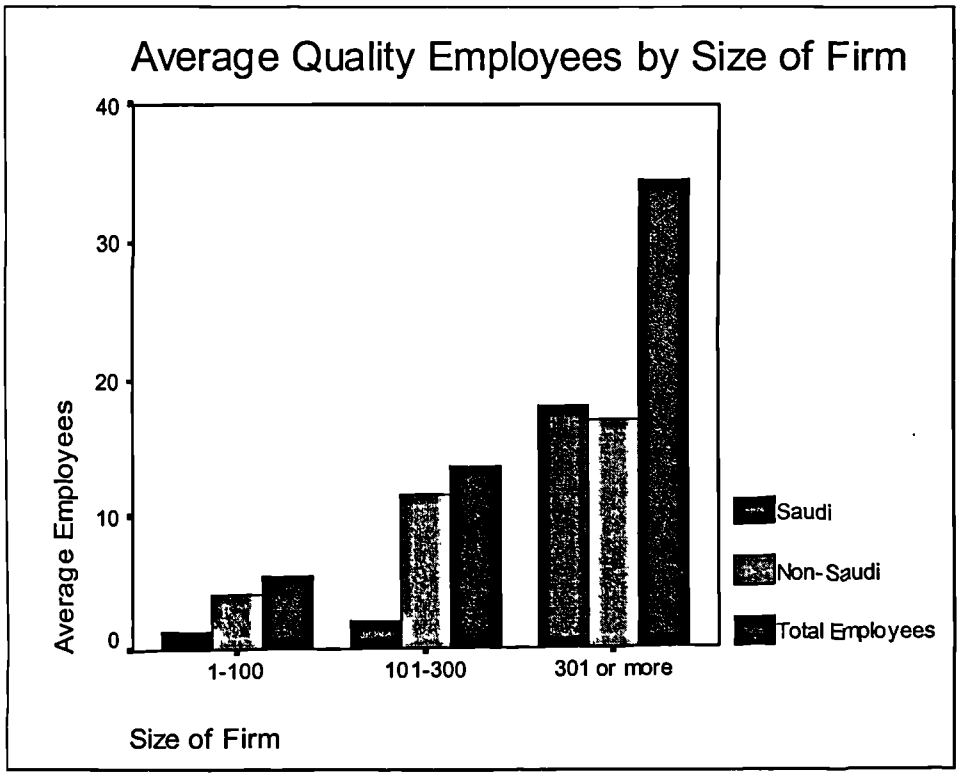

Figure 7.3 Employees in quality-related positions by size of firms

Table 7.6 shows that the average number of employees in the smallest size of firms was 5.37 among whom 1.25 were Saudi nationals and 4.12 were non-Saudi nationals. The medium-sized firms had an average of 13.42 employees: 2.1 Saudi and 11.3 non-Saudi nationals. The largest firms had an average of 34.45 employees performing quality tasks, among them 17.7 Saudi and 16.7 non-Saudi nationals. The large proportion of Saudi employees in the largest size of firms once more arises because of the contribution of Sabic's 12 firms in the employment of Saudi nationals, as explained in the previous section. The conclusion of this section is that, the larger the firm, the more likely it employed Saudi nationals.

7.5 Registration by Ownership:

The question about ownership of ISO 9000 firms concentrated not on the legal status of registered firms, which has no significance in this study. Instead, the classification was on aspects that are related to ISO 9000 implementation, such as joint ventures and government ownership. Table 7.7 and Figure 7.4 show the classification of ISO 9000 registered firms in Saudi Arabia.

Table 7.7 ISO 9000 Registered firms based on types of ownership

Types of Firms	**Frequency**	**%**
Joint venture	38	45.8
Saudi Private	32	38.6
Mix of Government & Private (no foreign involvement)	9	10.8
Saudi Corporate	4	4.8
Total	**83**	**100.00**

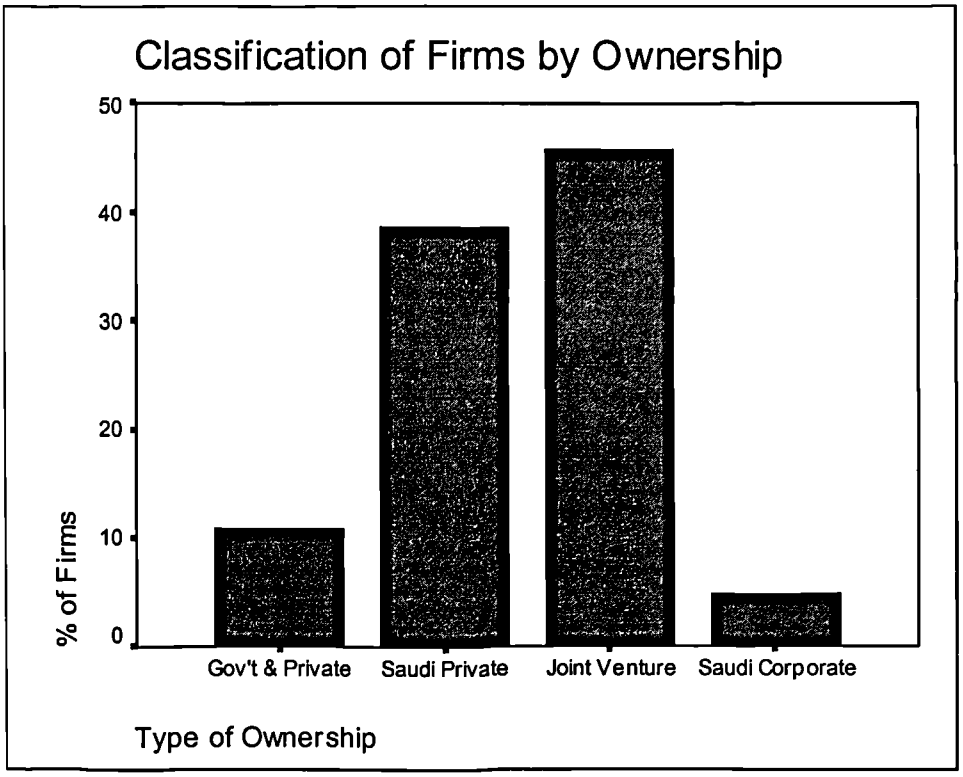

Figure 7.4 Classification of ISO 9000 registered firms by types of ownership

Table 7.7 illustrates that the majority of firms were joint ventures with foreign corporations abroad representing a large percentage of 45.8%. This could mean that such firms are concentrating on international markets, since exporting to certain countries may require an ISO certificate. In addition, joint ventures are influenced by their mother companies or partners abroad which are more aware of ISO and more developed in the arena of ISO registration. Saudi private firms ranked second, representing 38.6% of all ISO 9000 firms in Saudi Arabia. This relatively large percentage is not unusual since the majority of firms in Saudi Arabia are privately owned. Firms that are owned by both the government and the private sector, with no foreign involvement, came third with 10.8%, followed by Saudi corporate firms that are mainly joint stock firms, with 4.8%.

Comparing this finding with other studies, Erel and Gosh (1997) found that a substantial number of their sample of Turkey's ISO 9000 firms had foreign involvement. They calculated that 34 out of 73 companies (46.6%) had foreign involvement such as partnership, know-how agreement, patent agreement, or a purely foreign involvement. In Thailand, Krasachol *et al.* (1998) found that foreign involvement in ISO 9000 registered firms was high as well. They found that 37% of their sample were joint ventures while another 37% were foreign, and a minority of 12% were Thai-owned firms. Both those previous results are very close to the case of Saudi Arabia, where 45.8% of ISO 9000 registered firms were of the joint venture type. We could conclude that in the least developed countries, there is some correlation between ISO 9000 and foreign involvement ownership. In Saudi Arabia, it is wise for a foreign corporation to enter into a partnership with a Saudi firm since the law provides tax exemptions if such a partnership is 51% or more in favour of the Saudi representation. This, perhaps, is the reason why most foreign involvement being joint venture partnerships rather than foreign corporations that would have to pay tax after 10 years of establishment.

7.5.1 Size of Firms and Types of Ownership:

Table 7.8 and Figure 7.5 present a cross-tabulation between size of ISO 9000 registered firms and the type of ownership of such firms in Saudi Arabia. This table aims to specify the percentage of each type of firm in each size of category of firms.

Table 7.8 Firms based on ownership and size of firms

No.	Type of Firms	% of Size of Firms			
		1-100	101-300	301 or more	Total %
1	Government & Private	---	33.3	66.7	100.00
2	Saudi Private	25.0	37.5	37.5	100.00
3	Joint Venture	26.3	44.7	28.9	100.00
4	Saudi Corporate	---	25.0	75.0	100.00
	Total	**21.7**	**39.8**	**38.6**	**100.00**

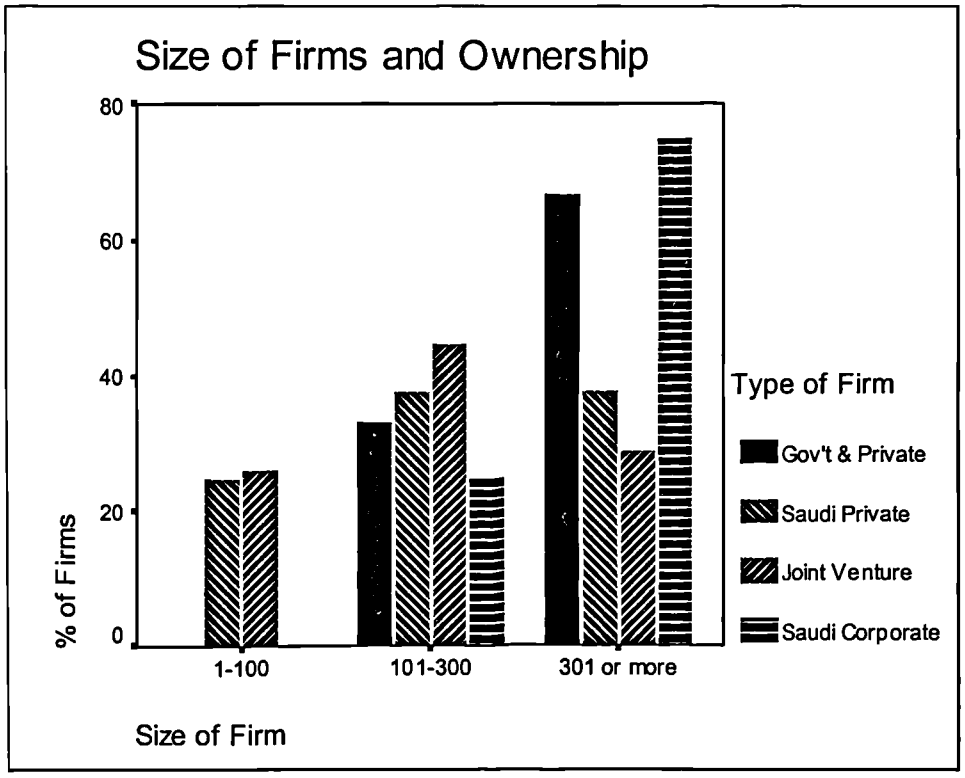

Figure 7.5 Size of ISO registered firms and types of ownership

Table 7.8 shows that the first group of firms – government and private – had their majority (66.7%) in the largest size category, with the remaining 33.3% in the medium size category. There were no small firms in the mixed ownership category of government and private. We can see that mixed ownership firms tend to be of a large size since the capital investment of the government is usually very large. In the second group, the Saudi private-type of firms, 25% of these were small, while the remaining 75% were distributed between the medium and the large size. In the third type of firms,

the joint ventures, the majority (44%), were in the medium size category and the remaining percentages were distributed among the small and the large sizes of firms. Finally, 75% of Saudi corporate firms were large and 25% were of medium size. These types of firms usually have joint stocks with a large number of shares providing substantial capital investment.

7.6 Involvement in Export:

Export involvement is probably the most important factor associated with ISO 9000 implementation since one very important criterion of export is that of obtaining an ISO certificate. Many international markets may require the acquisition of an ISO 9000 certificate for firms intending to export to such markets, or at least priority is given to firms that hold an ISO 9000 certificate in terms of trading partnerships relating to export involvement. The results of the involvement of ISO 9000 registered firms in exports are shown in Table 7.9.

Table 7.9 Firms' involvement in export

Exporting Status	Frequency	Valid %
Firms involved in exports	71	88.7
Not involved in exports	9	11.3
Total	**80**	**100.00**

Table 7.9 shows that the vast majority of firms in the study (89.2%) were involved in export to different degrees, while a minority of 11.3% of such firms were not involved in export at all. Saudi Arabia is a relatively under-developed country and its involvement in export world-wide (except crude oil and natural gases) is therefore minimal. However, this finding (88.7%), which may not be consistent with its actual exporting capability, could mean that ISO 9000 firms were driven to obtain ISO by

international requirements. In addition, this could mean that in Saudi industry in general, the percentage of exporting firms is substantially lower than the figure represented by ISO firms (88.7%). Saeed Al-Gahtani, the quality manager of the Eastern Petrochemical Company, asserted that "the most important reason for obtaining an ISO certificate is to enter the European markets". To explore the percentages of exports to sales, Table 7.10 and Figure 7.6 show the different export percentages to sales in the firms under the study.

Table 7.10 Percentages of exports to sales

Export Criterion (%)	Frequency	Valid %
No Export	9	11.3
1-9	33	41.3
10-30	19	23.8
31-50	7	8.8
51% or more	12	15.0
Total	**80**	**100.00**

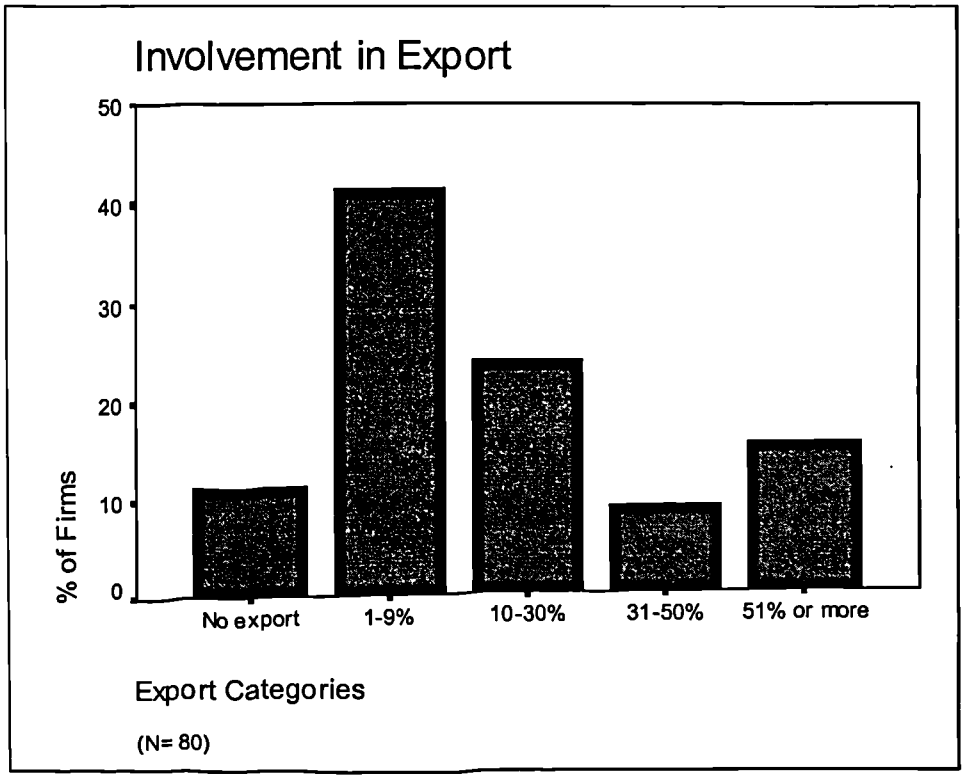

Figure 7.6 Involvement of ISO 9000 registered firms in export

Table 7.10 shows that the majority of firms (41.3%) exported 1-9% of their sales, followed by 23.8% of firms under study exporting 10-30% to outside markets. In third place, 8.8% of the firms exported 31-50% of their sales, then finally, 15% of firms exported more than half of their sales to the international markets. The conclusion of those findings is that ISO 9000 registered firms were greatly involved in export with almost 89%, despite the country being an under-developed nation.

We can compare this finding with that of Erel and Gosh (1997) in Turkey, which is a less developed country, as is Saudi Arabia. They found that in Turkish industry, 14.1% of firms were not involved in export at all, compared to 11.3% in Saudi Arabia. The largest number of firms (32.8%) in Turkey exported 10-25% of their sales, while the majority of Saudi firms exported less than 10%. 17.2% of the Turkish firms exported 25-50% of their sales, and 21.8% exported more than half of their sales. We can conclude from these findings that, the Turkish ISO 9000 registered firms, are more involved in export than those in Saudi Arabia. In an additional comparison, Stathori (1994) found that in Greek industry 94% of firms were involved in export and 6% were not involved. This relatively higher percentage than that of Saudi Arabia was possibly because Greece is a more industrialised country. In the case of Greek industry, the study did not investigate export as a percentage of sales, as in the cases in Saudi Arabia and Turkey. In addition, the high involvement in export of ISO 9000 registered firms in Saudi Arabia supported the claims of Fox (1994) and Young (1997) of the marketing advantages of ISO 9000.

7.6.1 Extent of Export and Sector of Activity:

The purpose here is to find out the distribution of firms based on their activity and the extent of exporting carried out. Table 7.11 shows the relationship between export and sector of activity. This table includes only the six highest sectors of activity based on number of firms involved, since the smaller sectors might be misleading.

Table 7.11 Extent of involvement of exports and sector of activity

Export % Categories	% of Sector of Activity					
	Metal	Chemical	Petroleum	Foodstuffs	Paints	Building
No Export	22.2	---	11.1	---	11.1	33.3
1-9	6.1	27.3	6.1	18.2	9.1	6.1
10-30	15.8	21.1	10.5	---	10.5	---
31-50	14.3	42.9	---	14.3	---	---
51 or more	---	66.7	8.3	---	---	8.3
Total	10.0	30.0	7.5	8.8	7.5	7.5

Only the six highest activities were reported

Table 7.11 shows that all chemical, and foodstuffs firms exported outside the Kingdom, and the "No export" category had no firms from these two sectors. In addition, it shows the large contribution made by chemical and petrochemical firms to export, where 66.7% of the large export category (51 % or more) was contributed by petrochemical firms. In the same category (51 % or more), petroleum and building materials firms came a far second with small percentages of 8.3 % for both sectors. In the second largest category of export (31-50%), chemical and petrochemical firms contributed 42.9%, followed by metal and food sectors with 14.3%. In the smallest categories (1-9% and 10-30%), chemical firms took the lead with 27.3% and 21.1% respectively. Moreover, a large portion of the building materials sector (33.3%) did not have any exports and its contribution in the other categories was generally minimal.

The conclusion of the previous cross-tabulation is that the chemical and petrochemical sector of ISO 9000 firms takes the lead in exports, followed by the metal products sector with the foodstuffs sector in third place. This finding, however, is exclusive to ISO 9000 registered firms in Saudi Arabia, since crude oil and natural gases are the largest exporting commodities in the Kingdom.

In 1998,[6] metal and engineering exports ranked first (49.1%), then chemical and plastic exports (26.9%), and foodstuffs ranked third with 4.51% of all exports. Sabic exports in the same year came far ahead of all combined Saudi exports, totalling SR 13496 million, where all Saudi combined exports amounted to SR 9670 Million.[7] These overall figures for Saudi industry are close to the findings for the ISO 9000 registered firms, where chemical and petrochemical exports ranked first, followed by metal exports with foodstuffs exports ranking third.

In this study, a precise comparison between Sabic and other firms' exports is not possible since we are comparing 12 firms to 68 (3 missing). However, in a cross-tabulation of Sabic vs. other firms,[8] we found that in the largest category of exports (51% or more), 58.3% of all firms were from Sabic and 41.7% were other firms. This figure shows the huge contribution of Sabic's exports among the ISO 9000 registered firms in the Kingdom.

[6] Ministry of Industry & Electricity (1999) *Development of Industry in 100 Years 1319-1419 A.H*, Riyadh, The Kingdom of Saudi Arabia, p. 178

[7] Crude oil and natural gas exports were not included in all of those figures.

[8] The cross-tabulation is not shown since the full details will not produce reasonable results.

7.6.2 Extent of Export and Type of Ownership:

In order to establish the relationship between the extent to which firms were involved in export and the type of ownership, a cross-tabulation of export vs. types of ownership was performed. Table 7.12 shows the results of the cross-tabulation and Figure 7.7 shows this relationship in a cluster graph.

Tables 7.12 Extent of export and type of ownership

Export Categories	% of Types of Ownership				
	Government & Private	Private	Joint Venture	Corporate	Total
No Export	33.3	33.3	33.3	---	100.00
1-9	6.1	39.4	48.5	6.1	100.00
10-30	5.3	57.9	31.6	5.3	100.00
31-50	14.3	42.9	42.9	---	100.00
51 or more	16.7	16.7	66.7	---	100.00
Total	11.3	40.0	45.0	3.8	100.00

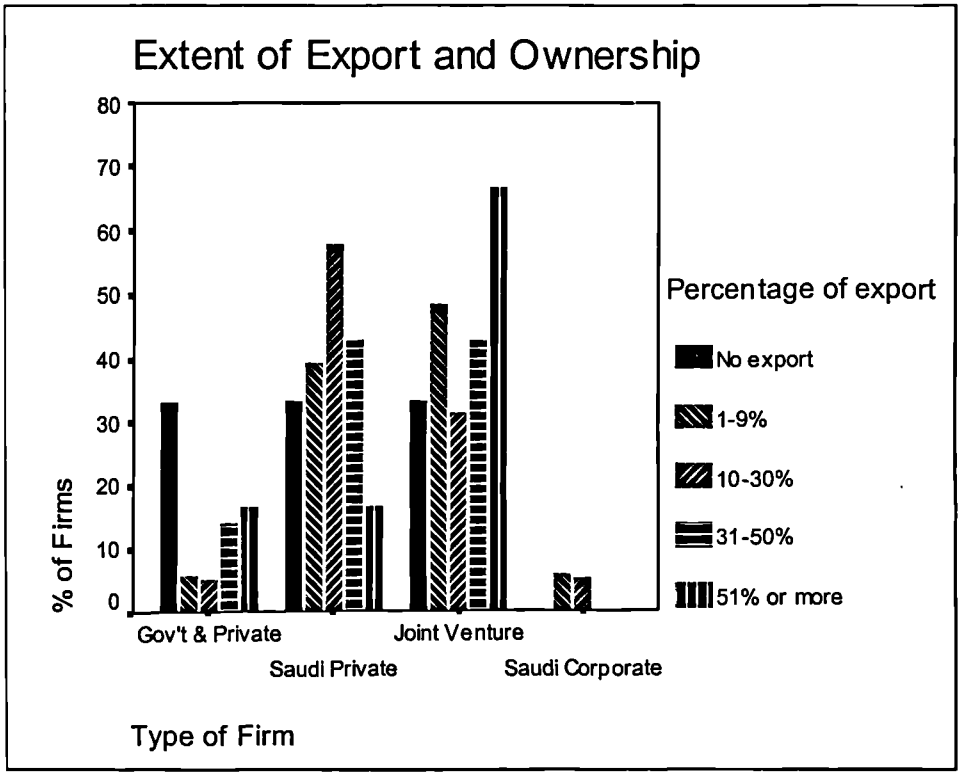

Figure 7.7 Extent of involvement in export and type of firms based on ownership

From Table 7.12, in the largest export category of more than 51% we see that joint venture firms took the lead with 66.7% of all firms. In the same category, both government and private, and private contributed a very low percentage, with 16.7% each. The Saudi corporate type of firms did not export in this category, nor did they in the second largest category of 31-50%. In the second largest category (31-50%), both joint venture and private firms ranked first, with 42.9% each, followed by the government and private types (14.3%). The conclusion of this relationship is that the joint-venture firms ranked first in the exporting arena in Saudi Arabia followed by the private firms.

7.7 Scope of Registration:

The purpose in this section is to find out the standard to which the firms were registered, one or more of the ISO 9000 standards and possibly ISO 14000. Table 7.13 and Figure 7.8 show the distribution of registration to ISO in the Kingdom of Saudi Arabia among ISO 9000 registered firms.

Table 7.13 Scope of Registration

ISO Standards	Frequency	%
ISO 9001	30	36.1
ISO 9002	53	63.9
ISO 9003	---	---
QS-9000	---	---
ISO 14000	---	---
Total	**83**	**100.00**

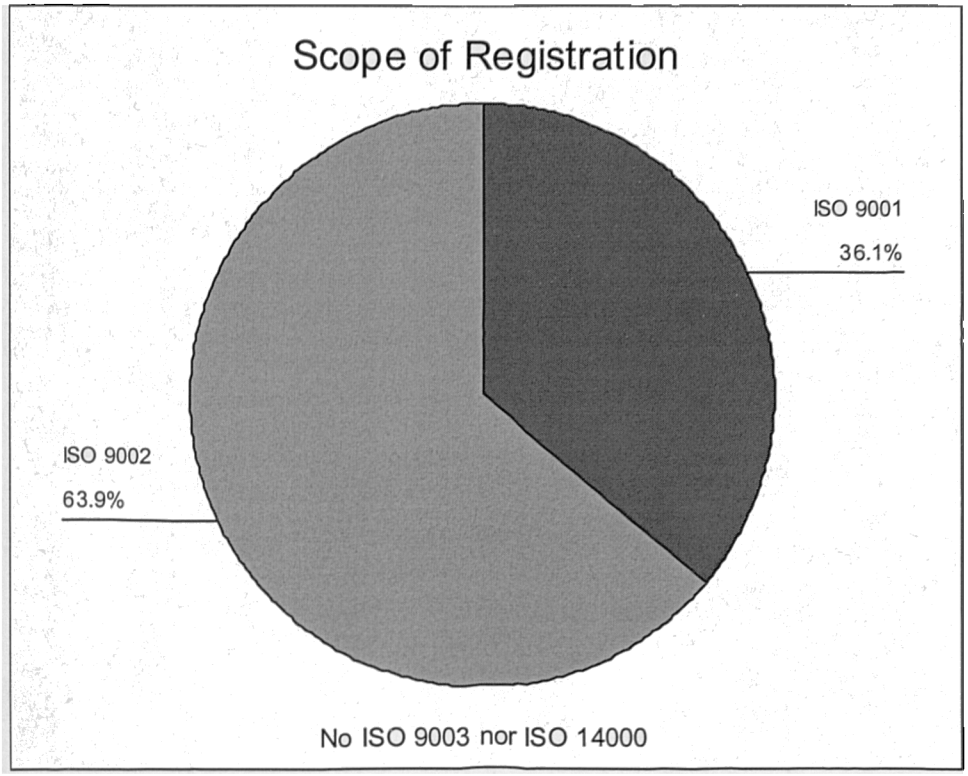

Figure 7.8 Scope of registration

Table 7.13 shows that the majority of firms (63.9%) were registered to ISO 9002, while the remaining 36.1% were registered to ISO 9001. Thus, the distribution is almost two thirds of firms registered to ISO 9002 and one third to ISO 9001. ISO 9001 deals with design issues in addition to ISO 9002 requirements. A large percentage of the Saudi firms were joint ventures (45.8%) and such firms received the design and technology from their foreign partners. Therefore, the design issue was usually not dealt with in Saudi firms. That might be the most important reason why the majority of firms were registered to ISO 9002. Another reason is that firms, even when they are designing their products in-house, do not have to register for ISO 9001. Instead, they could apt for ISO 9002, which has fewer requirements.

Hence, the scope of registration was exclusive to ISO 9001 and 9002. No single firm was registered to ISO 9003 since this standard is mainly for final inspection and testing and does not cover the quality system as a whole. Therefore, its benefits are very limited in terms of either the well being of the quality system in the organisation or international recognition. In addition, QS-9000 is another standard to which no firm was registered. This standard is solely for the automobile industry sector, and in this study only one automobile assembly firm was involved, but was not under any pressure to register to QS-9000 since there is no automobile-manufacturing sector in Saudi Arabia, and the firm is a German subsidiary. In addition, this standard (QS-9000) is mainly applied in the United States, so sub-contractors of the large automobile manufacturers are usually those required to obtain this standard. Moreover, Table 7.13 shows that no Saudi firm in the study was registered to ISO 14000, which deals with environmental issues. As a less-developed country, the awareness of environmental issues in Saudi Arabia is still very limited. Therefore, firms are neither obliged by the law nor even driven by competition or pressure from other sources to register for ISO 14000.

In comparison with this finding, Krasachol *et al.* (1998), found that in Thailand, the vast majority of firms (85%) were registered to ISO 9002 and that a very small minority of 10% of firms were registered to ISO 9001 and 5% to ISO 9003. This huge percentage (85%) of registration to ISO 9002 in Thailand is substantially greater than that of Saudi Arabia (63.9%). In addition, Brown and Van der Wiele (1995) found in their study of Western Australia that out of their sample, 57% of firms were registered to ISO 9002, 10% to ISO 9001, and 1% to ISO 9003. The remaining 32% were not registered to any standard. This finding shows a substantial difference between ISO 9001 and ISO 9002

in Western Australia in favour of ISO 9002. The conclusion of this comparison is that ISO 9002 registration in Thailand and Western Australia was substantially greater than registration to ISO 9001, and Saudi Arabia shows a similar pattern but with a smaller differential.

In addition to ISO 9000 registration, some firms specified other standards to which they were registered, as shown in Table 7.14. There were apparently other specifications for some types of products that were required in certain industries. Such specifications were concerned with the products manufactured and not with the quality system itself, as in the case of ISO 9000.

Table 7.14 Other Standards (Specifications of products)

No.	Standards	Freq.	Activity of Firms
1	API Spec. Q1	1	Pipes and vessels manufacturing
2	ASME	2	Metal products (pipes and vessels)
3	EN 46002	1	Medical dialysis
4	FDA 510 K	1	Medical syringes
5	PCA FAA	1	Airspace accessories & components
6	SASO Quality Mark	1	Dairy products
Total		7	

Table 7.14 shows that in the metal products sector, a firm that manufactured steel pipes and vessels implemented the specification of The American Petroleum Institute known as (API Spec Q1). Two firms in the same field of metal products, manufacturing steel pipes and vessels, implemented ASME specifications. In the fourth row, a joint venture firm that manufactured medical dialysis equipment implemented EN 46002 (a European specification). The partner of that firm is a British corporation that manufacture medical supplies. FDA 510 K is an American specification by the Food and Drug

Administration (FDA) in the medical field. A firm manufacturing medical syringes implemented this product specification. In addition, a firm manufacturing aeroplane accessories and components implemented a specification by the Federal Aviation Agency (FAA) in the United States for those types of products. Finally, a firm manufacturing dairy products obtained the quality mark of the Saudi Arabian Standards Organisation (SASO). ISO 9000, as mentioned earlier, is a quality system that does not deal with product specifications. Those firms implemented such specifications because of either a legal or a customer requirement in Saudi Arabia or in the international markets.

7.8 Period of Registration:

This question related to the length of time in years that the firms have been registered to ISO 9000. The researcher specified 4 alternatives, starting from less than a year to 5 years or more. The results are shown in Table 7.15 and Figure 7.9.

Table 7.15 Periods of registration (years of ISO 9000 registration)

Period of Registration	Frequency	%
Less than 1 year	7	8.5
1- less than 3 years	31	37.8
3- less than 5 years	31	37.8
5 years or more	13	15.9
Total	**82**	**100.00**

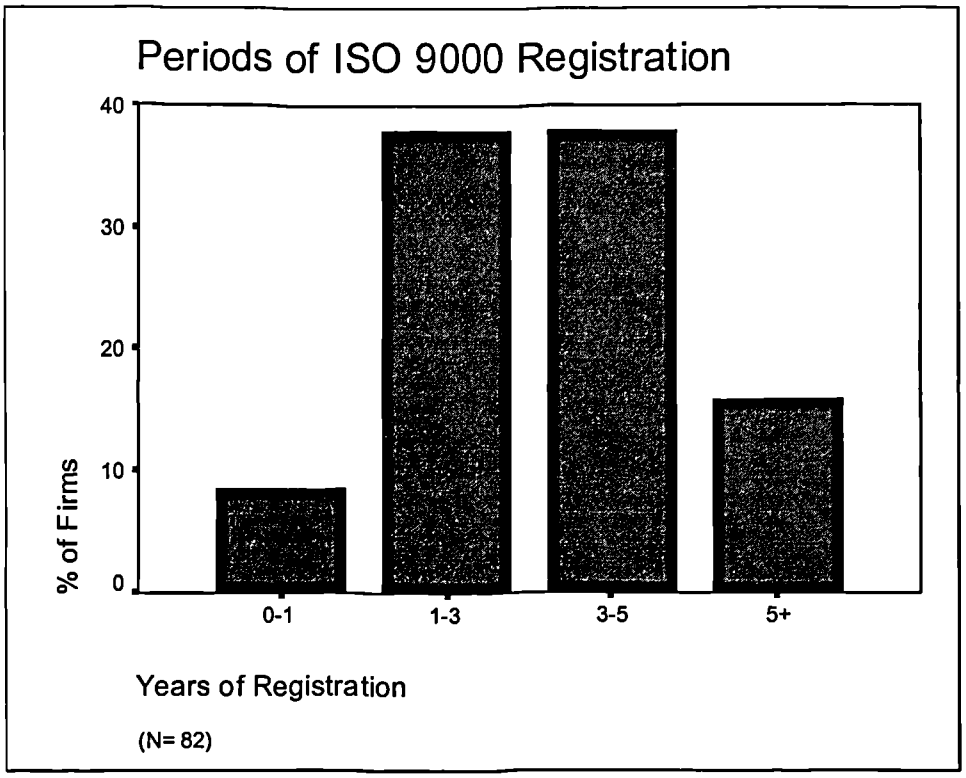

Figure 7.9 Periods of time of ISO 9000 registration

Table 7.15 shows that the vast majority of firms (84.1%) have been registered to ISO for less than 5 years and 8.5% of firms (7 firms) have been registered to ISO for less than one year. Firms registered to ISO for between 1 and 3 years were numbered 31 (37.8%), and another 37.8 % had been registered to the standard for between 3 and 5 years (31 firms too). Firms that had had an ISO certificate for more than 5 years were numbered 13, representing 15.9% of all ISO 9000 registered firms in the Kingdom.

Those findings show that ISO 9000 registration in Saudi Arabia is relatively new, as is the case in the developing countries. Prior to 1995, only 15.9% of firms were registered to ISO. Based on the ISO Survey of ISO 9000 and ISO 14000 Certificates conducted by ISO of Geneva,[9] by January1993 Saudi Arabia had 4 firms registered to ISO 9000.

[9] International Organisation for Standardisation (ISO) (1999) *The ISO Survey of ISO 9000 and ISO 14000 Certificates, Eighth Cycle*, Geneva, Switzerland, p. 10.

This figure may imply that ISO registration in the country probably started at the beginning of the 1990. In Turkey, as a matter of comparison, Erel and Ghosh (1997) found that ISO registration was very slow prior to 1993; the first firm was registered in 1989, then another firm in 1990 and a third one in 1991. In 1993, the registration process accelerated with 22 firms during that year, followed by 15 in 1994. In Thailand, Krasachol *et al.* (1998) found that registration of ISO effectively began in 1992 (5 firms), in 1993 there were 10 firms, then a larger number of 49 firms in 1994. During 1995 and 1996, they found that 70 and 73 firms were registered to ISO 9000 respectively. The findings of Turkey and Thailand support the findings of this study very closely.

7.9 TQM in ISO 9000 Registered Firms:

Although ISO 9000 is supposed to be a TQM element, firms in Saudi Arabia implement other features that are not included in ISO. ISO 9000, for example, does not include issues of quality culture nor employee involvement, and therefore, firms might find it necessary to implement quality elements other than those included in ISO 9000. Some firms incorporated some other elements without declaring a TQM programme, and they are named Non-TQM firms. On the other hand, some firms declare the implementation of TQM that includes ISO 9000 and they are named TQM firms. In this study, firms were asked if they had TQM in addition to ISO or not. The results are shown in Table 7.16 and Figure 7.10.

Table 7.16 TQM in ISO 9000 registered firms

ISO 9000 Firms	**Frequency**	**%**
TQM Firms	29	34.9
Non-TQM Firms	54	65.1
Total	**83**	**100.00**

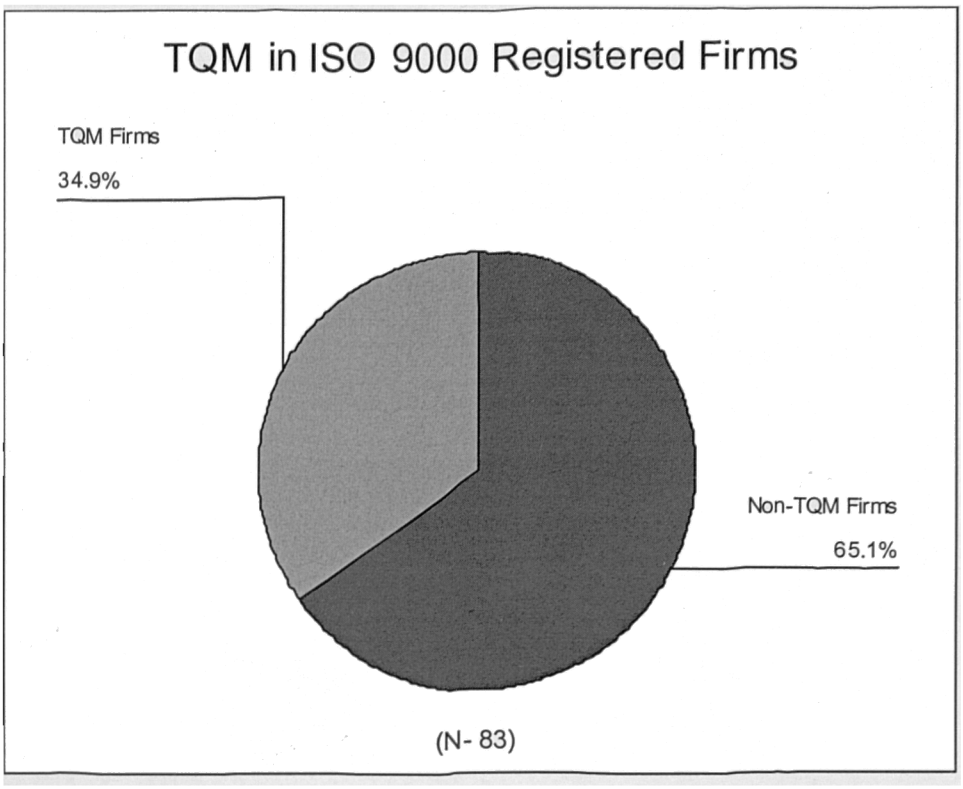

Figure 7.10 TQM and Non-TQM firms among ISO 9000 registered firms

Table 7.16 shows that the majority of ISO 9000 registered firms, or two thirds (54 firms) were not TQM firms, representing 65.1% of all firms in the study. TQM firms numbered 29, or a third, representing 34.9% of all ISO 9000 registered firms in Saudi Arabia.

As a matter of comparison, Taylor and Meegan (1997), in their study of ISO 9000 registration in the UK, found that among ISO 9000 registered firms, 67.8% had only ISO 9000, whereas 32.2% combined ISO 9000 and TQM. The findings of Saudi Arabia supported these of the UK, where the results are very close. In a study of the Eastern Province industries of Saudi Arabia, Andijani and Selim (1996) found that 47%

of factories had implemented TQM whereas the remaining ones had not. This study, however, was for all industries and was not exclusive to ISO 9000 registered firms. The findings in Saudi Arabia, that about 35% of ISO registered firms implemented TQM in addition to ISO, supported the discussion included in Chapter five about TQM and ISO 9000. Almost all of the scholars mention that ISO is limited, and therefore there is a need to go beyond it, such as Fox (1994), Corrigan (1994), Arora (1996), and Lal (1996), among others, have done.

7.9.1 TQM and Non-TQM by Size of Firms:

In order to find out the distribution of TQM and Non-TQM firms by size of firms, a cross-tabulation was carried out to investigate this matter. Table 7.17 and Figure 7.11 show the relationship between TQM implementation among ISO 9000 firms and the size of the firms in the study.

Table 7.17 Distribution of TQM and Non-TQM by Size of firms

Size of Firms	TQM Firms		Non-TQM Firms		Total	
	Freq.	%	Freq.	%	Freq.	%
1-100	4	22.2	14	77.8	18	100.00
101-300	4	12.1	29	87.9	33	100.00
301 or more	21	65.6	11	34.4	32	100.00
Total	29	34.9	54	65.1	83	100.00

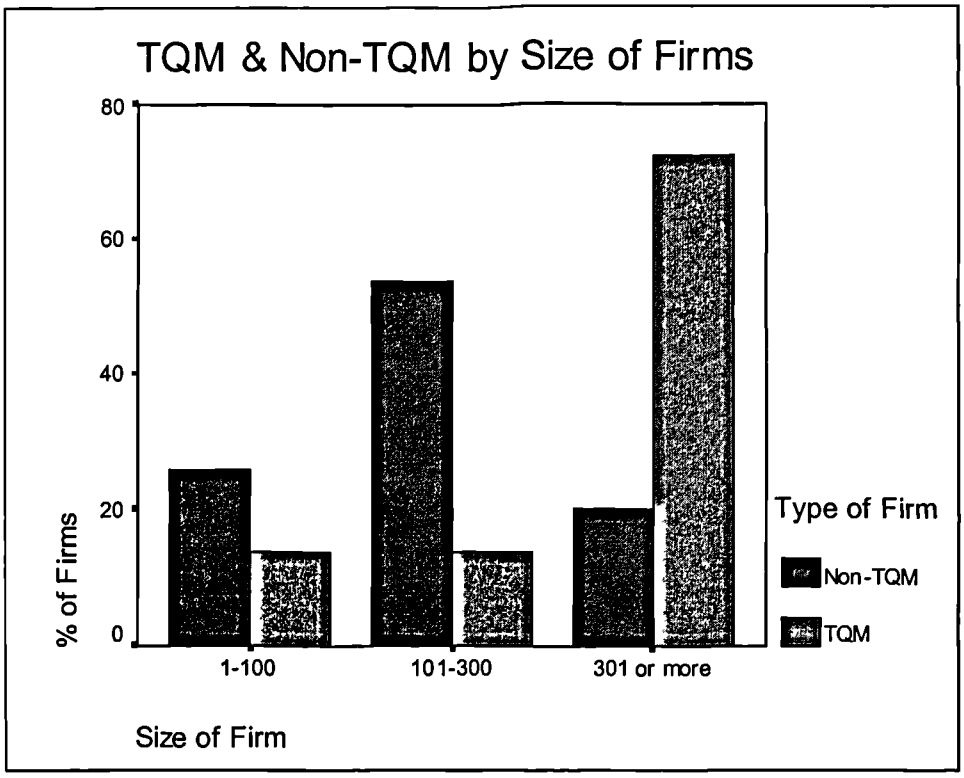

Figure 7.11 Distribution of TQM and Non-TQM by size of firms

Table 7.17 shows that, the vast majority (65.6%) of the largest firms (more than 301 employees) were implementing TQM, and the remaining 34.4% were not TQM firms. In the medium-sized firms (101-300 employees), Non-TQM firms were the majority, representing almost 88% of firms in that category. In the smallest size of less than 100 employees, Non-TQM firms were the majority as well, representing 77.8% of this category. The conclusion of this cross-tabulation between TQM in ISO 9000 registered firms and the size of firms is that large firms tend to implement TQM in addition to ISO 9000. Conversely, small firms tend not to implement TQM in addition to ISO 9000. It is maybe reasonable, as a matter of speculation, to find large ISO firms implementing TQM as a more comprehensive way of handling quality. Large corporations usually invest large amounts of capital and have sophisticated systems for quality. Such firms may consider ISO to be only a complementary part of their quality system.

The Saudi Petrochemical Company (Sadaf), one of the firms surveyed, has implemented TQM as a comprehensive system, to carry out their quality plans starting from the top and continuing all the way down their organisation. Sadaf's TQM programme consists of three major parts. First, there is the Quality Steering Team (QST), which provides overall leadership for the TQM process. Second, it includes five TQM committees; awareness, recognition, education and training, measurement, and quality assurance systems (ISO 9002). The third component of TQM is Quality Improvement Teams (QMTs).[10] In addition, the Eastern Petrochemical Company (Sharq), another Sabic surveyed firm, implemented ISO 9002 as part of their TQM programme as shown in Figure 7.12.

[10] Saudi Petrochemical Company (Sadaf) (1993) *Company Publications*, Jubail, The Kingdom of Saudi Arabia, (p.10)

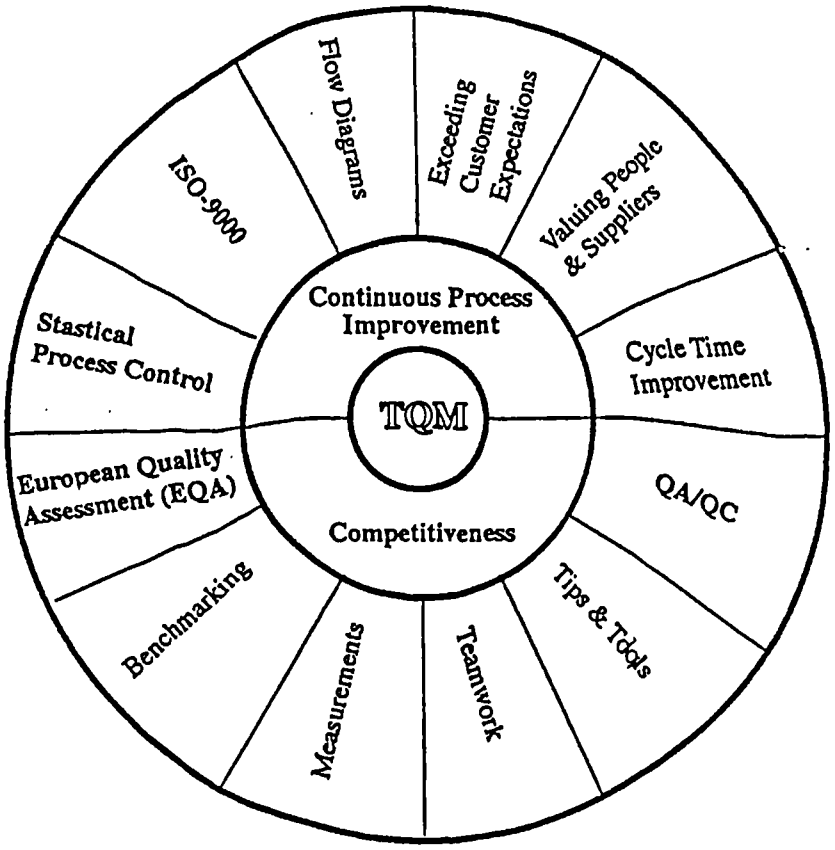

Figure 7.12 TQM programme of the Eastern Petrochemical Company (Sharq)
Source: Eastern Petrochemical Company (Sharq) (1998) Quality Management, Facilitator's Manual, (p.27).

The Eastern Petrochemical Company is a joint venture between Sabic and a consortium of Japanese companies led by the Mitsubishi Corporation. Al-Gahtani[11] (1998) stated that "people misunderstood ISO activities and compared it as an equivalent to TQM; although ISO is just one of the components of a TQM approach."

[11] Al-Gahtani, Saeed D., Quality Dept. Manager of Eastern Petrochemical Co. in clarification notes that accompanied the questionnaire to the researcher, dated 17-10-1998, (p.3).

Because the issue of ISO and TQM together is sometimes vague, Harrison[12] (1998) stated that "unless companies take a strategic view that they are not going to get ISO and embark on a TQM programme directly, ISO and TQM are not mutually exclusive. We based all our management systems on ISO as a precursor to TQM".

7.9.2 TQM vs. Non-TQM among Sabic Firms:

In order to differentiate between the 12 Sabic firms and the other firms that participated in the study in their implementing of TQM, a cross tabulation was conducted for this purpose. Table 7.18 and Figure 7.13 show the distribution of Sabic and other firms in implementing TQM or not, being either TQM or Non-TQM firms.

Table 7.18 Sabic and other firms in TQM vs. Non-TQM firms

ISO 9000 Firms	TQM		Non-TQM		Total	
	Freq.	%	Freq.	%	Freq.	%
Sabic Firms	10	83.3	2	16.7	12	100.00
Other Firms	19	26.8	52	73.2	71	100.00
Total	29	34.9	54	65.1	83	100.00

[12] Harrison, Ian, Business Improvement Manager of The National Titanium Dioxide Co. in clarification notes that accompanied the questionnaire to the researcher, dated 25-10-1998.

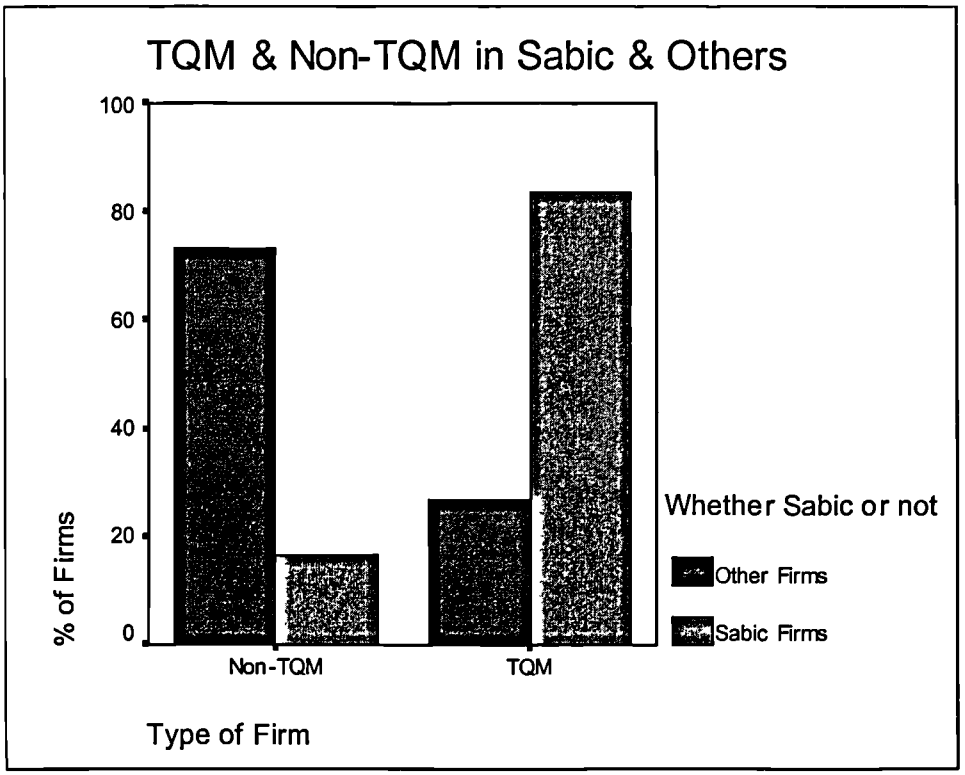

Figure 7.13 Distribution of Sabic firms and others between TQM and Non-TQM firms

Table 7.18 shows that 83.3% of Sabic's firms (10 firms) have implemented TQM with ISO 9000 as a major part of their quality system. The remaining 2 Sabic firms did not implement TQM, representing 16.7% of all Sabic firms included in the study. On the other hand, 26.8% of Non-Sabic firms (19 firms) have implemented TQM, and the majority of such firms (52 firms) did not have TQM programmes, representing 73.2% of non-Sabic firms. The conclusion of this cross-tabulation is that Sabic firms tend to implement TQM in addition to ISO 9000 since the vast majority of firms have done so. Conversely, other firms tend not to implement TQM in addition to ISO 9000 since the majority of them did not implement TQM.

7.10 Registration by City and Region:

This section deals with the distribution of ISO 9000 registered firms among the cities and the regions of Saudi Arabia. Table 7.19 and Figure 7.14 show the distribution of ISO 9000 registered firms among the Saudi cities.

Table 7.19 Distribution of ISO 9000 registered firms across Saudi cities

The City	Frequency	%	Region
Jeddah	27	32.5	Western
Riyadh	18	21.7	Riyadh (Middle)
Jubail	14	16.9	Eastern
Dammam	12	14.5	Eastern
Yanbu	10	12.0	Western
Al-Kharj	1	1.2	Riyadh (Middle)
Al-Khobar	1	1.2	Eastern
Total	**83**	**100.00**	

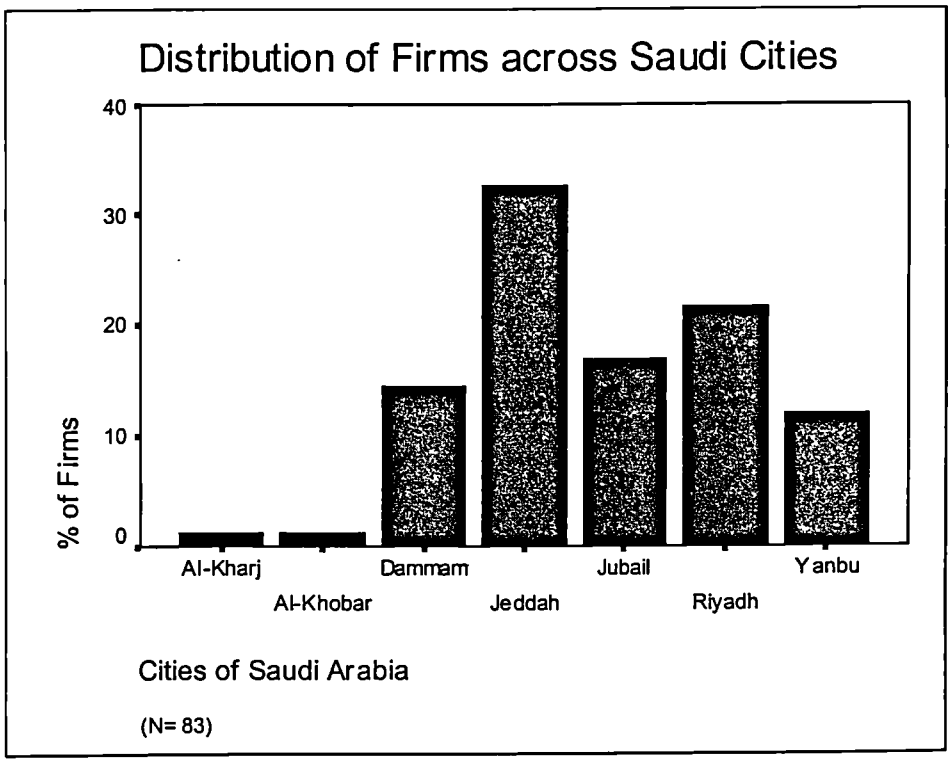

Figure 7.14 Distribution of ISO 9000 registered firms across Saudi cities

Table 7.19 shows that the largest number of firms (27) were located in Jeddah, in the Western Region by the Red Sea, representing more than a third of all ISO 9000 registered firms in Saudi Arabia (32.5%). The capital of Saudi Arabia, Riyadh, came second, having 18 firms and representing 21.7% of the total. Jubail, the home of most Sabic companies, came third, housing 14 firms registered to ISO 9000 and thus representing 16.9% of all firms. Dammam, the capital of the Eastern Region, ranked fourth in ISO 9000 implementation in the Kingdom with 12 firms, representing 14.5% of all ISO firms in the country. Yanbu in the Western Region by the Red Sea had 10 firms registered to ISO 9000, representing 12% of ISO firms. Finally, both Al-Kharj and Al-Khobar had one firm each, representing 1.2% of ISO 9000 firms in the country. Generally, the most important industrial cities in the Kingdom are Jeddah, Riyadh, Dammam, Yanbu, and Jubail. Jubail and Yanbu house very large, specialised factories and heavy industries.

In addition, a classification of ISO 9000 registered firms by the regions of Saudi Arabia is presented in this section. There are three major industrial regions in Saudi Arabia, Riyadh (Middle), Western and Eastern. The results are shown in Table 7.20 and Figure 7.15.

Table 7.20 Distribution of ISO 9000 firms by Saudi regions

Geographic Regions	**Freq.**	**%**
Western	37	44.6
Eastern	27	32.5
Middle	19	22.9
Total	**83**	**100.00**

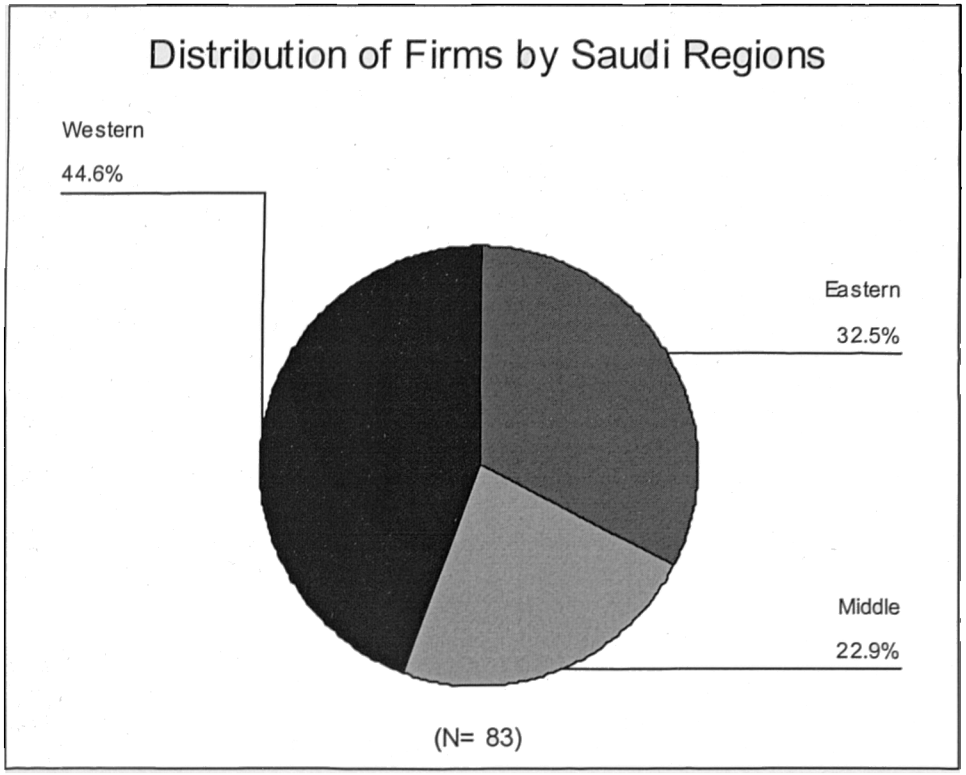

Figure 7.15 Distribution of ISO 9000 registered firms by Saudi regions

From Table 7.20, it can be seen that the Western Region, which includes Jeddah and Yanbu as its main industrial cities, ranked top with 37 firms, representing 44.6% of all ISO 9000 registered firms. The Eastern part of the Kingdom came second with 27 firms that were registered to ISO 9000, representing 32.5% of all firms. The Eastern Region, located by the Arabian Gulf, includes Al-Khobar, Dammam and Jubail. The third ranked region in Saudi Arabia in implementing ISO 9000 was Riyadh, in the middle of the country, with 19 firms representing 22.9% of all firms in the country. The Middle of the country comprises both Riyadh and Al-Kharj. It should be mentioned that these findings are based on the data collected, thus some other firms may well have registered to ISO certificates, but we do not know about them. However, since the firms that did not respond are distributed across cities and regions, we could say that the

percentages in those findings represent the whole population and closely represent reality.

In order to find out the distribution of the cities' registered firms across Saudi regions, a cross-tabulation was performed between city and region. The purpose here is to find the percentage each city represented in its region. Table 7.21 and Figure 7.16 show this cross-tabulation.

Table 7.21 Distribution of cities' registration by Saudi regions

No	Saudi Regions	% of registered firms in Saudi Cities						
		City	%	City	%	City	%	Total
1	Western	Jeddah	73.0	Yanbu	27.0	NA	NA	100.00
2	Eastern	Jubail	51.9	Dammam	44.4	Al-Khobar	5.3	100.00
3	Middle	Riyadh	94.7	Al-Kharj	5.3	NA	NA	100.00

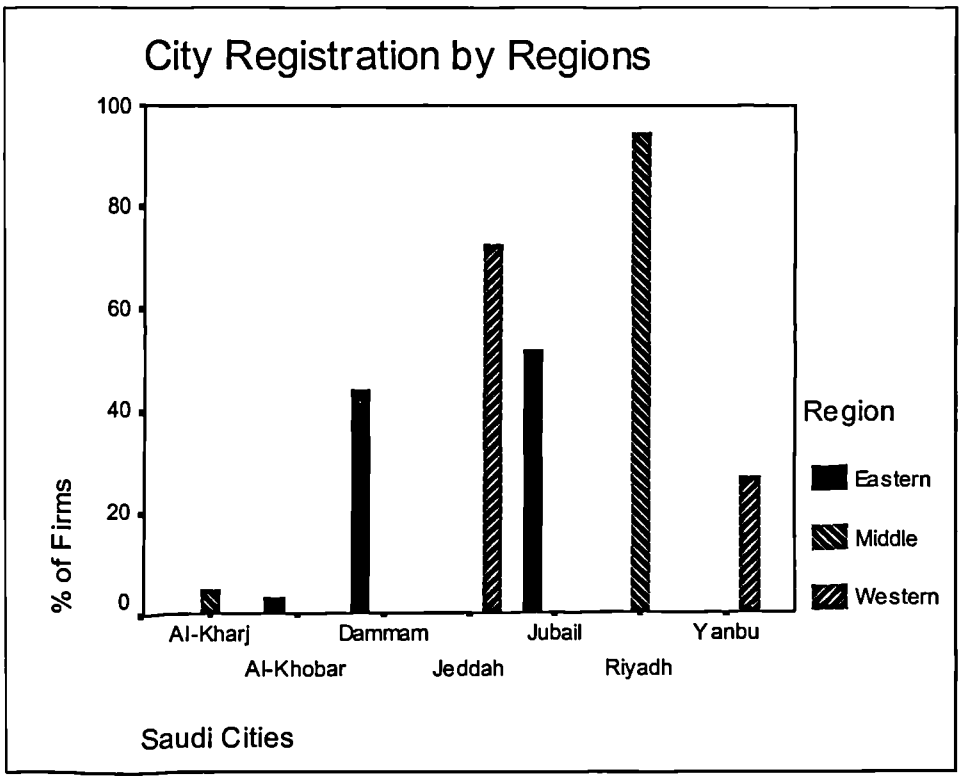

Figure 7.16 Percentage of a city's registered firms in each region

In Table 7.21 is evident that in the Western Region, Jeddah had 73% of ISO registered firms and Yanbu had 27%. Regarding the Eastern Region of Saudi Arabia, Jubail housed more than half of its firms (51.9%), Dammam had 44.4% and Al-Khobar had a small fraction of 5.3%. In the middle part of the country, Riyadh had the vast majority of ISO 9000 registered firms, representing 94.7%, while Al-Kharj had only one firm, representing 5.3% of the region's firms.

7.11 Summary:

This chapter covered the different aspects of the characteristics of ISO 9000 registered firms in Saudi Arabia. It included the features of firms that might have had some relevance to ISO 9000 implementation. The chapter classified the surveyed firms in terms of sector, size, employees in quality-related positions, ownership, involvement in export, scope, and period of registration, TQM vs. Non-TQM firms and finally the distribution of the firms across the different cities and regions of Saudi Arabia. In addition, the chapter included some cross-tabulations among those characteristics to find relationships among them. The relationship between the different sizes of firms and some of those characteristics was also included in the chapter. Due to the existence of 12 Sabic firms, the chapter included some classifications of and connections between those firms and the whole population in the study. When possible, a comparison between Saudi industries and other industries in other countries was conducted. A summary of this chapter will be included in the conclusion chapter (Chapter ten). The next chapter will continue the coverage of data analysis and discussion, presenting the quality system elements of ISO 9000 registered firms in Saudi Arabia.

CHAPTER EIGHT

QUALITY SYSTEM ELEMENTS

CHAPTER EIGHT

QUALITY SYSTEM ELEMENTS

8.1 Introduction:

This is the second chapter of data analysis and discussion, investigating the quality system elements of ISO 9000 registered firms in Saudi Arabia. Some of those elements or their sub-elements are covered by ISO 9000 requirements while others are not. Those elements are people issues, customer focus, product issues, tools for quality improvement, quality culture, and measuring performance in the organisation. In addition, the chapter includes a comparison between TQM and Non-TQM firms in executing those elements. Finally, a conclusion that sums the major findings of the chapter is included.

8.2 People Issues:

This section consists of the following subjects; top management commitment, teams and committees for quality, employee involvement, and general training for quality.

8.2.1 Top Management Commitment:

Sub-clause 4.1.2 of ISO 9001 (1994)[1] provides a general coverage of parts of management responsibility for quality, although it specifies "the management representative" who is usually the quality manager of the firm. However, the requirements could be applied to top managers in the organisation. Sub-clause 4.1.2.2 demands that the firm should provide adequate resources for quality. Moreover, Sub-clause 4.1.3 demands that the firm should review the quality system to ensure its

[1] ISO 9001 and ISO 9002 are identical in all clauses except in design where ISO 9001 covers it and 9002 does not. In this research, ISO 9001 will be mentioned as a reference for all discussion.

continuing suitability and effectiveness. In this question, respondents were asked to state the degree of their agreement or disagreement on a 5 point Likert-type of scale. Table 8.1 shows the results from the respondents concerning their senior managers' treatment of quality.

Table 8.1 Top management commitment to quality

No	Statements	Valid %					Mean	Std. Dev.
		SA	A	N	D	SD		
1	Senior managers provide adequate resources to improve quality	47.0	49.4	2.4	1.2	---	4.4217	.6073
2	Senior managers identify their quality goals and objectives clearly	50.6	36.1	12.0	1.2	---	4.3614	.7421
3	Senior managers devote time to quality	42.2	51.8	4.8	1.2	---	4.3494	.6331
4	Senior managers review progress in quality matters	43.4	49.4	6.0	1.2	---	4.3494	.6521

The scale is 5 = strongly agree (SA), 4 = agree (A), 3 = neither agree nor disagree (N), 2 = disagree (D), and 1 = strongly disagree (SD) for 83 firms.

From Table 8.1, it can be seen that the commitment of the senior managers in ISO 9000 registered firms in Saudi Arabia is high, scoring more than 4 in all six top management elements. The commonest practise was that senior managers provided adequate resources to improve quality where 47% of respondent said that they strongly agreed and 49.4% agreed on this element. The second most acknowledged element of commitment was that senior managers clearly identified their quality goals and objectives. More than half of the respondents said that they strongly agreed, while approximately 36% agreed with this statement. Devoting time to quality and monitoring progress came third and fourth respectively in senior managers commitment to quality. It should be mentioned here that such results are generally high which might not represent a true picture of the commitment of senior managers to quality. It is possible that some respondents, being quality managers, are members of the senior management team and therefore they evaluated themselves higher than what they really

were. Another reason is related to the culture and the nature of the people in the east, who usually do not like to criticise their superiors.

We can compare these results with the findings of Honey (1994) who surveyed 416 firms in Texas. She found that less than 1% of respondents indicated that there was no support, 10.5% little support, 27.6% some support, 38.2% much support, and 23.3% stated that they had full support. The findings of this study support those from Texas, but in the case of the Saudi firms, the support was overwhelming. In addition, these results from the Saudi industry support the claims of Evans and Lindsy (1993), Hradesky (1995), and Oakland (1996), who stress the importance of the full support of top management for the success of quality implementation. They also support Point 7 of Deming (1982), and Point 1 of Crosby (1979; 1984) for the institution of leadership and top management commitment.

8.2.2 Teams and Committees for Quality:

The question about committees and teams was a yes / no type since a firm either used the type of team or did not. Such teams or committees are not covered by ISO 9000 clauses. The results are presented in Table 8.2.

Table 8.2 Teams and committees for quality

No.	Teams and Committees	Yes		No	
		Freq.	%	Freq.	%
1	Steering committee	74	89.2	9	10.8
2	Problem-solving teams	67	81.7	15	18.3
3	Cross-functional teams	52	62.7	31	37.3
4	Quality Circles	33	39.8	50	60.2

From the table, it can be seen that steering committees in ISO 9000 registered firms represented the most used, with 74 firms using such committees, representing almost 90% of all firms. Problem-solving teams that were related to quality were the second most used in the firms under study, with almost 80% of firms using such teams to solve their quality problems. The third most used type of teams were cross-functional teams among departments, with almost 60% of firms using such teams and the remainder not. Finally, quality circles were the least used type of teams, where the majority of firms (60%) did not use them and 40% did. Some respondents mentioned that they had different names for the problem-solving teams such as Corrective Action Teams (CAT), and Trouble Shooting Committees (TSC).

The use of teams and committees in Saudi industry was not overwhelming, and thus does not support the claims of Dean and Evans (1994) that the success of TQM depends on the interdependence of the different parts through use of teams, and Point 9 of Deming (1982). Moreover, problem-solving teams corresponded with error-cause removal team (Point 2) of Crosby (1979; 1984). As a matter of comparison, Lascelles and Dale (1989) found that quality circles in the UK were used in approximately 17% of firms on the shop floor and to a lesser extent among the staff, which is substantially lower than those of Saudi Arabia (39.8%). However, the firms in the UK were not necessarily registered to ISO 9000, and quality circles are more famous in Japan not in the western countries, which might have contributed to this small percentage. Another finding by Krasachol *et al.* (1998), surveying both ISO and Non-ISO registered firms in Thailand, indicated the use of quality circles in exactly 39% of firms, which was almost the same percentage as in Saudi Arabia (39.8%). The findings of this study of quality circles do not support Ishikawa' s (1985) claim about the necessity for quality circles,

nor the opinion of Ho (1995b; 1996; 1999), who considers quality circles as a component of his model TQMEX.

8.2.3 Employees Involvement:

This question was about measuring the extent to which line workers were involved in quality. The question was designed on a 5 point Likert scale. The results are shown in Table 8.3.

Table 8.3 Practices of employee involvement in quality

No	Practices	Valid %					Mean	Std. Dev.
		SA	A	N	D	SD		
1	Line workers are encouraged to inspect the quality of their products and fix any problems	55.4	36.1	4.8	2.4	1.2	4.4217	.7982
2	Training and technical assistance are available to line workers to solve quality-related problems	49.4	36.1	8.4	4.8	1.2	4.2771	.9014
3	Management generally encourages rewards, accepts, evaluates, and implements employee suggestions in quality matters.	39.8	42.2	12.0	4.8	1.2	4.1446	.8989
4	Line workers are given the necessary resources to solve any quality problems that may arise	36.1	43.4	9.6	8.4	2.4	4.0241	1.0118

The scale is 5 = strongly agree (SA), 4 = agree (A), 3 = neither agree nor disagree (N), 2 = disagree (D), and 1 = strongly disagree (SD) for 83 firms.

The table illustrates that, the most common practice of involvement was that line workers were encouraged to inspect and fix quality problems, with 55.4% of respondents saying that they strongly agreed and almost 36% agreed on this practice. Providing training and technical assistance to line workers to solve any quality problems was the second most common practice of employee involvement among ISO 9000 registered firms in Saudi Arabia. Almost 50% of quality managers said that they strongly agreed and 36% agreed on this practice in their firms. The third most common

practice of employee involvement was that management encouraged and supported suggestions related to quality. Among respondents, almost 40% strongly agreed and 42.2% agreed on this matter. Finally, providing the needed resources to line workers to solve quality problems was the least adopted practice of employee involvement. Almost 36% of respondents said that they strongly agreed and 43.4% agreed on this practice.

These figures of employee involvement were generally high which meant that ISO 9000 registered firms tend to empower their employees to solve quality problems, supporting the claims of Dean and Evans (1994) who state that empowerment contributes significantly to the quality of products.

8.2.4 General Training for Quality:

Clause 4.18 of ISO 9001 (1994) demands that firms should identify training needs. The clause requires firms to provide training for all employees whose activities affect quality. Al-Henaihin (1998), an ISO 9000 auditor at SASO, mentioned that training should be provided by a recognised training agency. He added that the training agency or personnel are treated as service suppliers, and therefore auditing procedures for them as any other supplier are observed. This question investigated general training subjects, excluding ISO 9000 training, which will be dealt with separately in the ISO 9000 analysis (Chapter nine). The question included 12 training subjects and asked for any additional ones that respondents had used in their firms. The results are shown in Table 8.4.

Table 8.4 General training subjects (excluding ISO 9000 training)

No.	Training Subjects	Yes		No	
		Freq.	%	Freq.	%
1	Process improvement	65	80.2	16	19.8
2	Leadership training for middle managers and supervisors in how to build quality environment	61	75.3	20	24.7
3	Team building skills (e.g. interpersonal skills and communication)	55	67.1	27	32.9
4	Problem-solving training	52	64.2	29	35.8
5	Defect prevention	50	63.3	29	36.7
6	Statistical Process Control	47	59.5	32	40.5
7	TQM training	46	55.4	37	44.6
8	Customer care training	45	54.9	37	45.1
9	Quality costs training	45	54.9	37	45.1
10	Benchmarking	39	48.1	42	51.9
11	Process analysis training (e.g. systematic improvement model and measurement systems)	38	46.9	43	53.1
12	Design for manufacturing	37	45.1	45	54.9

The table shows that, the most frequently adopted training subject among firms was process improvement training, where almost 80% of respondents said that they included it. More than three-quarters of quality managers said that they employed leadership training for middle managers and supervisors. The third most frequently used training subject was team building training where over 67% of respondents used it and the remaining did not. Training for Statistical Process Control (SPC) was harnessed by approximately 60% of respondents, and 40% did not carry out SPC training. This is a large percentage of firms (40%) which were not training for SPC, since the use of these techniques is considered important to quality.

TQM training was incorporated by more than 55% of firms (46 firms), which was higher than the proportion of TQM firms in the total of ISO 9000 registered firms in Saudi Arabia (29 firms). This could mean that some of firms practised TQM training,

although they did not adopt the concept of Total Quality Management. TQM includes many elements that are useful to the quality system, therefore, TQM training could be helpful even to firms that do not implement or declare that they implement TQM. Benchmarking training was ranked 10th among training subjects with over 48% of firms (39 firms) providing this type of training. 42 firms used benchmarking, which means that 39 out of the 42 firms that used benchmarking did in fact have benchmarking training. The majority of firms, or more than half, did not have benchmarking training. The least used training subject was design for manufacturing, where almost 55% of firms did not have this type of training. This finding was expected since most of the firms studied were either joint ventures who were importing the design from abroad, or Saudi firms buying the patent for manufacturing their products from international corporations.

Quality managers of ISO 9000 registered firms added at the end of the question some training subjects that their firms practised. Two firms mentioned that they used safety training, and another firm included what they termed "hazard analysis critical continuous points", which was apparently a type of safety training. One respondent said that his firm had some additional training programmes, such as process safety, risk management, loss prevention, and corrosion control.

8.3 Customer Focus:

This section includes the following subjects; meeting customer demands, measuring customer satisfaction, and customer supplier relations. Among these methods, only the third one is covered by ISO 9001 (1994).

8.3.1 Meeting Customer Demands:

The question regarding meeting customer demands was designed on a Likert scale of 5 points, and asked quality managers to state how often they practised elements related to meeting customer demands. Table 8.5 shows the findings of the question.

Table 8.5 The firms' practices to meet customer needs

No	Methods of Identification	Valid %					Mean	Std. Dev.
		A	O	S	R	N		
1	Distribute customer requirements to all parts of the organisation	51.2	22.7	22.0	3.7	2.4	4.1463	1.0438
2	All departments participate in developing products	40.2	30.5	20.7	3.7	4.9	3.9756	1.0997
3	The use of Quality Function Deployment (QFD)	35.4	20.7	13.4	9.8	20.7	3.4024	1.5544

The scale is 5 = always (A), 4 = often (O), 3 = sometimes (S), 2 = rarely (R), and 1 = never (N) for 83 firms.

From the table, it can be seen that the highest practice among firms under study was the distributing of customer requirements to all parts of the organisation. This practice had always been performed by more than half of the respondents (51.2%), and 22.7% said that they did so often. This practice is highly rated since the mean is more than 4, which could indicate the frequency with which most of the respondents did. This finding is logical, since the most important thing in meeting the demands of the customers is first identifying the demands, and second, meeting them through the manufacturing of products that are designed to do so. The second highest practice in meeting customer demands is that all departments participated in developing products. Among quality managers in Saudi Arabia, 40.2% said that they had always participated in this and almost a third of them (30.5%) had done so often.

The use of Quality Function Deployment (QFD) was relatively low compared to the previous two techniques in the firms under study. Some respondents in small firms even wrote question marks, indicating that they did not know what this practice meant. Almost one third of quality managers (35.4%) said that this practice had always been carried out and 20.7% had used it often. A relatively high percentage of respondents (20.7%) said that they had never practised QFD at all, and almost 10% had used it rarely. The finding of the Saudi industry does not support the claims of Lockamy and Khurana (1995), who praise the use of QFD in the organisation.

8.3.2 Measuring Customer Satisfaction:

Quality managers of ISO 9000 registered firms were asked about the methods that they were using to measure customer satisfaction. The question was designed on a 5 point Likert type scale. Table 8.6 shows their answers in percentages and shows the mean and the standard deviation of each method.

Table 8.6 Methods for measuring customer satisfaction

No	Methods	Valid %					Mean	Std. Dev.
		A	O	S	R	N		
1	Customer complaints	89.0	8.5	1.2	1.2	---	4.8537	.4746
2	Customer returns	45.6	25.3	16.5	3.8	8.9	3.9494	1.2598
3	Feedback from salespersons or sales agents	40.7	27.2	16.0	4.9	11.1	3.8148	1.3239
4	Market share	30.0	35.0	21.3	8.8	5.0	3.7625	1.1278
5	Financial results	44.3	20.3	10.1	8.9	16.5	3.6709	1.5168
6	Customer survey results	16.3	23.8	35.0	16.3	8.8	3.2250	1.1690
7	Customer satisfaction index	16.7	25.6	15.4	20.5	21.8	2.9487	1.4224
8	Focus groups	10.4	22.1	18.2	13.0	36.4	2.5714	1.4366
9	Warranty costs as a percentage of sales	10.4	19.5	14.3	16.9	39.0	2.4545	1.4377

The scale is 5 = always (A), 4 = often (O), 3 = sometimes (S), 2 = rarely (R), and 1 = never (N) for 83 firms.

From the table, it is apparent that the commonest method used by firms was customer complaints, where almost 90% of respondents always practised it as a means of measuring customer satisfaction. No single firm had not used this method as a way of evaluation and only around 1% of firms had used it rarely. The second most frequent method of measuring customer satisfaction was customer returns, but this was far behind the first method. Among the respondents, 45.6% said that they had always practised this method and almost a quarter had done so often. Feedback from salespersons ranked third, where 40.7% of respondents said that they had always employed it and 27.2% had used it often.

Among the least used methods for measuring customer satisfaction (sixth in rank) was customer survey results, a common practice in the less developed countries. This method was always employed by almost 16% and often used by 23.8%, and more than a quarter of respondents said either they had not practised it before or used it rarely. A customer satisfaction index was not practised very often although it is a very useful tool. Focus groups were penultimate, where only 10.4% always adopted this method and 22.1% often used it, representing a mean of 2.57, which is considered low. Finally, focus groups and warranty costs as a percentage of sales came last as method of measuring customer satisfaction in Saudi Arabia. Warranty issues are not important in the developing countries, and in many cases, final customers do not receive compensation when are not compensated when warranty problems occur in general. In addition, sometimes the customers are not aware of their legal rights in liability or warranty issues. Most importantly, the regulations and laws in the developing countries do not regulate warranty and liability matters clearly and decisively.

Quality managers added some other methods that their firms adopted in order to measure customer satisfaction. An electronic firm was using six sigma quality statistics and a paint manufacturing firm was analysing feedback from seminars and presentations. A Sabic petrochemical firm included inventory rate and operation level as two means of measuring the satisfaction of its customers. The use of repeat orders was focused on by a can manufacturing firm; the more often any customer repeated orders, the more they considered such a customer to be satisfied. Finally, the quality manager of a Sabic petrochemical firm mentioned that they had technical and marketing meetings with their marketers each quarter. It should be mentioned here that all firms that had additional methods of measurement were joint ventures.

8.3.3 Customer-Supplier Relations:

Evaluating the Performance of Suppliers:

Sub-clause 4.6.2 of ISO 9001 (1994) demands the evaluation of suppliers (subcontractors), their quality system and any specific quality assurance requirements. This question related to methods or criteria used by ISO 9000 registered firms in Saudi Arabia to evaluate their suppliers. The results are shown in Table 8.7, ranked on the basis of their importance to respondents.

Table 8.7 Criteria and methods used to measure and evaluate a supplier's performance

No.	Criteria and Methods	Yes		No	
		Freq.	%	Freq.	%
1	Credible, timely delivery	78	94.0	5	6.0
2	The quality of suppliers' products	75	93.8	5	6.3
3	By number of rejects and defects	66	79.5	17	20.5
4	Using vendor rating system	61	73.5	22	26.5
5	Supplier's financial capabilities	41	50.0	41	50.0
6	Evaluating suppliers subjectively	39	49.4	40	50.6
7	Supplier's engineering capabilities	40	48.2	43	51.8
8	Using failure mode and effect analysis	24	28.9	59	71.1

The table shows that the most important criterion for evaluating suppliers' performance was credible, timely delivery of goods, representing 94% of respondents. Quality of a supplier's products came just slightly after the delivery of goods, representing 93.8% of firms. The credible delivery of goods was more important than the quality of the products in ISO 9000 registered firms. Almost 80% of respondents said that they used the number of defective goods as a means of measuring and evaluating suppliers' capabilities. The fourth most important method was the use of a vendor rating system, representing 73.5% of respondents. Evaluating the suppliers' financial and engineering capabilities were not important criteria when assessing suppliers. Finally, almost 60% of firms did not use failure mode and effect analysis, which is considered a more advanced statistical tool for evaluating suppliers.

Respondents answering the questionnaires were asked to add any other criteria or methods they had used to evaluate their suppliers. Five respondents said that they audited the quality systems of their suppliers as a way of ensuring the effectiveness of the quality systems. The auditing of suppliers' quality systems is one way of evaluating them, which is legitimate under Sub-clause 4.6.2 demanding evaluating suppliers' abilities to meet sub-contract agreements, including their quality systems. Three of the quality managers said that they considered the obtaining of an ISO 9000 certificate as one means of evaluating their suppliers. Another quality manager said that they checked the history of suppliers when dealing with others in the market as a way of evaluating them. Finally, "tonnage of rejects against tonnage consumed" was an expression used by one of the respondents, which was probably the same as number of rejects but as a percentage of the non-defective or used goods.

As a matter of comparison, Lascelles and Dale (1989) conducted a study in the UK of three groups of suppliers that were not necessarily ISO 9000 registered. The average use of vendor rating systems was 58.7% compared to 73.5% of respondents in the case of Saudi Arabia. The use of failure and mode effect analysis in Saudi Arabia was substantially lower than that of the UK. The Saudi figure was almost 29% compared to 44% in the UK.

Relations with Suppliers:

This question addressed the relations of ISO 9000 firms with their suppliers. The question was designed on a scale of 3 points asking quality managers to state how often they applied five quality attributes relating to their relations with suppliers. The results are shown in Table 8.8.

Table 8.8 Quality attributes of relations with suppliers

No.	Attributes	Valid %			Mean	Std. Dev.
		Often	Sometimes	Never		
1	Provided suppliers with clear product specification data	69.9	26.5	3.6	2.6627	.5472
2	Established long-term contracts with suppliers	45.8	43.4	10.8	2.3494	.6705
3	Provided technical assistance to suppliers	32.5	30.1	37.3	1.9518	.8396
4	Had joint quality planning with suppliers	20.3	45.6	34.2	1.8608	.7291
5	Relied on relatively few dependable suppliers	25.9	27.2	46.9	1.7901	.8324

The scale is 3 = Often, 2 = Sometimes, and 1= Never, for 83 firms.

It can be seen from the table, that the most commonly used relationship attribute was that of providing suppliers with clear product specification data. Almost 70% of respondents said that they had practised it often and 26.5% of them sometimes. This attribute is a Sub-clause 4.6.3 of ISO 9001 (1994), which demands the clarification of purchasing data in Sections a, b and c, asking for very precise data to be included. This

high percentage of positive responses indicates a reasonable compliance to the standard, and those ISO 9000 firms were aware of the importance of clarifying purchasing data. Establishing long-term contracts with suppliers was the second most used attribute, where approximately 46% of respondents had employed this often and over 43% of them sometimes. More than 60% of ISO 9000 registered firms provided technical assistance (often and sometimes) to their suppliers and around 11% of them did not. Approximately two thirds of respondents said that they had joint quality planning with their suppliers and a third of them did not. Finally, more than half of the respondents relied on a relatively small number of suppliers, while the other half of them did not.

Items 3, 4, and 5 in Table 8.8 show a lack of co-operation with suppliers and non-reliance on a smaller number of suppliers. These figures do not support the claims of Dean and Evans (1994) regarding the use of those techniques. Lascelles and Dale (1989), in their study of three groups of UK suppliers, found that the percentages of firms having joint quality planning with suppliers were 66%, 62.5%, and 63.1%, respectively. The average use of joint quality planning with suppliers was 63.8% in the UK. In Saudi Arabia, the use of joint quality planning with suppliers was almost 66% (combined 20.3% and 45.6%), which was slightly higher than in the UK.

Evaluation of Relations with Suppliers under the ISO 9000 Scheme:

This question dealt with the evaluation of ISO 9000 regarding its effects on relations with suppliers, including seven elements that were used by Naidu *et al.* (1996) in their study in Wisconsin, USA. Quality managers of ISO 9000 registered firms were asked to state their agreement or disagreement on a five-point scale. The results are shown in Table 8.9.

Table 8.9 Managing relations with suppliers under ISO 9000 scheme

No	Statements	Valid %					Mean	Std. Dev.
		SA	A	N	D	SD		
1	The firm had criteria for removing suppliers from lists if their performance was found to be unsatisfactory	38.6	55.4	1.2	3.6	1.2	4.2651	.7664
2	ISO improves the selection process of suppliers	28.9	60.2	7.2	3.6	---	4.1446	.7007
3	ISO ensures that only materials that meet our specifications are purchased	39.8	43.4	6.0	8.4	2.4	4.0964	1.0075
4	The firm monitors and assesses the quality system and the financial situation of its suppliers	12.0	61.4	13.3	12.0	1.2	3.7108	.8769
5	ISO will increase competition among suppliers	14.5	51.8	22.9	9.6	1.2	3.6867	.8825
6	The purchased materials from ISO firms are of higher quality than those of the non-ISO firms	8.4	36.1	32.5	18.1	4.8	3.2530	1.0102
7	ISO procedures lengthen the time for suppliers verification process	2.4	25.3	13.3	48.2	10.8	2.6024	1.0585

The scale is 5 = strongly agree (SA), 4 = agree (A), 3 = neither agree nor disagree (N), 2 = disagree (D), and 1 = strongly disagree (SD) for 83 firms.

The table shows that, more than 94% of the respondents strongly agreed or agreed (combined together) that they had criteria for removing suppliers from their lists when their performance was found to be unsatisfactory. This high percentage could mean that Sub-clause 4.6.2 of ISO, which demands the evaluation of sub-contractors, was fully adhered to with by firms in Saudi Arabia. In the second statement, approximately 90% of quality mangers strongly agreed or agreed that ISO improves the selection process of suppliers. Approximately 83% of ISO 9000 firms strongly agreed or agreed that ISO ensures that only materials that meet the desired specifications are purchased. This finding could mean that the process of verification of purchased product by suppliers, under Sub-clause 4.6.4 and clause 4.7, was effective. In addition, more than 73% of the respondents strongly agreed or agreed that their firm evaluated and assessed the quality systems and financial capabilities of their suppliers, as a requirement of Sub-clause 4.6.2 of ISO 9000. As to whether ISO was likely to increase competition among suppliers, approximately 66% of the respondents strongly agreed or agreed on this

matter. However, about 23% of them were not sure, while more than 10% disagreed or strongly disagreed. Regarding whether the materials purchased from ISO firms were of higher quality than the materials purchased from non-ISO firms, more than 44% of firms strongly agreed or agreed on this matter. However, a third of the respondents were confused, and therefore neither agreed nor disagreed, while more than 23% disagreed or strongly disagreed on this matter. This considerable percentage (44%) who agreed may have connected ISO with good and reputable firms, meaning that ISO was usually implemented by such firms in the market. Nevertheless, the firms that agreed were not the majority. Finally, more than 28% of the respondents believed that ISO procedures for verifying suppliers required a longer time and thus made the process more lengthy. However, the majority of respondents (59%) did not think so, and 13.3% were unsure.

These findings do not support the findings of Naidu *et al.* (1996) in Wisconsin in the US; all Saudi findings were significantly higher. This indicates that the Saudi respondents were more enthusiastic about and satisfied with ISO 9000, regarding quite highly the management of suppliers' relations under ISO 9000 scheme. Quality managers in Saudi Arabia looked to ISO more positively than did their counterparts in the US based on the study of Naidu *et al.* (1996).

8.4 Product Issues:

This section includes three subjects; identification of products, inspection and testing, and non-conformity of products.

8.4.1 Identification of Products:

Identification of Products during Manufacturing:

Clause 4.8 of ISO 9001 (1994) requires that there should be some kind of product identification during manufacturing. This question included three means of product identification; namely: serial number, lot identification, and production date code. Since the firms surveyed were from different sectors of activity, "another" method was included so those respondents could write about any others they used. Table 8.10 depicts the results of methods for product identification during manufacturing.

Table 8.10 Identification methods of products during manufacturing

No	Methods of Identification	Valid %					Mean	Std. Dev.
		A	O	S	R	N		
1	Lot identification	73.2	4.9	7.3	---	14.6	4.2195	1.4489
2	Production date code	73.5	4.8	2.4	2.4	16.9	4.1566	1.5419
3	Serial number	57.8	2.4	3.6	2.4	33.7	3.4819	1.8764

The scale is 5 = always (A), 4 = often (O), 3 = sometimes (S), 2 = rarely (R), and 1 = never (N) for 83 firms.

The table shows that the most commonly used practice among all firms was the lot identification method; more than 73% of the respondents employing this method said that they always used it and almost 5% often, with the highest mean of 4.21. Some respondents said that they used the term "Batch no." instead of lot number. The second most used method was production date code where 73.5% of the respondents using this method mentioned that they always used it, but almost 17% said that they never did so. The third most practised method for the identification of products was the use of a serial number, coming a distant third with a mean of almost 3.5, which indicates that this method has not been employed often. One respondent in a beverage can factory indicated that they used lot identification on each pallet and a production date code on each exported good. Another quality manager in a can-making firm noted that they

used a serial number on each can. It should be mentioned here that any firm could adopt more than one method at the same time.

Quality managers in ISO 9000 registered firms in Saudi Arabia mentioned other methods for identifying products during manufacturing, as shown in Table 8.11. Each firm has its own system and procedures for identifying its products. ISO 9000 auditors do not demand a certain type of identification. Instead, they make sure that each firm identifies its products properly, as Al-Henaihin (1998) of SASO mentioned to the researcher.

Table 8.11 Other identification methods of products during manufacturing

No.	Methods of Identification	Freq.	Sector of Activity
1	Colour code	2	Paints manufacturing (both)
2	Contract no.	2	1 Electronics and 1 Ceramic firm
3	Shade, Grade	1	Ceramic
4	Drawing no.	1	Electronics
5	Drum / Spool / Reel no.	1	Cables
6	Formula code & label colour	1	Foodstuff
7	Heat number	1	Steel rolling
8	Machine code & operator initials	1	Can making
9	Mix design no.	1	Building materials
10	Move tickets & staging tickets	1	Steel office furniture
11	Product name	1	Chemicals & Petrochemicals
12	Product specification sheet	1	Paints manufacturing
13	Production site	1	Chemicals & Petrochemicals
14	Purchase order	1	Aerospace accessories
15	Quality control report	1	Chemicals & Petrochemicals
16	Work order no.	2	1 Metal & 1 Aerospace accessories

From Table 8.11 it can be seen that firms use different methods of identification on their products based on their circumstances and the nature of their activities. Paint manufacturing firms sometimes used a colour code as a means of identification, while others, such as ceramic firms, used shade and grade. In the cable sector, a firm used

drum, spool or reel numbers as identification methods during manufacturing. A steel rolling firm used heat number, since this method is perhaps the most appropriate to its operation.

Identification of Products during Inspection:

During the inspection of products, firms usually use some kind of identification method to facilitate the process. This identification means that such a product is under inspection and testing for quality. Those identifiers sometimes remain attached even after such products have been dispatched from the firms. Similar to the case of identification during manufacturing, the researcher included four methods in order to identify products under inspection and testing. Table 8.12 shows the results of this question on a five-point scale.

Table 8.12 Identification methods of products during inspection and testing

No	Methods of Identification	Valid %					Mean	Std. Dev.
		A	O	S	R	N		
1	Labels attached to products	66.3	8.4	6.0	---	19.3	4.0241	1.5771
2	Use of specific physical location	53.7	13.4	6.1	4.9	22.0	3.7195	1.6501
3	Tags attached to products	48.8	6.1	11.0	1.2	32.9	3.3659	1.8020
4	Routing cards	35.8	8.6	3.7	6.2	45.7	2.8272	1.8493

The scale is 5 = always (A), 4 = often (O), 3 = sometimes (S), 2 = rarely (R), and 1 = never (N) for 83 firms.

From the table we notice that the most frequently used method of identification of products during inspection was the attachment of labels. This method was chosen by 66.3% of respondents as being always used. The designation of a special location for inspection was the second most used method of identification during the process. Exploiting locations was chosen by 53.7% of quality managers as always used, with the second highest mean of almost 3.7. The third method was the use of tags attached to

products, where almost half of the respondents said that they always used it but 33% said they never used it. Finally, the use of routing cards as a means of identification during inspection was the least used method, with a mean of 2.8 out of 5. It should be mentioned here that any firm could choose more than one method at the same time. For instance, sometimes, a label is attached to the product and at the same time there is a special location for this product during the inspection process.

Firms occasionally used additional means of identification for their products during the inspection process. Quality managers were asked to add any other methods at the end of the question. Table 8.13 shows the methods that were added by respondents as alternative means of identifying products during inspection.

Table 8.13 Other identification methods of products during inspection and testing

No.	Methods	Freq.	Sector of Activity
1	A computerised system	1	Cables
2	Batch sheets	2	1 Chemical and 1 Petrochemical
3	Chalk marking in process	1	Metal
4	Control release form	1	Foodstuff (Dairy)
5	Inject printing of outer packaging	1	Cartons (Packaging)
6	Ink printed on cans	1	Petroleum
7	Inspection reports	1	Chemicals
8	Lab test report (results and stamp)	2	1 Petroleum and 1 Petrochemicals
9	Off / On specification forms	1	Petrochemical
10	Product specification sheet	3	2 Paint firms and 1 Ceramics
11	Sample checks / audits	1	Can making
12	Stamps	1	Electronics

From the table it can be seen that there are different types of product identification were used under inspection and testing. A Saudi cable company, a very large organisation located in Jeddah, adopted a fully computerised inspection system. Two (chemical and

petrochemical) firms used batch sheets as a way of additional identification during the inspection process. A metal firm making iron and steel used chalk to mark bars and other metal products during inspection. In addition, a joint venture firm manufacturing grease and oil products used ink to mark cans. Another point to be worth mentioning from the table (8.13) is that a petroleum firm and a petrochemical firm used lab test results during the inspection process. Those types of firms make products that are usually tested in a laboratory for conformity to specifications. The Saudi Petrochemical Company (Sadaf), a Sabic petrochemical firm, used Off / On inspection forms, which deal with the compliance of products to specifications. Another three firms used product specification sheets during the inspection process. The first two were joint venture firms manufacturing paints while the third one was making ceramics (bathroom accessories). Paint firms used specification of products apparently from their foreign partners. Finally, an electronics firm used stamps as a mean of identification during the inspection of its sensitive products.

8.4.2 Inspection and Testing:

Phases of Inspection and Testing:

Clause 4.10 of ISO 9001 (1994) requires firms to establish and document procedures for inspection and testing in order to verify that the specified requirements for the product are met. The clause includes three phases of the inspection of products and materials depending on the stage of production. Phase one, the inspection of incoming materials under Sub-clause 4.10.2, requires that the firm should not use incoming materials until they have been inspected or it has otherwise been verified that such materials conform to specifications. Phase two, in-process inspection and testing under Sub-clause 4.10.3, requires the inspection of the product during manufacturing. The

third phase of inspection is final inspection and testing under Sub-clause 4.10.4, which requires that firms should undertake testing of finished products to ensure their compliance to the specified requirements. The sub-clause also demands that products should not be dispatched until inspection activities have been satisfactorily completed. Table 8.14 shows the results of the question about those phases in ISO 9000 registered firms in Saudi Arabia.

Table 8.14 Inspection and testing phases

No	Phases of Inspection	Valid %					Mean	Std. Dev.
		A	O	S	R	N		
1	Inspection of incoming products and Materials	86.7	9.6	2.4	1.2	---	4.8193	.5214
2	In-process inspection	90.4	8.4	1.2	---	---	4.8916	.3496
3	Finished good inspection	96.4	3.6	---	---	---	4.9639	.1878

The scale is 5 = always (A), 4 = often (O), 3 = sometimes (S), 2 = rarely (R), and 1 = never (N) for 83 firms. Phases are arranged by sequence and not by higher means.

The table shows the degree of sampling during inspection at each stage of manufacturing. The most frequently used method was the inspection of finished goods, with 96.4% of firms always inspecting finished products and 3.6% of firms inspecting them often. Those findings show a very high inspection rate for finished goods among the firms under investigation. The second most used type of inspection was in-process, which occurred during the manufacturing of products, where 90.4% of firms always did it and 8.4% practised it often. The inspection of incoming materials was the third most used type of inspection, with 86.7% of firms, always doing so and almost 10% often. We notice that this type of inspection had rarely been performed in 1.2%, or in one firm. No respondents said that they never inspected products.

As a matter of comparison, Lascelles and Dale (1989) investigated the three phases of inspection in the UK among three groups of firms. They found that 90.6% of firms performed an inspection of incoming products. Inspection of products during manufacturing was performed by 86.1% of firms. They found that final inspection was conducted by 90.6% of firms. Although those percentages were slightly lower than those found in Saudi Arabia, the Saudi results were, in general, consistent with this former study.

Methods of Inspection and Testing:

Sub-clause 4.10.4, which was mentioned in the previous section, demands the final inspection of goods. However, it does not specify or recommend the methods of inspection that should be undertaken, taking into consideration the nature of each product, which might require a certain type of testing. Table 8.15 shows the different inspection and testing methods used by ISO 9000 registered firms in Saudi Arabia.

Table 8.15 Methods of inspection and testing of products

No	Methods of Inspection	Valid %					Mean	Std. Dev.
		A	O	S	R	N		
1	Automated inspection (using inspection equipment)	58.8	23.8	8.8	1.3	7.5	4.2500	1.1638
2	Manual inspection (including the use of human senses)	62.2	12.2	15.9	3.7	6.1	4.2073	1.2043
3	Computer-aided inspection	23.5	14.8	13.6	6.2	42.0	2.7160	1.6676

The scale is 5 = always (A), 4 = often (O), 3 = sometimes (S), 2 = rarely (R), and 1 = never (N) for 83 firms.

The methods used in this question may overlap, meaning that a firm could use more than one method of inspection during any stage of manufacturing. The table (8.15) shows that the most frequently used means of inspection among ISO 9000 registered firms was the automated method, which utilised equipment for testing. This method

was always practised by approximately 60% of the respondents and often by about 24%. The second method was manual inspection, with approximately 62% of quality managers saying that they always used it, 12% often and almost 16% sometimes. The least employed method of inspection was that involving computers, with 23.5% of the respondents always using it but 42% never used computerised testing.

The use of computers did not necessarily mean that the firm tested its products entirely by computer, but it may mean, as one respondent said, that firms used the computers one way or another to facilitate the testing process. Nevertheless, some firms in the study had a fully computerised system for inspection, as in the case of the Saudi Cable Company and some Sabic firms. Moreover, the degree of computer use during inspection could be understood through the scale employed in the question; always, often, sometimes, rarely, and never.

At the end of the question, the respondents were asked to add whether there were any other methods for inspection used. Two steel firms said that they used NDE and NDT tests (Non Destructive Exams and Tests) on welds to examine their strengths under certain pressure. A pipe and vessels manufacturing firm used non-destructive methods of inspection, which refers to the measurement of resistance to pressure. In addition, two paint manufacturing firms had tests to measure the length of the time their paints could last under different environmental conditions. Finally, a joint venture firm producing petroleum products, such as oil, grease, diesel, and benzene, inspected products by taking a stream from their operations and analysing it for conformity to specifications. In a related issue, the quality manager of a petrochemical firm said that

they did a double check of inspection by a department other than the production one, which could mean another production line.

Inspection and Testing Equipment:

Clause 4.11 of ISO 9001 (1994) demands the establishment of documented procedures for inspection and testing equipment. Control and maintaining testing equipment is demanded by Sub-clause 4.11.1, where the establishment of a record for testing equipment is demanded by Sub-clause 4.10.5, both of ISO 9001. Table 8.16 shows the results of the question about such equipment.

Table 8.16 Inspection and testing equipment

No.	Criteria of inspection and testing equipment	Yes		No		Not applicable	
		Freq.	%	Freq.	%	Freq.	%
1	The existence of inspection equipment	81	97.6	2	2.4	---	---
2	Control & maintain testing equipment	81	97.6	1	1.2	1	1.2
3	Keeping record of testing equipment	80	96.4	2	2.4	1	1.2

From the table it is apparent that the vast majority of firms (97.6%) had inspection and testing equipment, while only two firms (2.4%) did not. All firms that had testing equipment had established systems for controlling and maintaining such equipment as a requirement of ISO 9000 standards (item 2). In addition, all firms that had testing equipment had established records, except one firm, which might question its compliance to the standard. The absence of a system of controlling and maintaining testing equipment or the absence of a record for the equipment might be a major non-conformity to the standard in both cases. Generally, the firms complied with ISO 9000 concerning those two points. Registration agencies visited ISO registered firms twice a year for assessment, and therefore compliance, based on their answers, seemed to be

satisfactory. It is assumed that the registration agencies would have allowed the absence of major requirements such as those included in this question.

8.4.3 Calibration of Inspection and Testing Equipment:

Sub-clause 4.11.2 of ISO 9001 (1994) covers in general the calibration process of inspection and testing equipment. Sections b and c of this sub-clause cover the calibration of equipment in a specific manner. The result of the question concerning calibration is presented in Table 8.17.

Table 8.17 Calibration of inspection and testing equipment

Criteria of Calibration	**Freq.**	**Valid %**
Calibrated inside the firm only	8	9.8
Calibrated outside the firm only	5	6.1
Calibrated both inside and outside the firm	68	82.9
Not applicable	1	1.2
Total	**82**	**100.00**

From the table, it can be seen that all firms that had testing equipment (81 firms) calibrated their equipment to comply with ISO requirements, as described earlier. The calibration of testing equipment is mandatory under Sub-clause 4.11.2. Therefore, this high level of compliance is normal, since registration agencies in their surveillance visits would not have allowed such a violation of the standard to occur. Two firms were mentioned in Table 8.16 as not having testing equipment. One of these answered not applicable, and the missing value was for the other firm.

Some testing equipment was small and easy to calibrate inside the firms, while others had to be calibrated by outside agencies. Only 8 firms calibrated all of their equipment

inside their firms only and without external help, accounting for 9.8% of firms with testing equipment. On the other hand, 5 firms said that they calibrated all of their equipment outside their firms, and they never calibrated inside. The majority of firms (68) mentioned that they calibrated some of their equipment inside and some outside, making the greatest percentage of almost 83% of firms with testing equipment.

One quality manager noted that they calibrated 40% of their equipment inside their firm and 60% outside. Nine respondents noted that they calibrated some inside and some outside without specifying the percentages. Two paint manufacturing firms said that they calibrated one piece of equipment outside and the rest inside their firms. The quality manager of a metal firm in Jeddah said that they calibrated equipment outside when they did not have the technical ability to do so inside. It should be mentioned here that outside-calibration does not necessarily mean sending equipment elsewhere, but indicates the involvement of an external calibration agency.

Calibration of Equipment by SASO:[2]

In industry, some equipment should be calibrated by outside firms in SASO or any other calibration agencies. The reason is that sometimes calibration equipment is very sensitive and should work in a controlled environment that has stability in terms of temperature, humidity, and air pressure. Vibration in factories sometimes affects calibration accuracy. On the other hand, some equipment has to be calibrated inside firms for two reasons. Firstly, some equipment should be calibrated in its normal environment since it might give different readings outside the firms. Secondly, large

[2] This section is based on an interview conducted with Tamis Al-Hammadi (1999), a calibration specialist at the Saudi Arabian Standards Organisation (SASO).

equipment such as a mechanical force machine and weighing bridges, because of their huge size, cannot be moved to calibration agencies.

After calibration, three outcomes occur regarding the calibration process. When successful, a calibration certificate is issued within the error limit according to the relevant standard identifying the accuracy of the equipment and calibration standard deviation and uncertainty. The second outcome of the calibration process is when equipment exceeds the error limit slightly. In such cases, the firm is given a provisional certificate to be reviewed in due course. In the case of equipment failing completely, a failure report is given.

SASO provides a calibration certificate that is accepted by registration agencies of ISO 9000 since SASO is the national certified body in the country. The cost of calibration is according to the accuracy of the equipment, the capability of equipment, the number of pieces of the equipment, and if calibrated inside or outside the firm. SASO usually sends one or two specialists to firms to conduct the calibration process. Al-Hammadi (1999) mentioned that not only does SASO engage in calibration in the country, but also other agencies operate in Saudi Arabia.

8.4.4 Non-Conformity of Products:

Non-conformity or non-compliance occurs when the product does not meet product specifications, as dealt with in general by Clause 4.13 of ISO 9001 (1994). The five requirements that are included in this question are dealt with under Sub-clause 4.13.1, and are identification, documentation, evaluation, segregation, and the notification of the manufacturing unit of the non-conforming products. The question related to the

compliance to a very important part of ISO 9000. Therefore, positive responses were expected to be high, as those requirements are mandatory and ignoring them leads to a major nonconformity to the standard. The results are shown in Table 8.18.

Table 8.18 Non-conformity of products

No	Non-conformity criteria	Valid %					Mean	Std. Dev.
		A	O	S	R	N		
1	Identify non-conforming products	97.6	2.4	---	---	---	4.9759	.1543
2	Document the non-conformity	95.2	3.6	---	---	1.2	4.9157	.4738
3	Evaluate the non-conformity	92.7	6.1	1.2	---	---	4.9146	.3221
4	Notify the responsible manufacturing unit	90.2	8.5	1.2	---	---	4.8902	.3516
5	Segregate non-conforming products where practical	92.8	2.4	2.4	---	2.4	4.8313	.6953

The scale is 5 = always (A), 4 = often (O), 3 = sometimes (S), 2 = rarely (R), and 1 = never (N) for 83 firms.

From the table it can be seen that compliance to the standard was high, and this is expected since such requirements are required by Sub-clause 4.13.1, which demands the execution of the five requirements for non-conforming products. Only one firm (1.2%) said that they did not document the non-conforming products. The quality manager of the Eastern Petrochemical Company (Sharq) mentioned the procedures for notifying the unit that had manufactured the defective product. He wrote that when the product is identified as an OFF-SPEC [off specifications], the production department is informed immediately through a Local Area Network (LAN) using an integrated system called SAP. He added that the observation of compliance to the standard is usually performed twice a year by registration agencies during surveillance visits. Therefore, it is unlikely to find much non-conformity to the standard, especially in this important issue (defective products), as he claimed.

Dealing with Non-Conforming Products:

Sub-clause 4.13.2 of ISO 9001 (1994) demands that firms, when discovering non-conforming products, should review the non-conformity and take action. This question concerned the alternatives that firms use in cases of discovering non-conformities. The question mentioned three alternatives, but asked respondents for any additional methods since Sub-clause 4.13.2 does not demand specific action but suggests different alternatives that might be taken. Table 8.19 depicts the results of that question.

Table 8.19 Alternative actions for non-conforming products

No	Actions	Valid %					Mean	Std. Dev.
		A	O	S	R	N		
1	Rework them to meet the specific requirements	22.0	42.7	26.8	---	8.5	3.6951	1.0851
2	Reject them (e.g. Scrap or recycle them)	17.1	9.8	48.8	22.0	2.4	3.1707	1.0400
3	Use them for other alternatives	6.1	9.8	41.5	25.6	17.1	2.6220	1.0731

The scale is 5 = always (A), 4 = often (O), 3 = sometimes (S), 2 = rarely (R), and 1 = never (N) for 83 firms.

From the table, it can be seen that the most frequently occurring alternative practised when dealing with non-conforming products was that firms reworked them to meet the specific requirements, with 22% of respondents saying they always selected this method and 42.7%, often. The second most common alternative was the rejection of the non-conforming product completely without trying to fix the problem. In that case, the firm would either scrap the product or might recycle it if possible, depending its nature. For this latter alternative, almost 17% of quality managers said that they always chose it and almost 10%, often, but the majority said they did it sometimes. Some firms petrochemical companies mentioned that they blended their defective products. The quality manager of a dairy products firm mentioned that they reprocessed the non-conforming products, which was just another way of recycling. The final alternative of

dealing with defective goods was to use such products for other purposes. It might be hard for such firms to use the defective goods in other alternatives, and therefore the minority of firms used this alternative.

Respondents, at the end of the question were asked to add any other alternative they might have practised when dealing with non-conforming products. Six respondents mentioned the establishment of a concession agreement between the manufacturer and the customer. This alternative is covered by Sub-clause 4.13.2, which includes the concession agreement to be considered as an alternative solution. This means that an agreement is established between the manufacturer and the customer so that the latter accepts the defected good as it is with either monetary compensation or other type of benefit. Finally, an atmospheric gas manufacturer chose the ventilation of non-conforming products without benefiting from those gases in any way.

Quality managers added some useful comments concerning non-conforming products in their firms. The quality manager of a chemical firm said that they considered first reworking the product; if this is not possible, then they considered the other alternatives. Two respondents noted that when dealing with non-conforming products, depending on whether the defect is minor or severe, it should be acted upon. In an advanced electronics manufacturer, the quality manager said that they had very tough procedures when dealing with non-conformity. This behaviour is understandable since that specific firm manufactures some very important military parts for the government, which require the very highest degree of precision.

8.5 Tools for Quality Improvement:

In this section, three subjects are covered: qualitative tools, Statistical Process Control (SPC), and benchmarking.

8.5.1 Qualitative Tools:

This question was about how frequently respondents used qualitative tools that are, in fact, often used by employees in the quality field. The researcher presented 7 qualitative methods and asked respondents to add any other techniques. BS 7850 (1992) Total Quality Management, Parts 1 and 2 (1992) recommends six qualitative tools to help in dealing with quality matters. Those tools are affinity diagrams, benchmarking, brainstorming, cause-and-effect diagrams, flow charts, and tree diagrams. All of them were used in this study (benchmarking is used separately). Task lists and multi-voting are used in this study as additional tools other than those of BS 7850. The results are shown in Table 8.20.

Table 8.20 Qualitative tools used in ISO 9000 registered firms

No	Qualitative Tools	Valid %					Mean	Std. Dev.
		A	O	S	R	N		
1	Task lists (Check lists)	38.6	31.3	18.1	6.0	6.0	3.9036	1.1647
2	Flow Charts	33.7	32.5	21.7	4.8	7.2	3.8072	1.1735
3	Brainstorming	22.0	17.1	32.9	4.9	23.2	3.0976	1.4282
4	Cause-and-effect diagram	14.5	13.3	22.9	21.7	27.7	2.6506	1.3919
5	Tree diagrams	4.9	12.3	17.3	16.0	49.4	2.0741	1.2726
6	Multi-voting	2.4	11.0	12.2	22.0	52.4	1.8902	1.1440
7	Affinity diagram	2.5	5.0	7.5	18.8	66.3	1.5875	1.0024

The scale is 5 = always (A), 4 = often (O), 3 = sometimes (S), 2 = rarely (R), and 1 = never (N) for 83 firms.

The table shows that the most commonly used tool was task lists, with 38.6% of respondents saying that they always used them and almost 31%, often. The use of task lists was high since the average was almost 4 out of 5 points on the Likert scale (3.9). Task lists are normally a very practical tool, since they organise someone's daily

functions and ensure that the work is systematically executed in a smooth fashion. Flow charts were the second most adopted qualitative tool where almost a third of the respondents said that they always used them and another third often used them. The adoption of flow charts was also common with a mean of 3.8 out of 5, which is considered high. Flow charts are just another way of organising tasks and jobs but in charts rather than lists as is the case with task lists, and this might have contributed to the high usage of these charts among respondents. The third qualitative tool was brainstorming but here one third of the respondents said that they used it sometimes, while more than 23% never used it.

Cause-and-effect diagrams and tree diagrams were both practised on a less than average basis since the means of both tools were less than 3 on the Likert scale. The use of tree diagrams was rare on average since the mean here was almost 2 out of 5 points. Almost half of the quality managers never used tree diagrams in planning and executing quality matters. Multi-voting and affinity diagrams were used by quality managers very rarely, with 52.4% and 66.3% of respondents, respectively, never using them.

The Eastern Petrochemical Company (Sharq), a Saudi-Japanese, joint venture type of firm, had used additional qualitative tools to those used in the questionnaire. Those techniques are Beliefs Process, Criteria Rating Form, Interviewing, Is / Is not Analysis, Nine-Block, and Story-Board technique. A brief definition of each technique is presented in Table 1, Appendix F.

Modarress and Ansari (1989) and Scheuermann *et al.* (1997) conducted two studies in the USA, investigating the use of both qualitative and quantitative tools. The results of

both are presented in Table 2, Appendix F with both qualitative and SPC techniques. From the table (Part 1), it can be seen that some results are close to Saudi results and some are not. The use of task lists, flow charts, and cause-and-effect diagrams in Saudi Arabia is substantially greater than in both those studies. The practice of brainstorming in Saudi Arabia was almost the same as in the results found by Scheuermann *et al.* (1997), 76.2% and 75% respectively. The use of multi-voting and affinity diagrams in Saudi Arabia was higher than that in the findings of Scheuermann *et al.*'s (1997) study. It should be mentioned that the study in Saudi Arabia was exclusive to ISO 9000 registered firms, while the other two studies were not. The conclusion that might be drawn from this comparison is that ISO 9000 registered firms in Saudi Arabia used qualitative tools more than did the firms in those two studies in the USA. One reason that might have caused this difference is that the firms in the USA represented a cross-section of industries, while the Saudi firms were registered to ISO and among the elite firms in the country.

8.5.2 Statistical Process Control (SPC):

Clause 4.20 of ISO 9001 (1994) covers statistical techniques and requests the firm to identify needs for statistical techniques. However, ISO does not specify certain types of statistical techniques. Conversely, BS 7850, Parts 1 and 2 (1992) suggests some techniques to be used, including control charts, histograms, Pareto diagrams, and scatter diagrams. All of them have been used in the questionnaire in this study, while sampling inspection, Taguchi methods and Shingo methods have been added. The results of this question are presented in Table 8.21.

Table 8.21 Statistical Process Control techniques used in ISO 9000 registered firms

No	SPC Tools	Valid %					Mean	Std. Dev.
		A	O	S	R	N		
1	Sampling inspection	46.3	30.5	11.0	3.7	8.5	4.0244	1.2270
2	Control charts	40.2	23.2	15.9	9.8	11.0	3.7195	1.3723
3	Histograms	18.3	17.1	17.1	15.9	31.7	2.7439	1.5138
4	Pareto diagrams	8.8	17.5	15.0	17.5	41.3	2.3500	1.3971
5	Scatter diagrams	4.9	8.6	29.6	13.6	43.2	2.1852	1.2259
6	Taguchi methods to improve process efficiency	2.4	2.4	8.5	11.0	75.6	1.4512	.9316
7	Shingo error-proofing to prevent error in process design	---	3.7	3.7	8.5	84.1	1.2683	.7036

The scale is 5 = always (A), 4 = often (O), 3 = sometimes (S), 2 = rarely (R), and 1 = never (N) for 83 firms.

The table shows that the most commonly used technique was sampling inspection, where 46.3% of respondents said that they always used it and 30.5%, often. This high percentage was probably because this technique is associated with inspection and testing products and materials, which is one of the most used functions in quality. The use of control charts was the second most used technique, with more than 40% of the quality managers saying that they always used it and approximately 23%, often. The use of histograms was third, Pareto diagrams fourth, and scatter diagrams was the fifth most used technique. The use of Taguchi and Shingo methods was very low: more than 75% said that they never used the first method and about 84% of respondents said they never used the second.

The quality manager of the Eastern Petrochemical Company (Sharq) added a tool that they use called CPI and Business Process Mapping which involves drawing diagrams. All of their processes are supported by a narrative which explains who does the job and his authorities. He added that the objectives of this type of quantitative tool is "check points", as he put it. Another technique used by this company was the Gantt chart to help to plan and schedule activities efficiently to meet schedule goals.

Similar to the case of qualitative tools, we can compare the findings in Saudi Arabia with those of Modarress and Ansari (1989) and Scheuermann *et al.* (1997) in the use of SPC in the USA. Table 2, Appendix F presents a comparison of the three studies. From the table (Part 2) it is apparent that sampling inspection, histograms, and Pareto diagrams in Saudi Arabia were almost the same as those of Modarress and Ansari (1989). The use of control charts in Saudi Arabia was higher than that found by Scheuermann *et al.* (1997). In addition, the use of scatter diagrams in Saudi Arabia was substantially higher than that of the other two studies. The use of SPC techniques in Saudi Arabia was close to the two studies in general, although the Saudi study was exclusive to ISO 9000 registered firms. Another study that was not included in Table 7, Appendix F was that of Krasachol *et al.* (1998), surveying ISO and Non-ISO firms in Thailand. They found that 63% of such firms used Taguchi methods, which was substantially higher than the percentage in Saudi Arabia (24.4%).[3]

8.5.3 The Use of Benchmarking:

The use of benchmarking is not mentioned in ISO 9000. However, BS 7850, Parts 1and 2 (1992) suggests benchmarking as non-numerical tool of TQM in the organisation. The results of using benchmarking are shown in Table 8.22 and Figure 8.1.

Table 8.22 Use of Benchmarking among ISO 9000 registered firms

The Use of Benchmarking	**Freq.**	**%**
Yes	42	50.6
No	41	49.4
Total	**83**	**100**

[3] This percentage is a result of combining the percentages of Always, Often, Sometimes, and Rarely in Table 8.21.

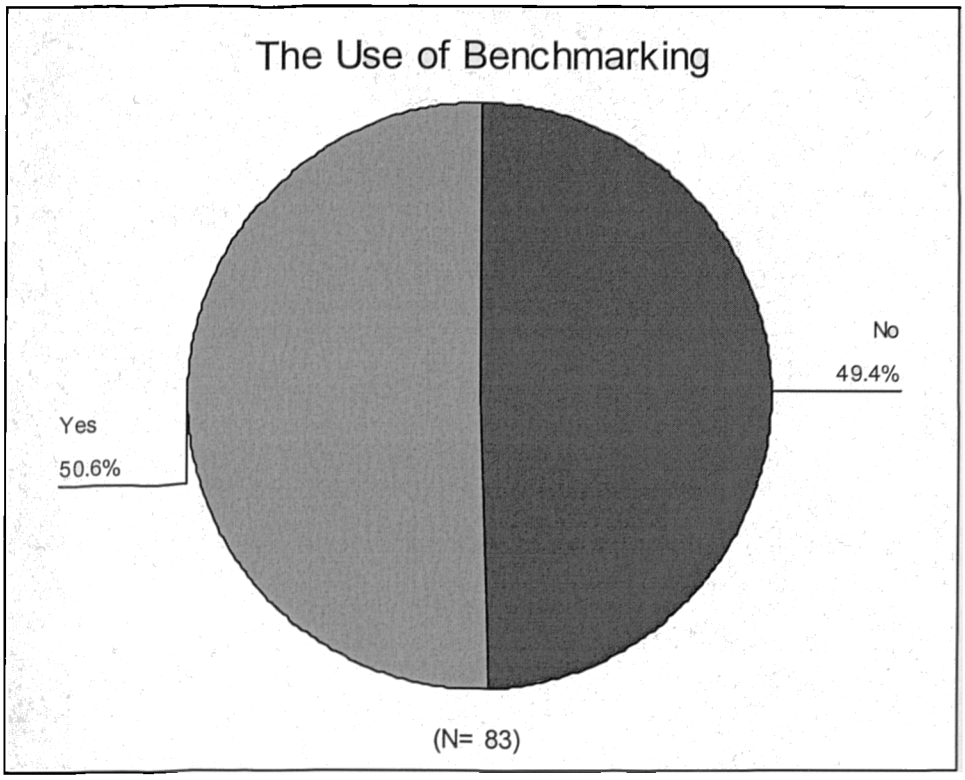

Figure 8.1 The use of benchmarking in ISO 9000 registered firms

Table 8.22 shows that the use of benchmarking in ISO 9000 registered firms in Saudi Arabia was almost evenly divided. 42 firms practised benchmarking (50.6%), and 41 firms did not, representing 49.4% of all firms. Figure 8.2 shows the benchmarking strategy of the Eastern Petrochemical Company, one of the firms surveyed.

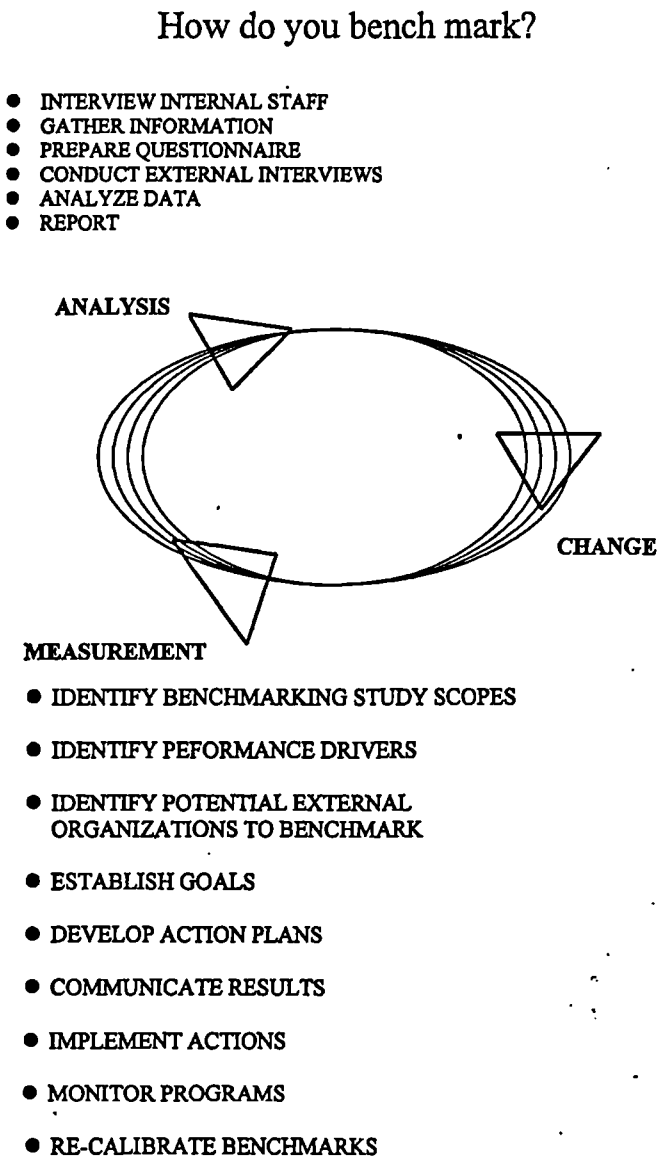

Figure 8.2 Benchmarking strategy of the Eastern Petrochemical Company (Sharq)
Source: Quality Management, Facilitator's Manual, (p.105)

The use of benchmarking in Saudi industry of just over 50% of ISO 9000 registered firms does not support the claims of Munro-Faure and Munro-Faure (1993), Oakland (1996), Camp (1989), Evans and Lindsay (1993) and Zairi (1996), which praise benchmarking as a beneficial tool for the organisation. As a matter of comparison,

according to Krasachol *et al.* (1998), 28% of ISO and non-ISO 9000 registered firms in Thailand used benchmarking. Therefore, the finding in Saudi Arabia does not support that found in Thailand, where almost 50% of firms used benchmarking among the ISO 9000 registered firms in the country. This difference might be because the Saudi firms included only the ISO 9000 registered ones, which are assumed to have more awareness of a quality system, while the study in Thailand included firms that were not ISO registered.

Types of Benchmarking:

Respondents who practised benchmarking in their firms (42 firms) were asked about the types of benchmarking that they used. The results are shown in Table 8.23.

Table 8.23 Types of benchmarking used among 42 firms

No.	Types of Benchmarking	Yes		No	
		Freq.	%	Freq.	%
1	Benchmarked against products or services of others	38	90.5	4	9.5
2	Benchmarked against process or functions of others	26	61.9	16	38.1
3	Internal benchmarking (against excellent dept. in the firm)	23	54.8	19	45.2
4	Benchmarked against partner of the joint venture	19	45.2	23	54.8

The table shows that the most frequently used type was benchmarking against the products or services of other excellent firms in the industry, represented by more than 90% of firms using benchmarking. The second most frequently used type was benchmarking against processes or functions of others, represented by almost 62% of firms using benchmarking. Internal benchmarking, which involves comparing one

department with another excellent department in the firm, was used by almost 55% of firms using benchmarking (42 firms in total). The least used type was benchmarking against partners of the joint venture, representing approximately 45% of benchmarking firms. Not all firms had a partner and therefore this type of benchmarking was the least used among them.

8.6 Quality Culture:

Quality culture is the first element of the quality system that was investigated in the study of ISO 9000 registered firms in Saudi Arabia. ISO 9000 clauses do not require the existence of quality culture practices. However, many firms world-wide have implemented this important feature of the quality system. This study is trying to cover the important elements of the quality system even if they are not covered by ISO 9000. The researcher selected, among others, the four techniques required to foster cultural changes, as mentioned by Hradesky (1995:153). Table 8.24 depicts the results of the respondents from the ISO 9000 registered firms in Saudi Arabia.

Table 8.24 Quality culture practices in ISO 9000 registered firms

No.	Practices	Valid %					Mean	Std. Dev.
		A	O	S	R	N		
1	Develop statements of values and beliefs related to quality and communicate them to employees	44.6	37.3	14.5	2.4	1.2	4.2169	.8702
2	Train employees to develop skills related to values and beliefs towards quality	37.4	43.4	14.5	3.6	1.2	4.1205	.8751
3	Measure and report the results of implementing cultural changes associated with quality	31.3	36.1	16.9	14.5	1.2	3.8193	1.0723
4	Offer incentives to encourage employees to implement new values and beliefs	19.3	25.3	28.9	18.1	8.4	3.2892	1.2150

The scale is 5 = always (A), 4 = often (O), 3 = sometimes (S), 2 = rarely (R), and 1 = never (N) for 83 Firms.

From the table, it is evident that the most practised element of quality culture was that of developing statements related to quality culture; 44.6% of respondents mentioned that they had always done this, and almost 37% had often done so. Training employees in quality culture matters ranked second, where the majority of respondents (43.4%) mentioned that they practised such a function often but not always. The last two quality culture elements were measuring and reporting the results of implementing a quality culture and offering incentives to encourage employees to implement such features.

From those findings, it is clear that quality culture in ISO 9000 registered firms was generally well fostered since the mean for all elements was more than three. In addition, another finding was that quality culture in ISO 9000 registered firms in Saudi Arabia was fostered in both TQM and Non-TQM firms, although quality culture has been famous for being a unique TQM element. As we noticed in the last section, some firms had implemented TQM and others had not done so.

8.7 Measuring Performance in the Organisation:

This question was about determining how often ISO 9000 registered firms in Saudi Arabia used certain tools or methods for the purpose of measuring performance in their firms. ISO 9001 (1994) does not suggest this practice, except for internal auditing. However, ISO 9001 of 2000 and BS 7850, Part 2 (1992) require and suggest tools for measuring performance. The question was designed on a 5 point Likert scale type in order to detect any small differences between the different methods and tools. The results are shown in Table 8.25.

Table 8.25 Methods and tools to measure performance in firms

No	Methods and Tools	Valid %					Mean	Std. Dev.
		A	O	S	R	N		
1	Feedback on customer satisfaction	50.0	26.3	13.8	7.5	2.5	4.1375	1.0761
2	Audit results	48.8	20.7	19.5	4.9	6.1	4.0122	1.2018
3	Quality failure costs (e.g. reject and scrap rates)	47.0	28.9	7.2	8.4	8.4	3.9759	1.2876
4	Production rates and adhering to scheduling	44.6	27.7	15.7	3.6	8.4	3.9639	1.2341
5	Financial accounts (e.g. changes in sales revenue)	25.0	22.5	26.3	12.5	13.8	3.3250	1.3480
6	Statistical Process Control (SPC)	32.5	16.9	13.3	15.7	21.7	3.2289	1.5721
7	Costs of warranty and product liability	11.3	18.8	17.5	12.5	40.0	2.4875	1.4582

The scale is 5 = always (A), 4 = often (O), 3 = sometimes (S), 2 = rarely (R), and 1 = never (N) for 83 firms.

The table shows that the most frequently practised method for measuring performance in firms was the use of feedback from customers about their satisfaction with the products; more than 76% said that they had always or often done it. The customer here could refer to either an industrial customer, such as those dealing with Sabic and purchasing raw materials, or final customers using or consuming the products. Satisfying customers is one definition of quality, which is meeting customer needs. The second most practised method of measuring performance in firms was the use of audit results; almost 70% of respondents said that they had done it always or often, and almost 20% had done sometimes. The third most used method for measuring performance was the use of quality failure costs such as reject and scrap rates to determine the quality level in the organisation. Approximately 76% of respondents said that they had always or often done so, but 7.2% had done sometimes. The rejected products were those which did not meet product specifications and consequently inflicted failure costs.

The use of SPC to measure performance in ISO 9000 firms was not high, where almost 22% of firms did not use such tools at all and 15.7% used them rarely. The least used method of measuring performance in ISO 9000 registered firms was the costs associated with warranty and product liability; 40% of firms did not use such a tool at all. This low use of warranty and product liability cost as a measurement of performance could be the result of the absence of clear product liability laws in the Kingdom. Moreover, many consumers in the less developed countries do not understand their rights concerning product liability and warranty of their purchased products.

Quality managers in ISO 9000 registered firms in Saudi Arabia added some additional notes at the end of the question. Hasan Al-Zayer, Quality Manager of Safco Ibn Al-Baytar, a firm surveyed and a Sabic affiliate, mentioned that all Sabic's firms used self-assessment. Such firms used EFQM (the European TQM model) to internally assess their quality systems employing their own internal auditing teams. He added that[4] "EFQM was used to identify areas of strength and points for improvement, the project was completed in 1997 ". In addition, the quality manager of Saudi Aramco Mobil Refinery (Samref) mentioned at the end of this question about measuring performance in his firm that "they used Linear Programming and an associated blending programme, and effectively controlled unit operations and product blending to meet customer product specifications".

[4] Notes written by Hasan Al-Zayer in the questionnaire.

8.8 TQM vs. Non-TQM Firms in Executing Quality System Elements:

As mentioned in Chapter seven, ISO 9000 registered firms in Saudi Arabia were divided into TQM and Non-TQM firms. It was found that 29 firms were implementing TQM, representing almost 35%, and 54 firms were Non-TQM, representing approximately 65% of the total firms in the study. The comparison was made in 12 specific elements in the quality system, since the execution of some elements is a matter of choice, whereby one cannot be determined if one firm is better than another. The elements consists of; top management commitment, teams for quality, employee involvement, general training for quality, meeting customer demands, measuring customer satisfaction, relations with suppliers, qualitative tools, SPC, benchmarking, quality culture and measuring performance.

For the purpose of the comparison, 12 tables were constructed, each one includes the items of each element of the quality system. When data is on an ordinal scale such as the 5 point-Likert scale, the table includes the difference in means between TQM and Non-TQM firms, and most importantly, the Mann-Whitney U test, as recommended by Diamantopoulos and Schlegelmilch (1997). On the other hand, when data is on a nominal scale, such as a yes / no question, the table includes the difference in percentages between TQM and Non-TQM firms and the Pearson Chi-square test as recommended by Diamantopoulos and Schlegelmilch (1997), Norusis (1998) and Alreck and Settle (1995). The difference in means and in percentages between the elements detect even slight differences, while the two statistical tests determine significant difference, if any, between the elements. The results of this comparison are shown in Tables 3 to 14, Appendix F.

In this comparison, Tables 3 to 14 in Appendix F show that the TQM firms did perform slightly better than the Non-TQM firms in the majority of items in the 12 quality system elements under comparison. However, based on the Mann-Whitney U test and the Pearson Chi-square test, there are significant differences (.05 or less) between TQM and Non-TQM firms in 14 items in the quality system elements in favour of the TQM firms. A summary of the significant results is shown in Table 8. 26.

Table 8.26 Summary of the significant differences between TQM and Non-TQM firms:

No.	Quality Elements	Significant Elements	Sig.	Firms did Better	Ref. Table*
1	Top Management Commitment	None			3
2	Teams for Quality	None			4
3	Employee Involvement	None			5
4	General Training	Problem solving training	.034	TQM	6
		Statistical Process Control's training	.006	TQM	
		TQM training	.000	TQM	
		Benchmarking training	.035	TQM	
5	Meeting customer demands	None			7
6	Measuring customer satisfaction	None			8
7	Relations with suppliers	Provide suppliers with clear product specification data	.052	TQM	9
		Provide technical assistance to suppliers	.009	TQM	
		Have joint quality planning with suppliers	.028	TQM	
8	Qualitative tools	Flow Charts	.001	TQM	10
		Brainstorming	.002	TQM	
9	Statistical Process Control (SPC)	Histograms	.001	TQM	11
		Pareto diagrams	.014	TQM	
		Taguchi methods	.005	TQM	
10	Benchmarking	None			12
11	Quality Culture	Develop statements of values and beliefs related to quality and communicate them to employees	.001	TQM	13
12	Measuring performance	The use of SPC as measuring tool	.048	TQM	14

* All tables are in Appendix F

The table shows that some elements did not include any significant differences between TQM and Non-TQM firms, including top management commitment, teams for quality, employee involvement, meeting customer demands, measuring customer satisfaction, and benchmarking. In the table, 4 items in training for quality showed significant difference in favour of TQM firms, including problem solving training, SPC training, TQM training, and benchmarking training. In addition, there are significant differences in 3 items in relations with suppliers, namely: provide suppliers with clear product specification data, provide technical assistance to suppliers, and have joint quality planning with suppliers. In qualitative tools, 2 significant differences were found in favour of TQM firms; flow charts and brainstorming. Moreover, SPC included 3 significant differences in favour of TQM firms, namely: histograms, Pareto diagrams and Taguchi methods. In quality culture, TQM firms were found to be significantly better in developing statements of values and beliefs related to quality and distributing them to employees. Finally, the use of SPC as a measuring tool was provided by significantly more TQM than Non-TQM firms.

From these figures, we can conclude that TQM firms performed significantly better (.05 or less) than the Non-TQM ones in those aspects of the quality system. We find some consistency in the results where TQM firms used more SPC (item 9 in Table 8.26), had more training in SPC (item 4) and employ SPC more in measuring performance (item 12). In addition, TQM firms practised benchmarking only slightly more than did the Non-TQM firms (Table 12, Appendix F), but not significantly. However, TQM firms provided benchmarking training significantly more than did Non-TQM firms (item 4 in Table 8.26). Regarding quality culture, which is considered a notable TQM element, it

was found that TQM performed significantly better in one item (item 11 in Table 8.26) and slightly better in the other 3 items (Table 13, Appendix F).

Those findings show a consistency in the results among quality system elements. TQM firms used problem-solving teams slightly more than the in Non-TQM firms (Table 4, Appendix F), similar to the case of problem-solving training (Table 6). The use of SPC in TQM firms was greater than in Non-TQM firms (Table 11), which is consistent with SPC training. Similarly, the use of benchmarking in TQM firms was higher than in Non-TQM firms (Table 12). Finally, there is a logical finding regarding TQM training: it is very natural that TQM firms were significantly more concerned with TQM training than Non-TQM firms (item 4).

The better performance of the TQM firms among ISO 9000 registered firms supports the claims of many scholars who recommend that firms go beyond ISO to a more comprehensive approach to TQM (Yung, 1997; Corrigan, 1994; Arora, 1996; Lal, 1996; Iizuka, 1996). In addition, the findings from Saudi industry support those of Sun (1999), who found that implementing ISO alone did not contribute as much as implementing both ISO and TQM.

8.9 Summary:

This chapter has investigated the quality system elements of ISO 9000 registered firms in Saudi Arabia and tested the compliance of those firms to some ISO 9000 clauses. It also compared TQM with Non-TQM firms in terms of executing some features of the quality system. Some of those quality system elements are included in ISO 9000 (1994) while others are not. The quality system elements were was divided into six

features, people issues, customer focus, product issues, tools for quality improvement, quality culture and measuring performance. A summary of this chapter is included in Chapter ten (Summary and Conclusion). The next chapter presents the completion of data analysis and discussion covering ISO 9000 implementation in Saudi Arabia.

CHAPTER NINE

ISO 9000 IMPLEMENTATION

CHAPTER NINE

ISO 9000 IMPLEMENTATION

9.1 Introduction:

This is the third and final chapter of the data analysis and discussion, comprising a comprehensive coverage to ISO 9000 implementation in Saudi Arabia. It consists of ten sections, including commitment and motivations, and mechanisms for achieving ISO that covers both consultancy and training. In addition, it investigates aspects of the process of ISO registration and issues related to the registration agencies. ISO documentation is also discussed which covers the quality manual and quality records. Moreover, the chapter analyses costs of ISO, factors in ISO implementation, such as *factors helping and hindering ISO*, and benefits gained from ISO. An overall evaluation of ISO implementation is also presented along with a discussion of what is beyond ISO 9000. Finally the chapter presents the role of the Saudi Government and SASO in implementing ISO, and ends with a conclusion to the chapter.

9.2 ISO Commitment and Motivation to Achieve ISO 9000 Implementation:

Who demanded ISO, Top Management or the Quality Department?

This question was about who demanded ISO implementation: top management or the quality department. The results are shown in Table 9.1 and Figure 9.1.

Table 1.9 Who demanded ISO, top management or the quality department

No	Statements	Valid %					Mean	Std. Dev.
		SA	A	N	D	SD		
1	Top management demanded ISO	72.3	24.1	1.2	2.4	---	4.6627	.6301
2	The quality department demanded ISO	42.7	26.8	9.8	15.9	4.9	3.8659	1.2645

Statistical Test	Z Value	Sig. (2-tailed)	
Paired-Samples Sign Test	-4.395	.000	

The scale is 5 = strongly agree (SA), 4 = agree (A), 3 = neither agree nor disagree (N), 2 = disagree (D), and 1 = strongly disagree (SD) for 83 firms.

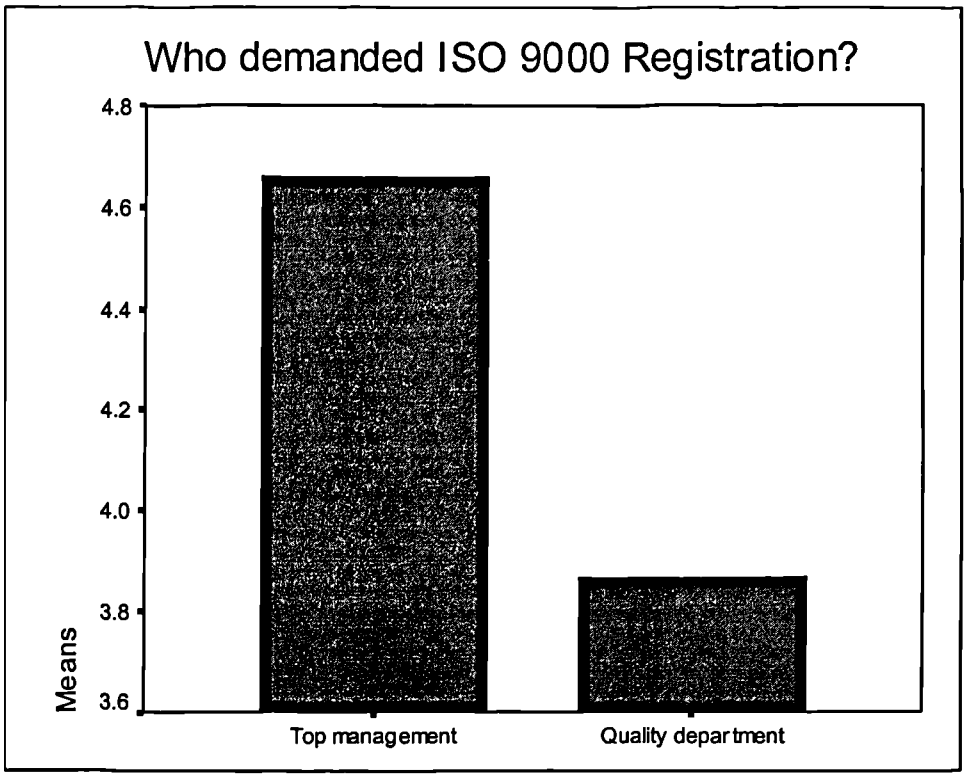

Figure 9.1 Who demanded ISO, top management or the quality department

From Table 9.1 it is evident that the majority of respondents agreed that top management in their firms demanded the implementation of ISO 9000 more than did quality departments. Almost 72% strongly agreed and 24% agreed that top management demanded the implementation, while more than 42% strongly agreed and 26.8% agreed that quality departments demanded ISO implementation.

The difference was clear when comparing the means of the two variables in favour of top management. However, to test if the difference was significant; a Paired-Samples Sign Test was performed. Diamantopoulos and Schlegelmilch (1997) recommended this test when the comparison is between two related variables and the data on an ordinal scale. The test shows that there was a significant difference (.000) between the two variables as shown at the bottom of Table 9.1. The conclusion is that top management demanded ISO significantly more than did quality departments among

ISO 9000 registered firms in Saudi Arabia. The reason for this could be that the decision to implement ISO is usually associated with strategic planning, which is dealt with at executive level. Moreover, entering international markets requires, sometimes, achieving ISO registration, which is decided by top management. Finally, in some instances, the quality department might be reluctant to embark on new changes in its work and consequently becomes resistant to change, such as in the case of ISO 9000 implementation.

Top Management Commitment to ISO 9000:

Clause 4.1.2 of ISO 9001 (1994) covers, in general, top management commitment to the implementation of a quality system based on ISO 9000. Sub-clause 4.1.2.2 demands the availability of adequate resources for the implementation of ISO 9000. Top management commitment to ISO 9000 is covered in three elements in this question on a 5 point-Likert scale type. The results are shown in Table 9.2.

Table 9.2 Top management commitment to ISO 9000 registration

No	Statements	Valid %					Mean	Std. Dev.
		SA	A	N	D	SD		
1	Top management is committed to ISO	75.9	20.5	3.6	---	---	4.7229	.5253
2	Top management provided the needed resources for the successful implementation of ISO	73.5	22.9	3.6	---	---	4.6988	.5350
3	Top management understands the purpose of ISO and the details of registration	63.9	30.1	6.0	---	---	4.5783	.6073

The scale is 5 = strongly agree (SA), 4 = agree (A), 3 = neither agree nor disagree (N), 2 = disagree (D), and 1 = strongly disagree (SD) for 83 firms.

It can be seen from the table that the commitment of top managers to the implementation of ISO was very high, which was similar to the case of top management commitment to quality in general. In addition, it is clear that top management provided

adequate resources for the implementation of ISO 9000, as Sub-clause 4.1.2.2 demands. These findings support the claim of many scholars, which seems logical, that this commitment is vital to the success of ISO implementation (Durand *et al.*, 1997; Hockman *et al.*, 1994; Benson and Sherman, 1995; Johnson, 1997).

Top Management Commitment to ISO vs. Commitment to Quality in General:

In order to find out if there was any significant difference between the commitment of top management to ISO vs. their commitment to quality in general, a Paired-Samples Sign Test was performed, as shown in Table 9.3.

Table 9.3 Top management commitment to quality vs. commitment to ISO 9000

No.	Commitment to Quality in general	Mean*	Commitment to ISO 9000	Mean**	Paired-Samples Sign Test	
					Z Value	Sig. (2-tailed)
1	Top management devote time to quality	4.3494	Top management is committed to ISO	4.7229	-4.380	.000
2	Provide adequate resources to quality	4.4217	Provide adequate resources to ISO	4.6988	-3.592	.000

*Figures are obtained from Table 8.1. ** Figures are obtained from Table 9.2.

From the table it can be seen that top management commitment to ISO 9000 implementation was significantly higher than their commitment to quality in general (significance .000). In addition, top management providing adequate resources for ISO 9000 was significantly higher than for quality in general (significance .000). The conclusion of those two results is that top management supported ISO implementation significantly more than they supported quality in general.

Motivation for ISO 9000 Registration:

Respondents to the questionnaire were asked to state the relative importance of the 19 reasons or motives for ISO registration on a 5 point-scale. The results are presented in Table 9.4, showing means, standard deviations and rankings. The 19 motives were ranked according to how important each element was to quality managers in ISO 9000 registered firms in Saudi Arabia. Table 15, Appendix F shows more details of the answers to this question.

Table 9.4 Motives for registration to ISO 9000 in Saudi Arabia*

Rank	Motives	Mean	Std. Dev.
1	To improve the efficiency of the quality system	4.6582	.7141
2	To maintain / increase market share	4.3293	.9034
3	To meet customer-supplier demands	4.3171	1.0643
4	To meet corporate objectives	4.3049	.8846
5	To be a step towards TQM	4.2289	1.1404
6	To improve the quality of products	4.1646	1.1144
7	To reduce defective rate and wastes	4.0864	1.0747
8	To market products in the international arena	3.8902	1.2766
9	To use ISO as a promotional tool	3.8659	1.1839
10	To improve communications	3.8125	1.2638
11	To improve the design of the products or the processes	3.7000	1.3445
12	To achieve costs reductions	3.6463	1.2898
13	To be eligible for tenders	3.6098	1.2547
14	To improve employee relations	3.4125	1.2698
15	To have better relations with sub-contractors	3.2073	1.3122
16	To avoid being excluded from the European markets	2.9146	1.5006
17	To meet government demands, requirements or pressure	2.9012	1.3748
18	To imitate competitors	2.4815	1.3703
19	To meet the requirement of a foreign partner	2.4684	1.6159

The scale is 5 = very important, 4 = fairly important, 3 = of average importance, 2 = of minor importance, 1 = not important. * The details of this table are included in Table 15, Appendix F.

The table shows that the most important motivation for registration was improving the efficiency of the quality system. Respondents recognised that ISO 9000 was geared towards quality system efficiency rather than for the quality of products; they chose to improve the quality of their products, as the 6th reason for choosing ISO in order of importance. The second most important reason was the desire to increase market share,

which was a significant move towards success and growth. Implementing ISO 9000 as a step towards TQM ranked 5 among other motives. This answer indicates that quality managers recognised that ISO, as a quality system, should be just the beginning for a more comprehensive quality approach.

Moving down from the first 5 motives, entering international markets was not a strong motive since it was ranked 8th, while the fear of being excluded from the European market was even less important, ranking 16th among the motives. Other point was that, apparently, Saudi firms did not feel that acquiring ISO registration improved their eligibility for tenders as this motive ranked 13th. Meeting Government requirements was considered not important at all, since this motive ranked 17th. Firms did not register to ISO 9000 just to imitate competitors as this reason was placed last but one. Finally, the foreign partners of some firms did not require ISO from their Saudi partners since this motive was regarded as the least important one for all firms, perhaps because only some of them had foreign partners. To investigate how important this motive was for joint venture firms, a comparison of means was conducted for this type of firm. The result shows that the foreign partners did not require such firms to implement ISO since it ranked only 16th among other motivations for this type of firm. However, while this may not mean that there was no influence, it does mean than it was not a requirement by the partners.

The researcher compared these findings with other countries; Belgium, the UK and Western Australia. The results are shown in Table 16, Appendix F. It can be seen from the comparison that improving the efficiency of the quality system was very important in all countries. In addition, other important motives in common were increasing or

maintaining market share, meeting customer demands, or pressures, and improving product quality. In Saudi Arabia and Belgium, meeting corporate objectives and forming a step towards TQM ranked 4th and 5th in both countries respectively.

Factor Analysis of Motives for Registration:

The aim of factor analysis is to find the pattern of a large number of factors to see if they can be condensed into smaller sets of components that can be understood by a common label. The basis for factor analysis for the 19 motives for ISO 9000 registration is that motives can be correlated because they share one or more common components. Therefore, factor analysis was used to reduce those 19 variables into factors containing some of the variables that share common ground. Table 9.5 shows factor analysis for the motives for ISO 9000 registration.

In factor analysis, a principal component approach was used with varimax rotation. The results of the analysis were in the form of 5 factors as shown in Table 9.5. Each factor consists of many motives; the researcher chose only those motives with factor loadings of .65 or higher, based on the sample size (Hair *et al.*, 1995). Factor loadings are "the correlation of a variable with a factor" (Kline, 1994: 5). Each factor had an eigenvalue that represents the amount of variance accounted for by a factor; the higher the eigenvalue the more variance it explains (de Vaus, 1996). The percentage of variance means the percentage each factor explains from all motives. The total variance explained by those 5 factors was 60.091%, which according to Hair *et al.* (1995) is considered to be acceptable.

Table 9.5 Factor analysis of motives for registration to ISO 9000

Motives for Registration to ISO 9000		Loadings
Factor 1 Increase Market Share (eigenvalue = 4.499: % of Variance = 23.678)		
1	To maintain / increase market share	.759
2	To be eligible for tenders	.707
3	To meet customer-supplier demands	.665
4	To improve the quality of products	.651
Factor 2 Improvement of Functions (eigenvalue = 2.338: % of Variance = 12.307)		
1	To improve communications	.786
2	To improve employee relations	.762
3	To improve the design of products or processes	.707
4	To improve the efficiency of the quality system	.702
Factor 3 International Marketing (eigenvalue = 1.821: % of Variance = 9.585)		
1	To avoid being excluded from the European markets	.744
2	To market products in the international arena	.688
3	To meet corporate objectives	.669
Factor 4 Cost Reductions (eigenvalue = 1.530: % of Variance = 8.053)		
1	To achieve costs reductions	.798
2	To reduce defective rate and waste	.700
Factor 5 Joint-Venture Influence (eigenvalue = 1.229: % of Variance = 6.468)		
1	To meet the requirement of the foreign partner	.796
Statistical Tests:		
Kaise-Meyer-Olkin Measure of Sampling Adequacy (KMO test) = .613		
Bartlett's Test of Sphericity: Approximate Chi-square = 457.965 df = 171 Sig. = .000		

The results of the factor analysis comprised 5 factors containing 14 motives that are supposed to explain all motives and represent them. Each factor was given a label by the researcher, depending on the motives it had and usually the greater the value of loadings of the variable, the more influence it had on the name of the label. Factor 1 was given the label 'increase market share' containing four motives: to maintain market share (loadings .759); to be eligible for tenders (.707); to meet customer-supplier demands (.665); and to improve quality (651). We see that factor 1 stressed the marketing motive of ISO 9000 for the firms surveyed. Factor 2 was named 'improvement of functions' containing four motives: to improve communications (.786); to improve employee relations (.762); to improve design (.707); and to improve

efficiency of the quality system (.702). Factor 3 was named 'international marketing', having three motives: to avoid being excluded from the European market (.744); to market products in the international arena (.688); and to meet corporate objectives (.669). In factor 3, the first two motives were correlated, stressing the international motive for registering to ISO 9000. In addition, factor 4 was given the name 'cost reductions' thus representing the two motives; to achieve cost reductions (.798), and to reduce defective rates (.700). Since both factors are about cost reduction and are correlated they were therefore grouped by factor analysis. Finally, factor 5 had the label of 'joint venture influence', containing only one motive, which was to meet the requirement of the foreign partner, and having loadings of .796.

In order to test the factor analysis, the Kaiser-Meyer-Olkin test (KMO) is an indicator of how well suited the sample data is for factor analysis and its value is less than 1. The acceptable value should be between .5 and .99 (Kaiser, 1974). Therefore as the value of the KMO as shown in Table 9.5 was less than 1 (.613), it was acceptable. This means that data was suitable for factor analysis and consequently factor analysis was valid. The second test was Bartlett's test of sphericity, which measures the correlation among variables. The test at the bottom of Table 9.5 had a significance of (.000), which means that there was a significant relationship among motives for registration to ISO 9000 in Saudi Arabia (SPSS Inc., 1999).[1]

International Marketing Motives for Registration by Extent of Involvement in Export:

The Kruskal-Wallis test is used to investigate the differences between firms based on their degree of export and their international marketing motives for registration. The two motives that dealt with international marketing were: to market product in the international arena, and to avoid being excluded from the European market. This test is an alternative to the One Way Anova since the latter deals with continuous data. The Kruskal-Wallis test, on the other hand, deals with data on an ordinal scale, comparing between more than two groups in performing one or more variables. (Norusis, 1998, and Diamantopoulos and Schlegelmilch, 1997)

The purpose of this test is to see if firms, because of the extent of their involvement in exports, differ in considering those two motives important. The results of this test are shown in Table 17, Appendix F. The table shows that there were significant (.05 or less) differences between the various extent of involvement in exports and the firms' judgement of the two motives as being important reasons for registration to ISO. The significance figures were .008 and .010, respectively. This means that firms, based on their extent of involvement in exports, differed significantly in attributing importance to those two motives. The higher the percentage of export, the greater the degree of importance given to those two motives for registering to ISO (by having higher mean ranks). The conclusion is that firms with a high percentage of export, significantly, considered those two motives to be more important than did firms with smaller percentages of export.

[1] SPSS Inc. (1999) *SPSS Training Course Library*, Advance Statistics, Chapter seven, P.15.

To investigate if there was a correlation between the extent of export and the two international marketing motives, the Spearman's Correlation Coefficient test was performed. The result is shown in Table 18, Appendix F. The table shows that there was a significant correlation (.01 or less) between the extent of export and international marketing motives. The figures were .407 for one variable (to market products in the international arena) and .360 for the other variable (to avoid being excluded from the European markets). Both were positive, which means that the higher the extent of exporting, the more important those motives are. The degree of correlation between those two motives was moderate, based on Diamantopoulos and Schlegelmilch (1997).[2]

Planning Measures Prior to ISO Implementation:

This question was put to quality managers to investigate their planning measures before implementing ISO 9000. The results are shown in Table 9.6.

Table 9.6 Planning measures prior to ISO implementation

No.	Planning Measures	Yes		No	
		Freq.	Valid %	Freq.	Valid %
1	Measured internal aspects such as waste, re-work, or cost of paperwork	44	56.4	34	43.6
2	Measured external aspects such as sales increases, credit notes, and refused items	44	55.7	35	44.3
3	Performed cost-effective analysis (quantify the financial impact of ISO implementation	38	48.1	41	51.9
4	Used Gap analysis to assess firm's quality system capabilities against ISO and discovered any gaps	33	41.8	46	58.2

[2] They considered the correlation strong when the figure is 0.8 and more, moderate between 0.4 and 0.8 and weak when the correlation is less than 0.4.

The findings in the table show that planning for ISO 9000 implementation in Saudi Arabia was not adequate. Almost half of the respondents who answered this question did not perform certain important measures before implementing the system. Among the four planning measures that the researcher included, the most practised planning technique was assessing internal aspects associated with the implementation process. Just over 56% of respondents performed this measure and the remaining did not. Measuring the external aspects associated with the implementation process was performed by 55.7% of quality managers who answered this question. Another finding shown by the table was that less than half of respondents (48.1%) undertook cost-effective analysis to see if ISO was financially viable or not. This means that more than half of respondents to this question implemented the system without knowing whether or not the implementation was beneficial to their firms. In addition, more than 58% of respondents did not perform gap analysis to assess the capabilities of their quality systems for ISO. This relatively high percentage could be partly attributed to a dependence on external consultants who might have performed this measure on behalf of firms. We see from those results that planning for ISO implementation, by and large, was not based on quantifiable procedures. A substantial percentage of respondents who answered this question did not perform such planning measures to see if ISO was really going to help their firms or be undertaken solely for prestigious purposes. Another final note is that there were approximately 4 missing answers; the respondents noted that they were not working in their firms at the time they implemented ISO, so they were not able to answer on those issues.

Size of Firms & Planning Prior to ISO Implementation:

In order to test if different sizes of firms performed differently in planning before implementing ISO techniques, the Pearson Chi-square test was performed. Categories of size of firms were reduced to three: small, medium, and large[3] in order to reduce the possibility of the failure of Chi-square test. This type of test performs better when cross-tabulation is among fewer groups. Table 19, Appendix F shows the results of this test. From the table, it is apparent that there were no significant differences (.05 or less) between the size of a firm and its performance in planning before ISO implementation. It could be presumed that large firms might have performed better than small ones, but this test shows that there was no significant difference between sizes of firms in carrying out measures for planning before implementing ISO 9000 in Saudi Arabia.

Human Resources for ISO Implementation:

Sub-clause 4.1.2.3 of ISO 9001 (1994) mandates the appointment of a person to be directly responsible for the execution of ISO in the firm known as the "management representative". This question was about human resources for implementing ISO 9000 in Saudi Arabia. The results are shown in Table 9.7.

Table 9.7 Human resources for ISO implementation

No.	Elements of Human Resources	Yes		No	
		Freq.	Valid %	Freq.	Valid %
1	There is an ISO project team to carry out the actual implementation of ISO 9000 requirements	54	65.1	29	34.9
2	There is an ISO 9000 facilitator (an employee who is directly responsible for ISO)	77	92.8	6	7.2
3	The firm hired a new employee (s) to implement ISO 9000	8	9.8	74	90.2

[3] Small firms (1-100 employees), medium firms (101-300), and large firms (301 or more employees).

The table shows that almost two thirds of the respondents (65.1%) had an ISO project team in order to plan, co-ordinate, and execute the implementation process. The second item was about the management representative who is required by ISO stipulations and therefore the expectation outcome from this question was that all firms must have had management representatives for ISO. The result here was that all firms except 6 had management representatives. However, in reality all firms had a representative for ISO, and they answered the questionnaires. The reason for the 6 respondents saying that they had no ISO facilitator could be because they thought that this person was only carrying out ISO-related duties without actually being responsible for the quality department. Or perhaps those respondents thought that the facilitator was distinct from the management representative. From the observation of the researcher, the most senior person in quality usually called the quality manager or quality assurance manager, was the ISO representative in a firm, with the exception of one firm whose ISO representative was a quality consultant. The third item in Table 9.7 concerned the hiring of new employees for ISO implementation. Only 8 firms (9.8%) said that they had hired new employees to help in implementing ISO in their firms. As a speculation, that could be because some firms would have relied on external consultants to help in the process of implementation, while others had their own expert, trained employees.

As a matter of comparison, Lee (1995), in studying the experience of firms implementing ISO 9000 in Hong Kong, found that 6% of manufacturing firms hired new employees for this purpose. The percentage in Saudi Arabia was 8%, which was close to that of Hong Kong and therefore supports that study.

9.3 Mechanisms for Achieving ISO 9000- Consultancy and Training:

The Use of External Consultants:

Quality managers were asked about their reliance on external consultants for ISO 9000 implementation and asked if these external consultants were their registration agencies or not. Table 9.8 and Figure 9.2 show whether or not ISO 9000 registered firms relied on external consultants. The investigation into the use of registration agencies in consultancy is discussed afterwards.

Table 9.8 The use of external consultants to help implement ISO 9000

The use of External Consultants	Frequency	Valid %
Yes	49	59.8
No	33	40.2
Total	82	100.00

Pearson Chi-square for the difference between sizes of firms in the use of external consultants

Value	Df	Significance (2-sided)
.018	2	.991

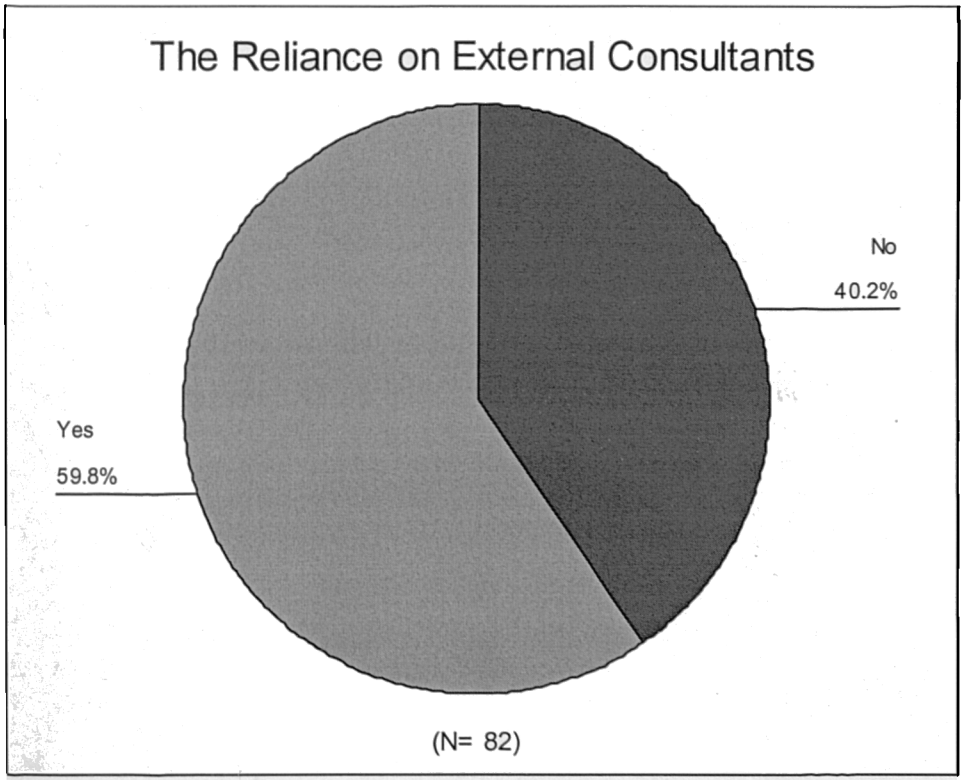

Figure 9.2 The use of external consultants to help implement ISO 9000

Table 9.8 shows that the vast majority of ISO 9000 registered firms relied on external consultants to help implement the quality system. Almost 60% of ISO 9000 registered firms relied on external consultancy while the remaining 40% did not.

The use of external consultancy in the manufacturing sector of Hong Kong, as a matter of comparison, was slightly higher than that of Saudi Arabia. Lee (1995), in studying ISO 9000 implementation in Hong Kong, found that 63% of firms in the manufacturing sector hired external consultants to help in implementing ISO. The figure in Saudi Arabia was 59.8%.

Size of Firms in the Use of External Consultants:

In order to investigate the difference between sizes of firms in using external consultants, a Pearson Chi-square test was performed. Sizes of firms were categorised into three sizes, small, medium and large firms. The results of the test are shown at the bottom of Table 9.8. From the table it can be seen that there was no significant difference (.05 or less) between the three sizes of firms in their use external consultants. This means that the sizes of firms did not differ significantly in the use of external consultants.

Conflict of Interests and the Use of Consultants:

ISO 62 (1996), that governs the conduct of the registration agencies, prohibits registration agencies from providing consultancy to its clients. Sub-clause 2.1.2, provision O, item 2, demands that registration agencies shall not offer "consulting services to obtain or maintain certification / registration." However, among the 49 firms that relied on external consultants, 11 firms received consultancy from their

registration agencies, although this might create a clear conflict of interest between assessment and consultancy. The firms that did so represented approximately 13% of ISO 9000 registered firms in Saudi Arabia.

To investigate this matter, the researcher asked registration agencies about their involvement in consultancy with their clients. Price (1999) of Lloyds Register Quality Assurance in Saudi Arabia mentioned that his agency had never been involved since this is against UKAS rules. However, he wrote that, "many certification agencies ignored that in Saudi". Bounds (1999), of Moody International in Jeddah, mentioned that they had not been involved in such matters to avoid a conflict of interests, but accused others of doing so. Alyah (1999) of Det Norske Veritas in Dubai said that they never done soeither since this violates EN 45012, EAC 12 and ISO 62. Nevertheless, the researcher concludes that this conflict has arisen in some registration agencies in Saudi Arabia.

Training for ISO 9000:

ISO 9000 Training Programmes:

Clause 4.18 of ISO 9001 (1994) demands that firms shall identify training needs and provide training to all personnel performing activities affecting quality. The clause does not specify any type of training programmes. This question was about ISO 9000 training programmes that firms received. The results are shown in Table 9.9.

Table 9.9 ISO 9000 training programmes

No.	Training Programmes	Yes		No	
		Freq.	Valid %	Freq.	Valid %
1	General awareness educational programme about ISO 9000	76	91.6	7	8.4
2	Auditing / Lead Auditing	76	91.6	7	8.4
3	Special training in ISO 9000 implementation	58	69.9	25	30.1

The table shows that a substantial percentage of firms received general awareness training programmes in ISO 9000 (91.6%). Those programmes were not exclusive to quality employees but could be provided to other personnel in the firms. In addition, firms received auditing training programmes, such as internal auditing and lead assessor programmes; 76 firms received such training, representing 91.6% of firms. Finally, almost 70% of firms received other special training in ISO, such as planning and documentation for ISO 9000.

Some quality managers added comments at the end of the question. One respondent mentioned that lead assessor training was provided for the TQM head and his assistants, and general awareness programmes were for all employees. Two quality managers said that they had received training in ISO documentation. Another two respondents mentioned that they had received training on ISO as part of TQM, beyond ISO 9000.

ISO Training Providers:

This question was about providers of ISO 9000 training in Saudi Arabia. The researcher included both the Saudi Arabian Standards Organisation (SASO) and the chamber of commerce in the city where the firm was located. The reason for including SASO as well as the chamber of commerce as the main providers was because they were more likely to be involved in training activities. Moreover, the researcher added a

space at the end of the question to include any other providers. The results are shown in Table 9.10.

Table 9.10 ISO 9000 training providers (government & semi-government sectors)

No.	Training Providers	Yes		No	
		Freq.	Valid %	Freq.	Valid %
1	Saudi Arabian Standards Organisation (SASO)	10	12.0	73	88.0
2	Chambers of commerce	15	18.5	66	81.5

The table shows that SASO provided training to only 10 firms, representing 12% of all ISO 9000 firms under study, although the agency had three centres in Riyadh, Jeddah, and Dammam. Apparently, the role of SASO in providing ISO 9000 training was very limited. Among those 10 firms that received such training, 7 firms were in Riyadh, 2 in Jeddah, 1 in Dammam, and 1 in Jubail. This might mean that SASO of Riyadh were more active in training for ISO 9000 than other SASO branches in the country.

In addition, Table 9.10 shows that chambers of commerce in the Kingdom provided ISO training to 15 firms, representing 18.5% of all firms. This figure was also low, especially considering that chambers of commerce in Saudi Arabia have substantial resources, indeed, even more so than those of SASO. Moreover, there was a chamber of commerce in each city that had a firm registered to ISO 9000, and they could have had a greater role in training for ISO 9000, especially in the absence of relevant educational and vocational institutions in the country.

Quality managers were given the chance to include other ISO training providers (apart from SASO and chambers of commerce), in either internal training or external training provided by the private sector. The results are shown in Table 9.11.

Table 9.11 Other ISO training providers (other than SASO & chambers of commerce)

No.	Training Providers	Frequency	%
1	Private agencies*	39	61.0
2	Registration agency	14	21.9
3	Internal staff training	7	10.9
4	Parent company / sister company	4	6.2
Total		**64**	**100.00**

*Names of private providers are included in Table 20 in Appendix F

The table shows that private firms provided training to 39 firms, representing the highest number among all providers including the Government and others. The second was the registration agencies, providing 14 firms with ISO training. Seven firms had their training provided by their own staff as internal training. Training by a parent or sister company was carried out by 4 firms. It should be mentioned here that using one provider did not exclude using others, since most firms may have received training from more than one provider.

The participation of the registration agencies in training their clients may question the conflict of interests matter and the integrity of the registration process. Another important conclusion was the absence of educational institutions and the Ministry of Industry in training provision. There were eight universities and many vocational colleges that did not contribute in the provision of any type of training in any of the quality fields.

Table 20 in Appendix F, which includes the names and the nationalities of private ISO training providers in Saudi Arabia, shows the dominant role that the British agencies played in training and in the registration for ISO 9000, which will be discussed later. The table shows that British agencies provided 82.1% of the private known training compared to 17.9% provided by Saudi agencies.

Evaluation of Chambers of Commerce in ISO Training:

To evaluate the role of the chambers of commerce in providing ISO 9000 training, cross-tabulation was performed between the city and ISO training provided by the chamber of commerce. In order to be precise about the role, a comparison was made of the firms that received training from the chamber of commerce, with the total number of firms registered in each city. The results are shown in Table 9.12.

Table 9.12 Evaluation of chambers of commerce in providing ISO 9000 training

Rank	Chamber of Commerce	All Firms Registered in the City (1)	Firms Received Training (2)	% of (2) to (1)*
1	Jubail	14	5	35.7
2	Dammam	12	4	33.3
3	Riyadh	18	4	22.2
4	Yanbu	10	1	10.0
5	Jeddah	27	1	3.7
6	Al-Khobar	1	Missing	Missing
7	Kharj	1	0	0.0
Total		**83**	**15**	100.00

*The percentage of the firms that received training of the total number of firms registered in the city

From the table, it can be seen that the chamber of commerce in Jubail ranked first, training 35.7% of ISO registered firms in the city. Dammam's chamber was second, training 33.3% of the firms in the city. Riyadh's chamber of commerce ranked third training 22.2 of the firms in the capital, while the chambers of commerce at Yanbu and Jeddah trained only 1 firm each. Al-Khobar and Kharj are small cities and each of them house only one firm, so we did not expect much from them. In conclusion, we could argue that the highest percentage of ISO registered firms that a chamber of commerce trained, the more active and involved in ISO the chamber was. In addition, chambers of commerce in the Eastern Region, in Jubail and Dammam, did better than the others. Contrarily, the chambers in the Western Region, in Jeddah and Yanbu, fared the worst,

while Riyadh, in the Middle Region, was average. Figure 9.3 shows the contribution made by the chambers of commerce in training firms in Saudi cities.

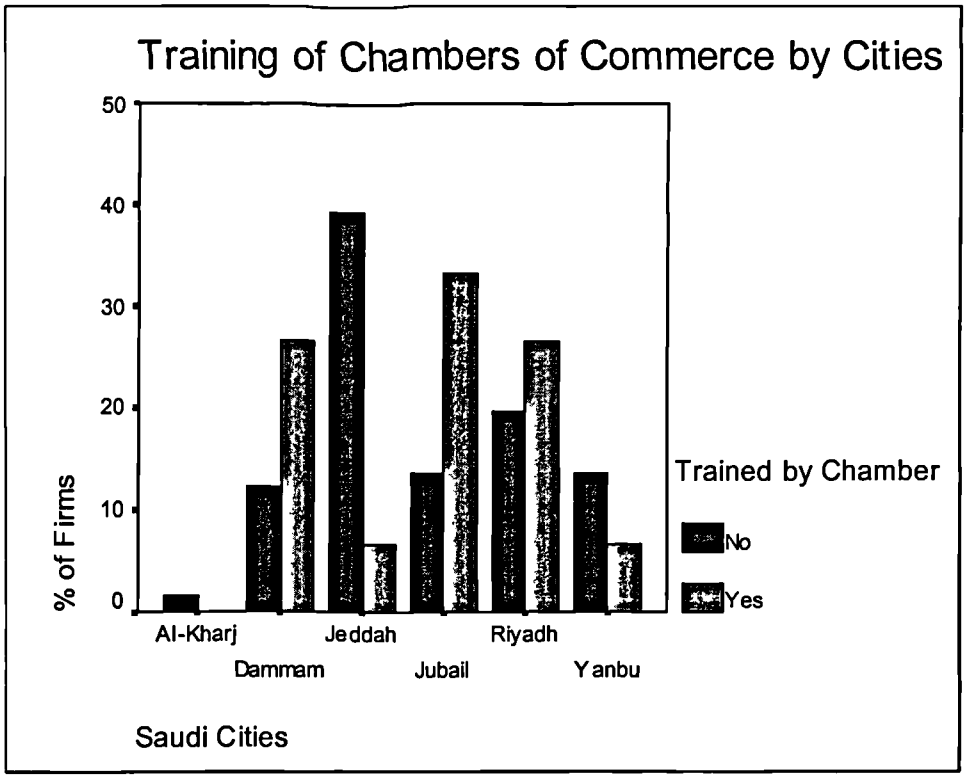

Figure 9.3 Contribution of chambers of commerce by Saudi cities
(Al-Khobar is missing value)

9.4 The Registration Process:

Factors Influencing the Choice of the Registration Agency:

This question addressed the importance of factors influencing the choice of registration agencies among ISO 9000 registered firms. The question was designed on a Likert scale of 5 points. The results are shown in Table 9.13.

Table 9.13 Factors influencing the choice of registration agencies

Rank	Factors	Valid %					Mean	Std. Dev.
		5	4	3	2	1		
1	Their reputation and image	67.9	25.9	4.9	---	1.2	4.5926	.7032
2	Their knowledge of the industry	37.8	24.4	17.1	8.5	12.2	3.6707	1.3793
3	Experience in Saudi Arabia	30.5	20.7	20.7	14.6	13.4	3.4024	1.4042
4	Their costs	15.9	31.7	29.3	11.0	12.2	3.2805	1.2199
5	The relative simplicity of their audit procedures	11.0	18.3	25.6	20.7	24.4	2.7073	1.3193
6	Demand / advice by parent company or partner	12.2	15.9	20.7	17.1	34.1	2.5488	1.4155
7	Personal relationship	12.3	17.3	17.3	13.6	39.5	2.4938	1.4673
8	Their closeness to firm	9.9	13.6	24.7	17.3	34.6	2.4691	1.3517
9	Advice by another company or person	2.4	12.2	24.4	23.2	37.8	2.1829	1.1453

The scale is 5 = very important, 4 = fairly important, 3 = of average importance, 2 = of minor importance, 1 = not important.

The table shows that the most important factor for choosing a registration agency was reputation and image; almost 70% of respondents said that this factor was very significant in their choice. The second most influential factor was the knowledge the registration agency had about the nature of the industry. Approximately 38% of quality managers said that this factor was very important and 24.4% said it was important. Each industry has its own special characteristics, which require the auditors to be aware of its operations. Therefore, the more knowledge the auditors have about the nature of firms and their business, the better their execution of the auditing procedures. The third most crucial factor in choosing a registration agency was the experience the agency had in the Saudi Arabian market. Approximately 16% of respondents said that they considered this factor to be very important while 31.7% said it was an important factor. Usually, once the registration agency has established itself in the Saudi market, other new firms will choose the agency that has experience with other Saudi firms.

The cost of the registration process ranked 4th among other factors. This factor was not very important since the fees of the agencies are competitive. In addition, the simplicity of the auditing procedures of the registration agency did not matter very much either. Finally, subjective reasons for choosing registration agencies ranked lowest among others. Such factors include the demand by partners, personal relationships, the closeness of the registration agency to the firms and advice recommended by a friend or another company.

Those findings in Saudi industry were similar to those of Carlsson and Carlsson (1996) in their study of Swedish industry. Reputation and image in both countries was the most important criterion in choosing a registration agency. Knowledge about the industry followed by the experience in the market ranked 2nd and 3rd respectively in Saudi Arabia. In Sweden, both factors ranked after the image factor, similar to Saudi Arabia. The fees of the registration agency in both countries were not significant criterion in choosing the agency. One clear difference between the two countries was that personal relationships were more important than the fees of registration agency in Sweden, whereas the case in Saudi Arabia was the opposite.

Factors Influencing the Choice of Registration Agencies by Size of Firms:

The purpose here was to investigate if the different sizes of firms made a significant difference in choosing registration agencies. The Kruskal-Wallis test was used here as an alternative to the One Way Anova since the data was on an ordinal scale. The results are shown in Table 21, Appendix F. The table shows that there were significant differences (.05 or less) between the different sizes of firms in choosing registration agencies in only two factors. Those factors were personal relationship and advice given

by another company or person, with significance figures of .051 and .000 respectively. Those figures indicate that different sized firms varied significantly in performance on those two factors. We notice from the table that small firms tended to put more importance on those two subjective factors (higher mean ranks) when choosing registration agencies more than did large firms.

Before Choosing the Registration Agency:

The question here was about the measures that had been taken before choosing the registration agencies. The researcher presented four important actions that firms might have taken before making such a decision. The results are shown in Table 9.14.

Table 9.14 Measures taken before choosing the registration agency

No.	Measures	Yes		No	
		Freq.	Valid %	Freq.	Valid %
1	We checked their previous experience	76	93.8	5	6.2
2	We evaluated their internal operations to examine their competence and confidentiality	56	69.1	25	30.9
3	We evaluated the fees they charged depending on our financial capability	55	67.9	26	32.1
4	We checked their long-term financial viability	34	42.0	47	58.0

The table shows that almost 94% of ISO 9000 registered firms checked the previous experience of registration agencies prior to contracting them. Evaluation of the internal operations of registration agencies had been carried out by approximately 69% of respondents while 30.9% had not done so. The fees charged by registration agencies was not of major concern to respondents since almost one third of them had not checked this very closely. This figure was consistent with the findings in the former section, where we discovered that the fees of registration agencies did not represent an

important factor in choosing registration agencies. Finally, the majority of firms (58%) had not checked the long-term financial viability of registration agencies. The reason for this could be the fact that the registration agencies had high profile names, which gave firms confidence in them. These findings, that many firms did not evaluate the internal operations, or the fees, or the long-term financial viability, do not support the claims of Weightman (1997) who strongly recommends those measures.

Registration Agencies in Saudi Arabia:

This question asked, first, if a firm was registered by the Saudi Arabian Standards Organisation (SASO) and, if not, by which other agency. The reason for this approach was because some firms had dual registration through SASO and either BSI[4] or SGS. The results are shown in Table 9.15 and Figure 9.4. It should be mentioned that although the total number of firms was 83, the table included 92 firms because 9 firms had dual registration with SASO and either BSI or SGS.

Table 9.15 Shares of the registration agencies operating in Saudi Arabia

Rank	Registration Agencies	Freq.	%
1	British Standards Institution, QA (BSI)	26	28.3
2	Det Norske Veritas (DNV)	14	15.2
3	SGS, Inspection Services Saudi Arabia Ltd. (SGS)	13	14.1
4	Saudi Arabian Standards Organisation (SASO)	11	12.0
5	Lloyds Register Quality Assurance (LRQA)	9	9.8
6	ABS, Integrated Services Inc. (ABS)	6	6.5
7	AOQC: Moody International (AOQC)	5	5.4
8	TUV, Cert (TUV)	4	4.3
9	Germanischer Lloyds (GL)	2	2.2
10	American Petroleum Institute (API)	1	1.1
11	Bureau Veritas, BVQI Middle East (BVQI)	1	1.1
Total*		**92**	**100.00**

[4] Abbreviations of the names of the registration agencies are included in Table 9.15.

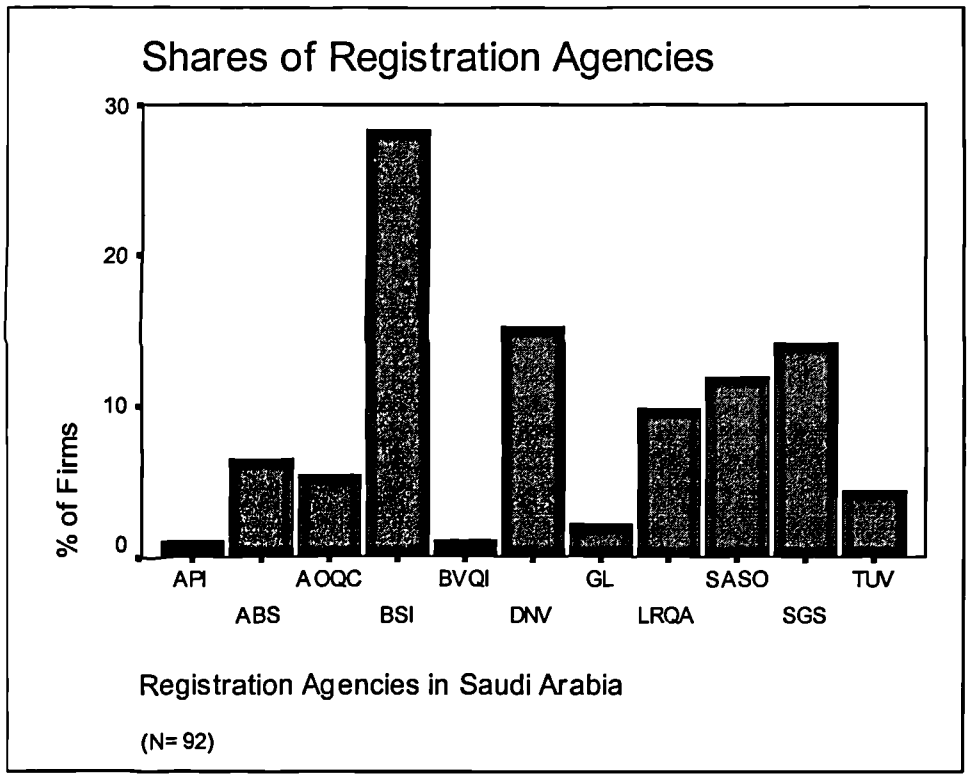

Figure 9.4 Shares of registration agencies operating in Saudi Arabia

Table 9.15 shows that BSI registered the largest number of firms in Saudi Arabia, representing approximately 28% of all firms. DNV was second, auditing approximately 15% of firms and SGS was third, registering almost 14% of ISO 9000 firms in Saudi Arabia. SASO certified 11 firms (12%), 9 of them in co-operation with BSI or SGS (7 with BSI and 2 with SGS) while only 2 firms were certified by SASO alone. The remaining agencies had the following shares: Lloyds 9.8%, ABS 6.5%, AOQC 5.4%, TUV 4.3%, Germanischer Lloyds 2.2%, API 1.1%, and finally, BVQI another 1.1% of all ISO registered firms in Saudi Arabia.

In a recent study in India, Acharya and Ray (2000) found that the involvement of foreign registration agencies was substantial, where BVQI had registered 47% of firms in their study, and both LRQA and DNV had registered 11% of firms. The Saudi

figures then support those of India, taking into consideration that there are some similarities between the two countries.

Duration of Registration Agencies Operating in Saudi Arabia:

The length of time that each registration agency had been in operation was calculated by conducting a cross-tabulation between registration agencies and years of registration of each firm. The results of this cross-tabulation are shown in Table 22, Appendix F. The table shows that the oldest group of registration agencies operating in Saudi Arabia includes BSI, DNV and Lloyds Register, which have spent 5 years or more in the country. The second oldest group includes ABS, Germanischer Lloyds, SGS, TUV and API, working in Saudi Arabia between 3 and 5 years. The third oldest registration agency was AOQC: Moody, having spent between 2 and 3 years operating in the country. The fourth oldest agency was Bureau Veritas, having worked in the kingdom between 1 and 2 years. Finally, the Saudi Arabian Standards Organisation (SASO) had been in the business of registration and working on its own without co-operation with BSI or SGS for less than a year.

Locations and Nationalities of the Registration Agencies:

Table 23, Appendix F shows the locations and nationalities of the registration agencies operating in Saudi Arabia. We notice from the table that some agencies operate from within the country while others operate from abroad. BSI, the dominant agency in the country, operates from the UK by sending teams of auditors to Saudi firms for assessment. DNV operates from Dubai to be close to the Eastern Region of Saudi Arabia and to the Gulf State countries. Germanischer Lloyds is located in Egypt, which is near the West Coast of Saudi Arabia, so far auditing firms only in Jeddah. Of the

registration agencies that are located in Saudi Arabia, 3 agencies were in Dammam, 1 in Jeddah, and 1 in Al-Khobar.

In addition, Table 23, Appendix F shows the nationalities of the registration agencies in Saudi Arabia. The majority of registered firms (80.4%) in the country were audited by British agencies. SASO ranked 2nd by auditing 12% of registered firms. However, SASO audited only 2 firms by its own efforts. The remaining 9 firms were audited in co-operation with BSI then SGS. The third nationality was Germany: 6.5% of firms were registered by German agencies. Finally, only 1 firm was registered by an American agency making only 1.1% of the total number of firms. We can conclude that foreign agencies operating in Saudi Arabia have dominated the registration scene, representing a share of 88% of registered firms. Figure 9.5 shows the shares of those nationalities operating in Saudi Arabia. One point that should be mentioned here is that although some of those agencies were originally from the Netherlands or Switzerland, their associated British agencies operate in Saudi Arabia. This makes the nationality of such agencies British and accredited by United Kingdom Accreditation Services (UKAS).

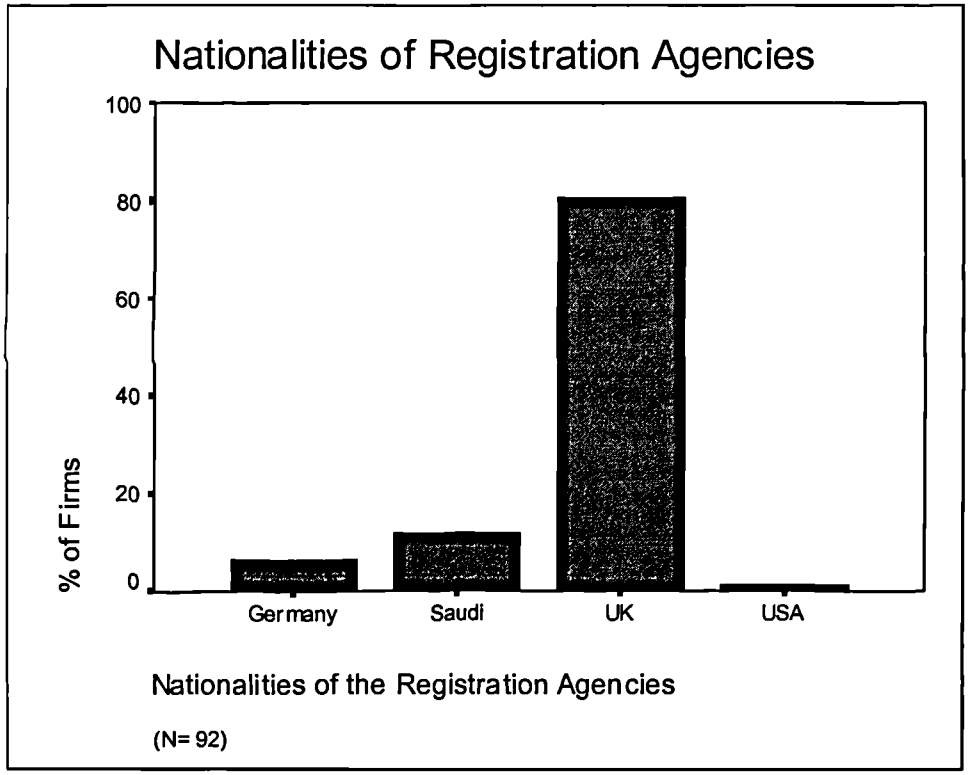

Figure 9.5 Percentages of registered firms by nationalities of registration agencies

Reasons for not Choosing SASO:

ISO 9000 registered firms that did not choose SASO as their registration agency were asked to state their agreement or disagreement with possible 5 reasons for not choosing SASO. The results are shown in Table 9.16.

Table 9.16 Reasons for not choosing SASO

No	Reasons	Valid %					Mean	Std. Dev.
		SA	A	N	D	SD		
1	The foreign certificate is more prestigious world-wide	45.3	29.7	15.6	6.3	3.1	4.0781	1.0736
2	The foreign certificate is more valid and credible world-wide	46.2	24.6	20.0	7.7	1.5	4.0615	1.0588
3	The foreign agency is usually more competence than SASO	25.4	23.8	34.9	12.7	3.2	3.5556	1.1039
4	The foreign agency's audit procedures are less complicated than SASO's	---	1.6	66.7	17.5	14.3	2.5556	.7573
5	The foreign agency is cheaper	---	1.6	62.5	18.8	17.2	2.4844	.7967

The scale is 5 = strongly agree (SA), 4 = agree (A), 3 = neither agree nor disagree (N), 2 = disagree (D), and 1 = strongly disagree (SD)

The table demonstrates that the most important reason for choosing a foreign agency over SASO was that the ISO certificate of the foreign agency was more prestigious world-wide. More than 46% of the respondents strongly agreed and about 30% agreed with this. The foreign agencies are usually more appealing to firms and the people in the developing countries rather than their own national agencies. Big names, such as BSI, DNV, SGS and so forth, are usually felt to be more prestigious world-wide, regardless of any other objective reasons. The second most important reason was that the ISO certificate of the foreign agency was more valid and credible in the world. More than 46% of quality managers strongly agreed and 24.6% agreed on this. The credibility and validity of ISO 9000 certificate was very important to firms especially since SASO, as of the date of collecting this data, had not yet been accredited by the ISO (International Organisation for Standardisation) as a registration agency. The required standard ISO 62 had not been achieved by SASO as Bas-ham (1998) mentioned. The reason for Saudi industry not choosing SASO as a registration agency supports the suggestions of Weightman (1997), who prefers an accredited agency.

The third key important reason for not choosing SASO was that the foreign agency was deemed more competent; 25.4% of respondents strongly agreed and 23.8% agreed with this. As SASO had not been accredited by ISO as a registration agency, firms had the right to assume that SASO was less competent than the foreign agencies. The two least important reasons were that the audit procedures of the foreign agencies were less complicated than SASO's, and that the foreign agency was cheaper than SASO. Those reasons did not influence the choice of the foreign agency. We have noticed from previous sections that the cost of the registration agencies has not been an important deciding factor for ISO 9000 registered firms.

In addition, three firms mentioned that they did not choose SASO because it was not ready at that time to audit them against ISO 9000. The quality manager of Safco Ibn Al-Baytar, told the researcher that SASO did not have the experienced auditors who understood the field of petrochemicals. Therefore, he thought that SASO with its limited technical capabilities could not have performed an ISO assessment for his firm.

Internal Auditing:

Internal audit is a mandatory requirement of Clause 4.17 of ISO 9001 (1994), which demands that the firm should establish an internal quality audit programme to verify whether quality activities comply with planned arrangements.[5] Therefore, we expect the result of this factor to be almost perfect conformance since it is mandatory and the violation of such an element would be considered a major non-conformity. The result of the internal auditing question is shown in Table 9.17.

Table 9.17 Existence of internal auditing for ISO 9000 quality system

Internal Audit	Frequency	%
Yes	82	98.8
No	1	1.2
Total	**83**	**100.00**

The table shows that all firms except one did perform internal auditing against ISO 9000, representing 98.8% of firms, which was expected. Therefore, the compliance with the relevant clause (4.17) was satisfactory. ISO 9000 auditors insist in their surveillance visits that internal auditing is well performed and fully documented (Al-Henaihin, 1998).

[5] Guidelines on quality-system audits are included in ISO 1001-1(1994), ISO 10011-2 (1994) and ISO 10011-3 (1994).

The Pre-assessment Audit:

The process of a pre-assessment audit is performed by the registration agency prior to the full assessment to examine the readiness of the firm for a final audit. The result of this question is shown in Table 9.18.

Table 9.18 Pre-assessment audit conducted in ISO 9000 registered firms

Pre-assessment Audit	Frequency	%
Yes	72	87.8
No	10	12.2
Total	**82**	**100.00**

The table shows that the vast majority of ISO 9000 registered firms in Saudi Arabia (72 firms) received a pre-assessment audit, representing 87.8% of firms. Not all firms received such an assessment as it is not required by ISO 9000 (ISO 62, 1996). However, it helps a firm to diagnose its quality system for any problems and to reduce the costs of the final registration process in general (Potts, 1997).

The majority of firms then used the pre-assessment audit, which supports the claims of Hockman *et al.* (1994) and Potts (1997) as to the benefits of this assessment. In Hong Kong, Lee (1995) found that 81% of ISO 9000 registered firms in the manufacturing sector did have a pre-assessment audit performed by registration agencies. This finding is slightly lower than that of Saudi Arabia (87.8%), which means that the Saudi figures support those of Hong Kong.

Number of Audits until Achieving Registration:

This question related to the number of audits carried out prior to receiving full registration to ISO 9000. The researcher gave three alternatives; one audit, two audits, and more than two audits. The results of this question are shown in Table 9.19 and Figure 9.6.

Table 9.19 Number of audits until firms achieved full registration

Audits	**Frequency**	**%**
During the first audit	73	88.0
During the second audit	10	12.0
During the third audit	---	---
Total	**83**	**100.00**

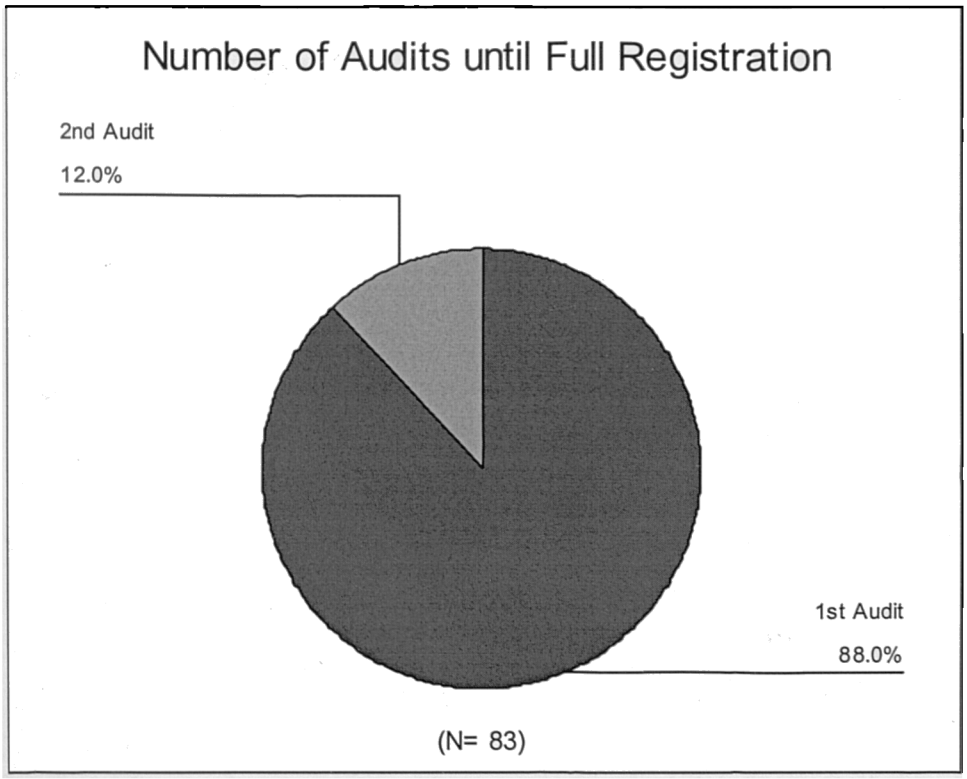

Figure 9.6 Number of audits until firms achieved full registration

From Table 9.19 it is apparent that the vast majority of ISO 9000 registered firms (73) achieved a registration certificate from the first audit, representing 88%, whilst 10 firms

achieved ISO 9000 registration during the second audit, making up the remaining 12% of ISO 9000 registered firms in Saudi Arabia. This means that a considerable number of firms did fail during the first audit, which required them to go to the second audit for ISO 9000 certification. The researcher asked the assessors for their views on this matter. Price (1999) of Lloyds mentioned that 85% of firms passed at the first audit and 15% at the second audit. Alyah (1999) of Det Norske wrote that 60-75% of firms achieved registration at the first audit and the rest during the second. Bounds (1999) of Moody gave a more optimistic percentage, saying that 94% of Saudi firms achieved full registration at the first audit. Since those figures given by the assessors fall between 60% and 94%, which are close to those given by the quality managers, we may consider the figure from the respondents (88%) to be a valid conclusion.

Number of Audits by Size of Firm:

The purpose here was to find out the percentage of firms according to their size that achieved ISO registration during the first and second audits. A cross-tabulation was performed between number of audits and size of firms. The results are shown in Table 9.20 and Figure 9.7.

Table 9.20 Number of audits by size of firm

No.	Sizes of Firms (Number of Employees)	% of Firms that Achieved Registration During		
		First Audit	Second Audit	Total
1	1-100	100.00	---	100.00
2	101-300	84.80	15.20	100.00
3	301 or more	84.40	15.60	100.00
Total		88.00	12.00	100.00

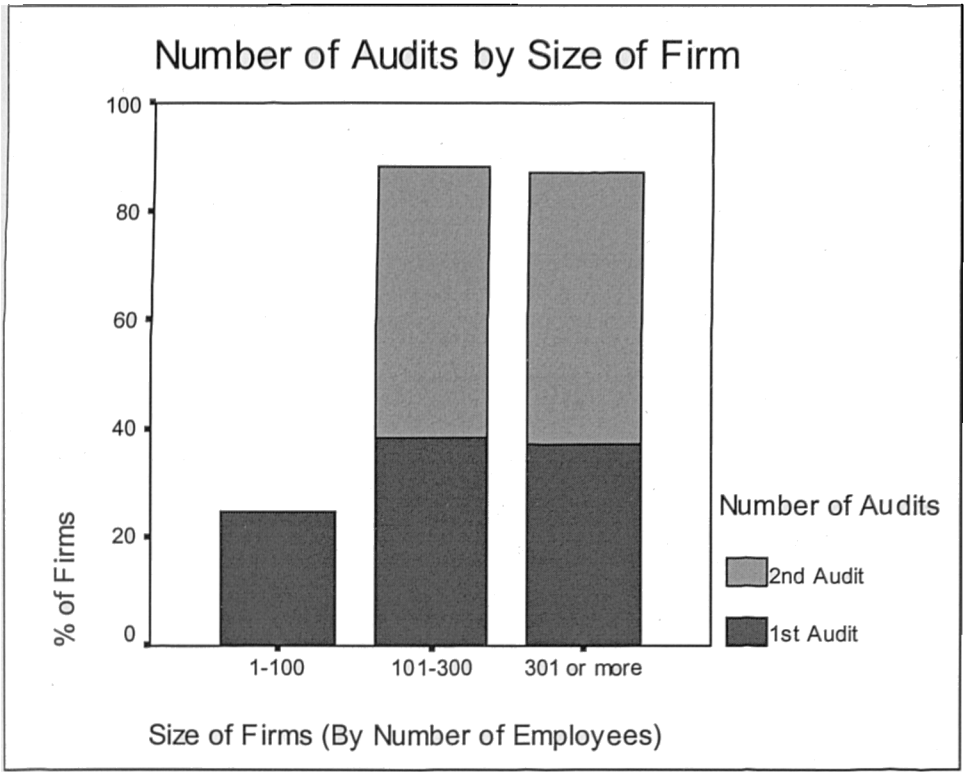

Figure 9.7 Number of audits until full registration by size of firm

Table 9.20 shows that all small firms and approximately 85% of the firms in the other two size groups achieved ISO 9000 registration during the first audit. From those results, one may conclude that the smaller the firm, the more likely it is to achieve registration during the first audit. As a speculation, it is possible that smaller firms may have encountered fewer problems and requirements, and had less documentation. In addition, such firms may have relied on external help in preparing for ISO.

The Duration of the Registration Process:

This question was about the time spent by the firms in achieving ISO 9000 registration from the beginning to the end of the process. The results are shown in Table 9.21 and Figure 9.8.

Table 9.21 The duration of the registration process

Years	Frequency	%
Less than 1 year	42	51.2
1- 2 years	34	41.5
2- 3 years	5	6.1
3 years or more	1	1.2
Total	**82**	**100.00**

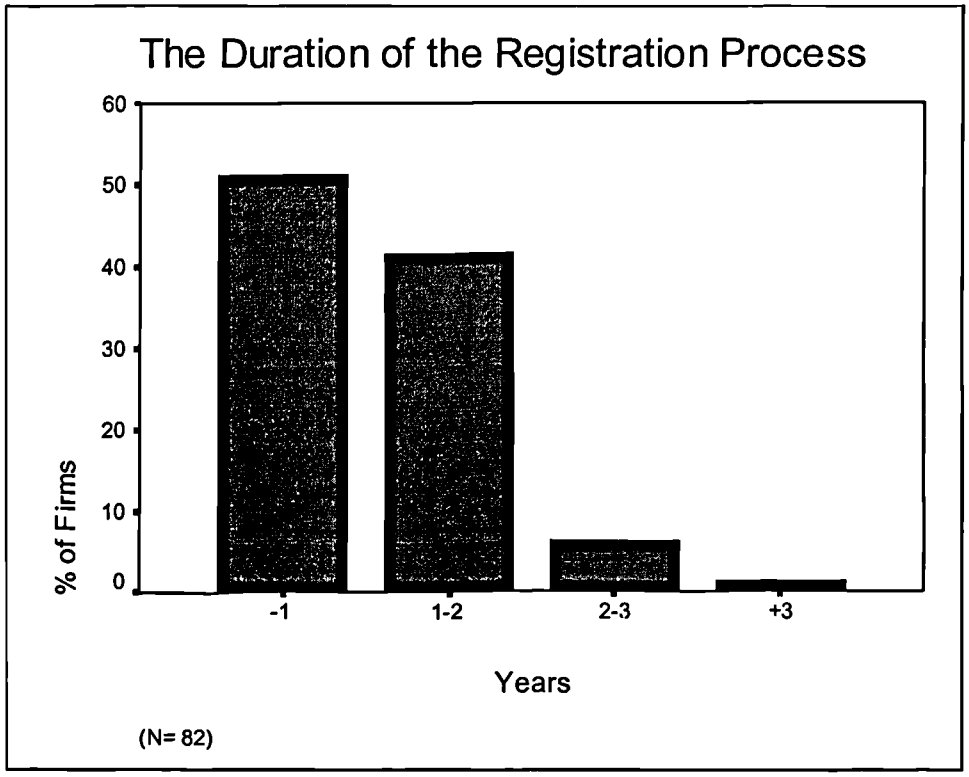

Figure 9.8 Duration of the registration process until full registration

From Table 9.21 it is evident that approximately half of the firms (42 firms) spent almost a year in the registration process, making up 51.2% of all firms. The second group, comprising 34 firms, achieved ISO registration in to and two years, representing 41.5% of all ISO 9000 registered firms in Saudi Arabia. Five ISO 9000 firms achieved registration in 2 to 3 years. Finally, one firm spent more than 3 years obtaining ISO certification. The conclusion is that more than 90% of firms did achieve ISO 9000 in less than 2 years from the beginning to the end of the process.

In the questionnaire posted to the assessors in Saudi Arabia, their answers supported these findings. Price (1999) mentioned that firms in Saudi Arabia achieved registration much faster than in the UK. He mentioned that with the help of consultants, small firms could spend only 3-6 months gaining registration, but others could spend 2 years if not guided. Alyah (1999) said that the duration depends on the size of the firm, but registration usually takes 3-12 months. Bound (1999) agrees with Price (1999), that if firms employed consultants, they could spend only 7-9 months in achieving registration.

These findings of Saudi Arabia support the expectation of Durand *et al.* (1997) of between 3 and 18 months. In Turkey, Erel and Ghosh (1995) found that approximately 31% of Turkish firms achieved registration in less than a year, 64% between 1 and 2 years, and the remaining 5% of firms achieved ISO 9000 registration in more than 2 years. In India, Acharya and Ray (2000) found that 28% achieved it in less than a year, 63% between 1 and 2 years, and the remaining 9% of firms between 2 and 3 years. The conclusion of this comparison is that Saudi firms have been slightly faster than their Turkish and Indian counterparts in achieving ISO 9000 registration.

The ISO 9000 Certificate:

The question of the validity of ISO certificate was addressed to quality managers asking them to determine the duration or the validity of their ISO 9000 certificate. The results are shown in Table 9.22.

Table 9.22 The duration of validity of ISO 9000 certificate by registration agencies

No.	Registration Agencies	Duration of Certificate
1	British Standards Institution, QA (BSI)	Does not expire
2	Det Norske Veritas (DNV)	3 Years
3	SGS, Inspection Services Saudi Arabia Ltd. (SGS)	
4	Lloyds Register Quality Assurance (LRQA)	
5	ABS, Integrated Services Inc. (ABS)	
6	AOQC: Moody International (AOQC)	
7	TUV, Cert (TUV)	
8	Germanischer Lloyds (GL)	
9	American Petroleum Institute (API)	
10	Bureau Veritas, BVQI Middle East (BVQI)	
11	Saudi Arabian Standards Organisation (SASO)	2 Years

From the table it can be seen that BSI offered an indefinite ISO 9000 certificate that does not expire, pending continuous, successful surveillance visits. The majority of the registration agencies, however, offered a 3-year valid certificate to their clients in Saudi Arabia. Nine out of eleven registration agencies operating in the country offered this type of certificate. Finally, the Saudi Arabian Standards Organisation (SASO) offered an ISO certificate that is valid for only two years.

Surveillance Visits:

This question related to the number of surveillance visits conducted each year by the registration agencies to ensure that the quality system is conforming to ISO 9000 requirements. The results are shown in Table 9.23 and Figure 9.9.

Table 9.23 Surveillance visits conducted by the registration agencies each year

Number of Surveillance Visits	Frequency	%
One per year	13	15.7
Two per year	70	84.3
Three per year	—	—
Total	**83**	**100.00**

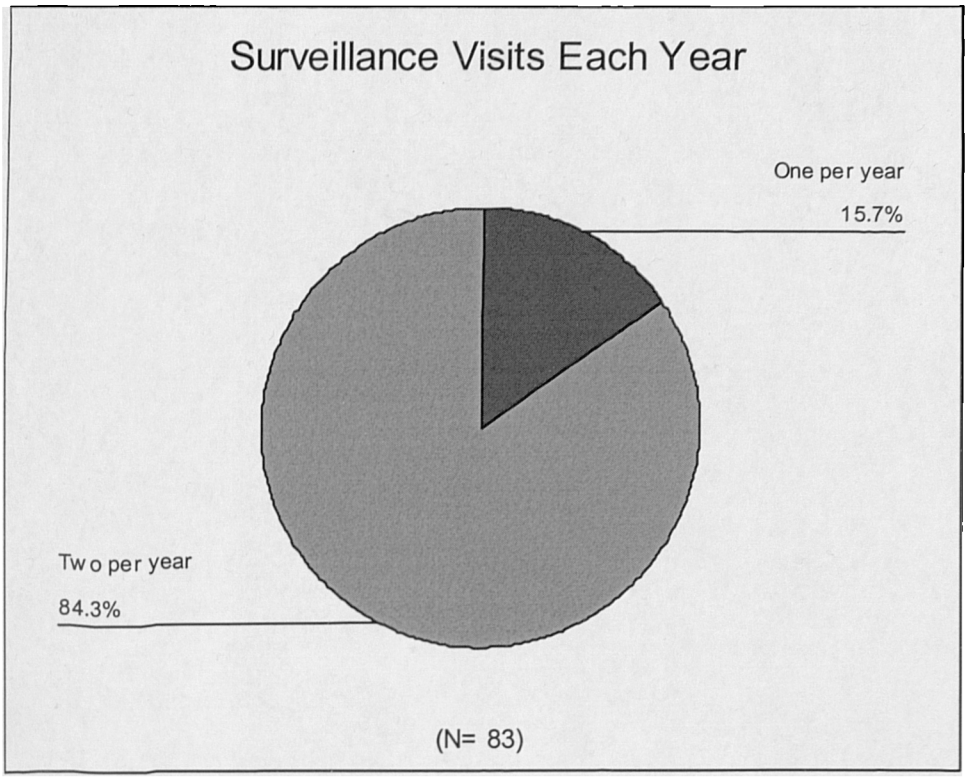

Figure 9.9 Surveillance visits conducted by registration agencies each year

Table 9.23 shows that the vast majority of firms (70 firms) received 2 surveillance visits each year, representing 84.3% of ISO 9000 registered firms in Saudi Arabia. On the other hand, 13 firms received one surveillance visit each year, making up 15.7% of all the firms under study. The firms that had dual registration with SASO and either BSI or SGS mentioned that they received 4 surveillance visits, 2 by SASO and 2 by the other registration agency. Another finding was that the British registration agencies, ABS, AOQC, BSI, Bureau Veritas, DNV, Lloyds Register, and SGS conducted 2 surveillance visits each year. SASO carried out 2 surveillance visits as well. On the other hand, the German agencies, Germanischer and TUV, and the American agency, API, conducted only one surveillance visit a year. These findings revealed that Saudi firms complied with the requirements of ISO 62 (1996) in having surveillance visits at least once a year and the majority had it twice a year, as Arora (1996) expected.

The assessors were asked in the postal questionnaires about the degree of coverage of the quality system that assessors perform during surveillance visits. Alyah (1999) mentioned that in they cover part of the quality system in one visit but they cover the whole system each year (90%). Price (1999) also said that they cover part of the quality system each visit. Moreover, Bound (1999) wrote that they cover management clauses each time (e.g. management review, internal audits) plus selected clauses as identified during surveillance visits.

9.5 Issues with Registration Agencies:

Problems with the Registration Agencies:

This question investigated the severity of the problems that might have faced ISO 9000 registered firms from their registration agencies. The question included 7 perceived problems, asking respondents to state their degree of agreement or disagreement on a 5 Likert scale. The results are shown in Table 9.24, in which the problems are ordered from the most to the least severe ones.

Table 9.24 Problems with the registration agencies operating in Saudi Arabia

No	Statements	Valid %					Mean	Std. Dev.
		SA	A	N	D	SD		
1	Auditing fees are high	7.3	24.4	25.6	36.6	6.1	2.9024	1.0728
2	Choosing the appropriate registration agency is difficult	2.4	13.3	9.6	56.6	18.1	2.2530	.9858
3	Auditing procedures are complicated	3.6	14.5	2.4	61.4	18.1	2.2410	1.0311
4	Auditing time is lengthy	6.0	6.0	6.0	69.9	12.0	2.2410	.9575
5	They lack knowledge about our particular industry	4.8	6.0	6.0	53.0	30.1	2.0241	1.0238
6	The registration agency has endless demands	2.4	3.6	4.8	67.5	21.7	2.0241	1.0238
7	There is a scepticism about the ethics of the assessors	2.4	3.7	13.4	43.9	36.6	1.9146	.9323

The scale is 5 = strongly agree (SA), 4 = agree (A), 3 = neither agree nor disagree (N), 2 = disagree (D), and 1 = strongly disagree (SD)

The table shows that the most important problem in the opinion of the respondents was the fees charged by the registration agencies. Approximately one third of the respondents (31.7%) either strongly agreed or agreed that this was a problem. The second most important problem was choosing the appropriate registration agencies, where almost 16% of quality mangers either strongly agreed or agreed that this was a difficulty. The complications of the auditing procedures and the time consumption of the registration agency were both considered equally important problems ranking, 3rd and 4th among the others. However, the majority of the respondents either disagreed or strongly disagreed with the existence of such impediments as a whole. Therefore we could say that the existence of those problems is not an important consideration. Finally, the lack of knowledge about the industry, the registration agencies having endless demands, and scepticism about the ethics of the assessors were all regarded as relatively minor problems and were considered by the vast majority of the respondents to be of little significance.

Satisfaction with the Registration Agencies:

Respondents were asked to rate their overall satisfaction with their registration agencies on a 5-point scale. The results of this question are shown in Table 9.25 and Figure 9.10.

Table 9.25 Satisfaction with registration agencies

Levels of Satisfaction	Frequency	%
Very high satisfaction	36	43.9
High satisfaction	38	46.3
Average satisfaction	8	9.8
Low satisfaction	---	---
Very low satisfaction	---	---
Total	**82**	**100.00**

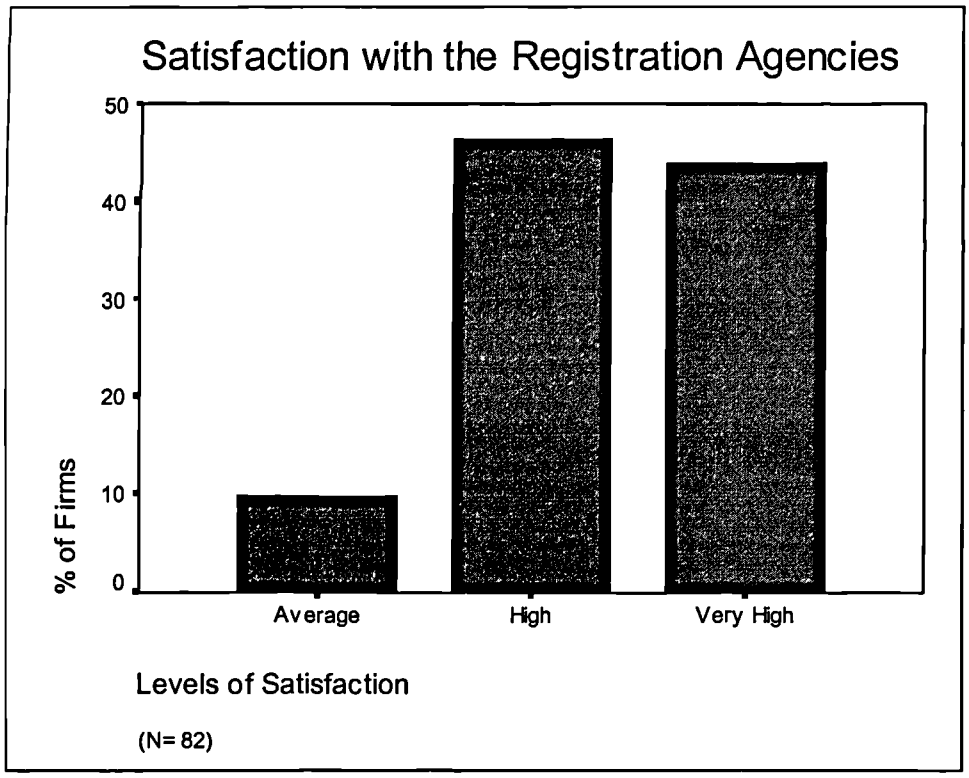

Figure 9.10 Satisfaction with the registration agencies operating in Saudi Arabia

Table 9.25 shows that the majority of firms (38) representing 46.3% of all respondents rated their satisfaction with registration agencies 4th on a 5-point scale, which means a high satisfaction but not very high. Of the respondents, 36 of them rated their satisfaction very highly or 5th out of 5 on the scale, making up 43.9% of all ISO 9000 registered firms in Saudi Arabia. Finally, 8 respondents considered their satisfaction as average, or 3rd out of 5 on the scale, making up the remaining 9.8% of quality managers in the survey. No respondents to this question considered their registration agencies to be less than average since they did not give less than 3 out of 5 on the scale. The conclusion of this evaluation of the registration agencies operating in the country is that the level of satisfaction was high in general and the disappointment was minimal, as shown in those figures.

In Hong Kong, Lee (1995) found that the satisfaction level with auditors of the three sectors under study was generally high; 79% in the service industry, 81% in the manufacturing sector, and 92% in the building sector. The average satisfaction level in Hong Kong was 85% in all sectors, but with no scaling as to the degree of satisfaction. In India, Acharya and Ray (2000) found that over 95% of firms were satisfied, 2% were not very happy, and 3% were not at all happy. From this comparison, it can be said that the Saudi findings are closer to those of India and therefore support them. Nevertheless, the level of satisfaction in Hong Kong is still generally high, which concludes that satisfaction with the registration agencies auditing ISO 9000 is high in the three countries.

Ranking of the Registration Agencies:

The purpose here is to rank the registration agencies operating in Saudi Arabia based on the satisfaction of their client firms. Two statistical methods were used; comparing means and the Kruskal-Wallis (one way Anova) tests. The results are presented in Table 24, Appendix F. The table shows the ranking of the registration agencies in Saudi Arabia with respect to the satisfaction level of the ISO 9000 registered firms in the country. Lloyds Register was ranked first and SGS ranked last. However, differences were slight and not significant (.524) since establishing a significant figure among 9 groups was somewhat difficult. When the Mann-Whitney test was used to compare between the first and the last agencies, it showed a significant difference.

9.6 ISO 9000 Documentation:

Types of Documentation:

Documentation in ISO 9001 (1994) is probably the most repeated item in the standard since the standard requires documentation of all procedures in all ISO clauses. In addition, Clause 4.5 covers the documentation process in its three sub-clauses. Respondents were asked about the existence of the three types of documentation; the quality manual, quality procedures and work instructions. Quality records as the fourth level of documentation will be addressed in a subsequent section. All firms are expected to have those three types of documentation. The results are shown in Table 9.26

Table 9.26 The existence of the three types of documentation

No.	Documentation Types	Yes		No	
		Freq.	Valid %	Freq.	Valid %
1	Quality Manual	83	100	---	---
2	Quality procedures	83	100	---	---
3	Work instructions	81	97.6	2	2.4

The table shows that all firms had quality manuals and quality procedures. Work instructions were used by almost 98% of firms; only 2 firms did not use them. The quality manual is mandated by ISO 9001 (1994) in Sub-clause 4.2.1, which demands that the firm prepares a quality manual covering the requirements of the ISO 9000 standard (9001, 9002, or 9003) in the quality manual. In addition, Al-Henaihin (1998), an auditor at SASO, mentioned that the first requirement for a firm's assessment is to submit the quality manual. Therefore, 100% compliance concerning the quality manual is expected since its existence is crucial to ISO 9000 implementation.

Quality Records:

Quality records are the fourth level of documentation covered by Clauses 4.5 and 4.16 of ISO 9001 (1994). Clause 4.5 covers elements 3 and 6 in Table 9.27 while Clause 4.16 covers all 6 elements in the table, including 3 and 6, which are covered by Clause 4.5. In addition, the control of quality records is probably the most repeated item in ISO 9001 clauses 4.1.13, 4.2, 4.3.4, 4.4, 4.6.2, 4.7, 4.8, 4.9, 4.10, 4.11, 4.12, 4.13, 4.14, 4.17, and 4.18 (Peach, 1997:405). The results of investigating quality records are included in Table 9.27.

Table 9.27 Practices relating to quality records

No	Practices	Valid %					Mean	Std. Dev.
		A	O	S	R	N		
1	We maintain quality records	91.6	8.4	---	---	---	4.9157	.2796
2	We store and file quality records	90.4	9.6	---	---	---	4.9036	.2969
3	We can access quality records	90.4	9.6	---	---	---	4.9036	.2969
4	We collect and document quality records	82.9	14.6	2.4	---	---	4.8049	.4565
5	We index quality records	79.3	11.0	6.1	---	3.7	4.6220	.8977
6	We segregate or dispose of obsolete quality records	59.8	20.7	13.4	1.2	4.9	4.2927	1.0714

The scale is 5 = always (A), 4 = often (O), 3 = sometimes (S), 2 = rarely (R), and 1 = never (N)

The table shows a reasonable compliance to ISO 9001 clauses 4.5, 4.16 and to the other clauses mentioned earlier that govern quality records and documentation. In addition, those high figures prove compliance to the documentation requirements that are included in almost all ISO 9000 clauses since they require 'documented procedures'. The least implemented item, which was related to the disposal of obsolete quality records, was probably due to the reluctance of firms to destroy some data that might be needed in the future. One respondent mentioned that his firm kept records for 3 to 5 years before disposal. In addition, Table 25, Appendix F includes examples of quality records that were mentioned by the respondents.

Writing the Quality Manual:[6]

Reliance on External Help in Writing the Quality Manual:

This question was about the reliance of firms on external help in writing their quality manuals. External help usually comes from external consultants. The results of the first part are shown in Table 9.28 and Figure 9.11.

le 9.28 Writing the Quality Manual (s) with external help

erion	Freq.	%
Quality Manual was written by our employees	43	53.1
Quality Manual was written with external assistance	38	46.9
Total	**81**	**100.00**

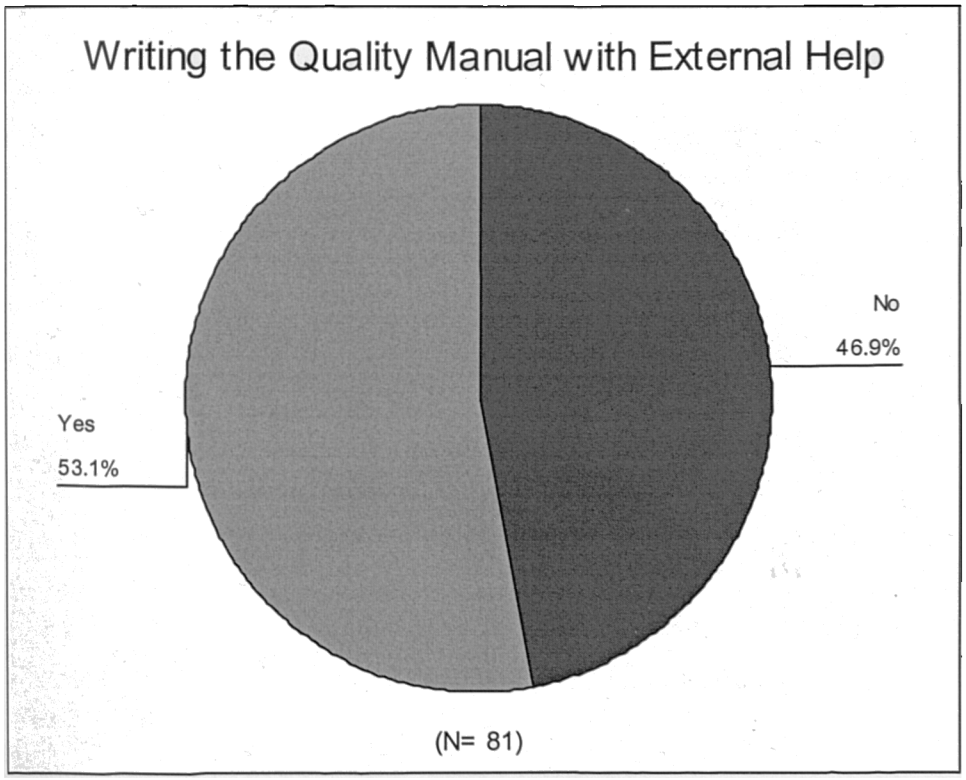

Figure 9.11 Reliance on external assistance in writing the quality manual

[6] Guidelines on the preparation of quality manual are provided in ISO 10013.

Table 9.28 shows that the use of external assistance in writing the quality manual (s) was great. Approximately, 47% of ISO 9000 registered firms relied on external help, usually an external consultant. On the other hand, just over 53% of respondents relied on their own staff in writing their quality manual (s). In some instances, such as in the case of the large firms, they had more than one quality manual.

Participation of the Employees in Writing the Quality Manual:

The second part in writing the quality manual related to the employees' participation which means that, since employees in their departments are supposed to know the details of their own work. Therefore, they can participate in providing information and advice to the person who is writing the quality manual. The results of this part are shown in Table 9.29.

Table 9.29 Participation of employees in writing the quality manual

Each person participated in writing the element of the quality manual that is related to his job	**Freq.**	**%**
Yes	63	76.8
No	19	23.2
Total	**82**	**100.00**

The table shows that the majority of firms (76.8%) had their employees participate in advising in the writing of the quality manual. Therefore, they probably contributed with their knowledge about the details of their jobs. On the other hand, the employees of the remaining 23.2% of firms did not participate in the writing of the quality manual.

Quality Manual Layout:

As mentioned in the literature review, a quality manual's contents are arranged either by the sequence of ISO 9000 elements or by the workflow of the firm. Respondents were asked about the method they followed in arranging their quality manual. The results are shown in Table 9.30 and Figure 9.12.

Table 9.30 Layout of the quality manual

Methods of Layout	Freq.	%
According to the sequence of ISO 9000 elements	72	86.7
According to the workflow of the firm	11	13.3
Total	83	100.00

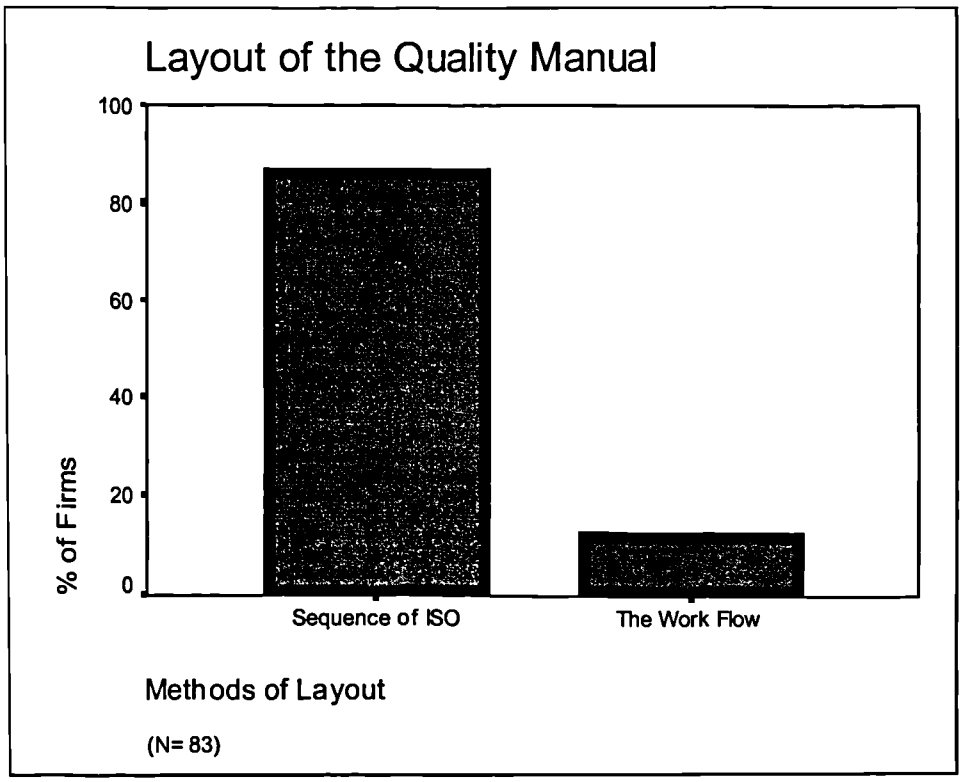

Figure 9.12 Layout of the quality manual

Table 9.30 shows that the vast majority of ISO 9000 registered firms in Saudi Arabia (72 firms) arranged their quality manual according to the sequence of ISO 9000 elements, representing 86.7% of all firms. The remaining 11 firms wrote their quality

manual according the workflow of their firms, making up 13.3% of the respondents. This finding might assume that arranging the quality manual according to the sequence of ISO 9000 clauses could be easier for firms than the other method. These findings support the suggestion of Clause 7.7 of ISO 10013 (1995) and of Benson and Sherman (1995), that the quality manual will look more organised.

Evaluation of the ISO 9000 Quality Manual:

This question related to the evaluation of the ISO 9000 quality manual on a 5 point-scale. Analysis of this question is divided into two parts; agreement as to the advantages of the quality manual, and agreement as to its disadvantages. Table 9.31 shows the results of the respondents' agreement on two advantages, while Table 9.32 shows the results of their agreement on six disadvantages of the ISO 9000-quality manual.

Table 9.31 Agreement of the advantages of ISO 9000 quality manual

No	Statements	Valid %					Mean	Std. Dev.
		SA	A	N	D	SD		
1	The quality manual is helpful	40.2	58.5	1.2	---	---	4.3902	.5153
2	The quality manual is accurate	24.1	63.9	4.8	6.0	1.2	4.0361	.8031

The scale is 5 = strongly agree (SA), 4 = agree (A), 3 = neither agree nor disagree (N), 2 = disagree (D), and 1 = strongly disagree (SD) for 82 firms.

From Table 9.31 it is apparent that agreement from the respondents on the two advantages of ISO 9000 quality manual was great. Almost all the respondents thought that the quality manual was helpful to them, although 58.5% of them did not strongly agree on this issue. This item did not specify what kind of help the manual provides, instead, it asked about the degree of agreement among respondents. In addition, approximately 90% of quality managers strongly agreed or agreed that the ISO 9000

quality manual was accurate. The conclusion is that the vast majority of the quality managers of ISO 9000 registered firms in Saudi Arabia believed that the quality manual was helpful and accurate.

On the other hand, Table 9.32 shows the agreement of the respondents as to the disadvantages of the ISO 9000 quality manual. The table shows that the most important disadvantage of the quality manual was the large administrative burden involved when implementing ISO 9000. However, while more than 35% of respondents strongly agreed or agreed with this disadvantage, the majority did not think so. The second most important disadvantage of the ISO 9000 quality manual was that it was theoretical and about 16% of quality managers strongly agreed or agreed on this matter. The third disadvantage was that the quality manual leads to a loss of flexibility; with almost 11% strongly agreeing or agreeing on this issue. The quality manual being too elaborate and long ranked fourth; being complicated ranked fifth; and being useless after registration ranked as the least important disadvantage.

Table 9.32 Agreement about the disadvantages of the ISO 9000 quality manual

No	Statements	Valid %					Mean	Std. Dev.
		SA	A	N	D	SD		
1	It involves a large administrative burden	8.5	26.8	7.3	50.0	7.3	2.7927	1.1731
2	It is too theoretical	4.9	11.0	6.1	62.2	15.9	2.2683	1.0189
3	It leads to a loss of flexibility	3.7	7.3	12.2	63.4	13.4	2.2439	.9103
4	It is too elaborate and long	---	15.9	7.3	61.0	15.9	2.2317	.9067
5	It is too complicated	---	1.2	4.9	68.3	25.6	1.8171	.5693
6	It is useless after achieving registration	1.2	4.9	2.4	48.8	42.7	1.7317	.8322

The scale is 5 = strongly agree (SA), 4 = agree (A), 3 = neither agree nor disagree (N), 2 = disagree (D), and 1 = strongly disagree (SD) for 82 firms.

The conclusion about the evaluation of the ISO 9000 quality manual is that, in general, respondents had a positive attitude towards it. However, while they felt it was helpful and accurate, they thought that it had some disadvantages. The majority of respondents

did not agree with those disadvantages of the quality manual. The most important disadvantages were that; it involves large administrative burden, it is too theoretical and it leads to a loss of flexibility.

In Belgium, Vloeberghs and Bellens (1996) found the following disadvantages of the ISO 9000-quality manual: it involved an enormous administrative burden followed by loss of flexibility; its nature is too theoretical and finally, it is too elaborateness. It can be noticed that the large administrative burden ranked first in both Belgium and Saudi Arabia. Loss of flexibility ranked second in Belgium but three in Saudi Arabia. The theoretical nature of the quality manual ranked third in Belgium but second in Saudi Arabia. Finally, the elaborateness of the quality manual ranked fourth in both countries. The conclusion of this comparison is that both countries are very similar in their ranking of the disadvantages of the ISO 9000-quality manual and therefore the Saudi findings support those of Belgium.

9.7 Costs of ISO 9000 Implementation:

Types of Costs:

This question covered the three types of costs associated with ISO 9000 implementation. First, the internal costs, referring to those associated with the internal implementation of the system inside the firm, such as the costs of training, reorganisation, hiring new employees, education, and so forth. The second type of costs concerns the fees paid to external consultants. The third costs comprise fees charged by the registration agencies for application, pre-assessment audit, audit and surveillance visits. These fees are usually charged on a per person, per day basis. Table 9.33 presents descriptive statistics showing the minimum, the maximum, and the average of costs associated with ISO implementation. Figure 9.13 shows the average costs of the three types of ISO 9000 implementation costs.

Table 9.33 Costs of implementing ISO 9000 in Saudi Arabia* in Saudi Riyals (SR)**

No.	Types of Costs	Minimum	Maximum	Average	% of Total Averages
1	Internal costs inside the firms	.00	1,400,000	208,212.12	66.80
2	Consultancy fees	.00	500,000	65,595.5	21.10
3	Registration agencies' fees	5,000	100,000	37,688.62	12.10
4	**Total Averages**			311,496.24	100.00

* Missing values, 50 for item 1, 47 for item 2, and 38 for item 3. **£1 Sterling = 6 Saudi Riyals approximately.

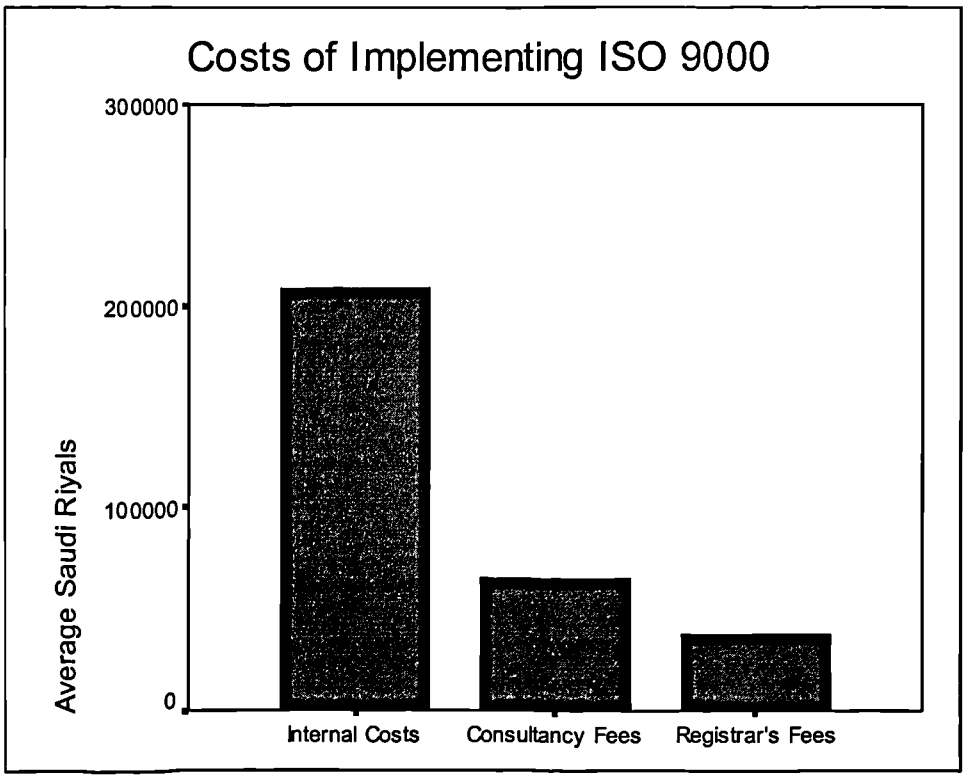

Figure 9.13 Average costs of implementing ISO 9000

From Table 9.33 it is clear that the highest costs associated with ISO implementation were the internal costs that occurred inside the firm. The average internal costs among all firms were more than SR 208,000, representing 66.8% of all three costs. The consultancy fees paid to external consultants ranked second, making an average amount of approximately SR 66,000 and representing 21.1% of all costs. The lowest costs associated with ISO 9000 implementation were the fees of the registration agencies, making an average amount of about SR 38,000 and representing 12.1% of all costs. In addition, Bas-ham (1998) mentions that SASO, charges SR 3,000 per auditor per day for a pre-assessment audit and for the formal assessment. Lloyds Register Quality Assurance charges a flexible rate depending on certain factors, such as size of firm, but generally, they charge SR 3500 to 4400 per day, per person (Price, 1999). It can be noticed that the cost of registration was not the largest expenditure and firms are in fact

paying more money to prepare themselves for ISO. In fact, fees paid to consultants are sometimes greater than the fees paid to the registration agencies. Thus, ISO registration requires restructuring, training and consultancy, which incur significant costs.

The table shows the minimum and the maximum of each type of cost. The minimum internal costs and the minimum consultancy fees were zero each since firms relied on their internal resources in implementing ISO 9000. The minimum fees of the registration agencies were SR 5,000 for a small firm in Yanbu with less than 100 employees. On the other hand, the maximum internal costs were SR1.4 million for a large corporation of more than 1,000 employees in the steel industry in Jeddah. The quality manager of this firm noted that, of this amount, more than SR 338,000 was spent on training. The quality manager of a large Sabic firm noted in the questionnaire that they spent between SR 5 to 6,00,000 on reorganisation to meet ISO requirements. In addition, the maximum consultancy fees were SR 500,000 for a Sabic petrochemical firm located in Yanbu with more than 1,000 employees. Finally, the maximum fees of the registration agencies were SR 100,000 charged for each of two firms with more than 1,000 employees each.

The costs of surveillance visits are usually determined by the amount of work of the auditor per day. There was no question included about the costs of surveillance visits. However, some respondents mentioned such costs as additional notes. One respondent noted that they had a fixed contract with their registration agency to have their surveillance visits at a cost of SR 25,000 for three years regardless of how many days they spent, while another firm was charged SR 45,000. SASO charges SR 2000 per auditor, per day for surveillance visits (Bas-ham, 1998).

It can be noticed that the missing values in Table 9.33 were significant in all the three types of costs, 50, 47 and 38 respectively. This was probably due to a number of reasons. The first was the sensitivity of disclosing numbers and costs in the private sector. Secondly, some quality managers were not at the firm at the time of registration, as some of them noted. Thirdly, some quality managers did not know the internal costs since they occurred in the human resources department. Fourthly, two firms that had dual registration did not specify the amount; they just wrote 'dual registration'. Finally, sometimes it is difficult for respondents to quantify the indirect internal costs.

As a matter of comparison, a survey was conducted in the USA among ISO 9000 registered firms, which included the costs of implementing ISO 9000.[6] The similarities and differences between the findings in Saudi Arabia and those of the US are shown in Table 26, Appendix F. From this it can be seen that the percentages of each type of cost, internal, consultancy and registration fees, to the total average of the costs are very similar. Internal costs in both countries represented more than 66% of the average costs in both countries. The other two types of costs represented percentages that are very close. However, the costs in the US were almost double those of Saudi Arabia. Those big differences could be for two reasons. Firstly, the sample in the US included very large corporations with capital of more than one billion dollars, which meant higher costs. Secondly, the standard of living in the US is much higher than that in Saudi Arabia, which contributed to the high costs of ISO 9000 implementation in the former.

[6] Irwin and Dun & Bradstreet Information Services (1996) *ISO 9000 Survey, Comprehensive Data and Analysis of U.S. Registered Companies, 1996,* USA.

Costs of Implementing ISO by Size of Firms:

This section deals with the costs of implementing ISO 9000 in the three sizes of firms. In order to find out the average costs in each size of firm, the means were compared. The results are shown in Table 9.34 and Figure 9.14.

Table 9.34 Average costs of ISO implementation by size of firms in Saudi Riyals (SR)

No.	Sizes of Firms (Number of Employees)	Types of Costs (Averages)		
		Internal Costs	Consultancy Fees	Registrar's Fees
1	1-100	53,000.00	28,375.00	32,339.56
2	101-300	147,000.00	61,467.88	33,315.10
3	301 or more	346,666.67	95,912.67	48,000.00

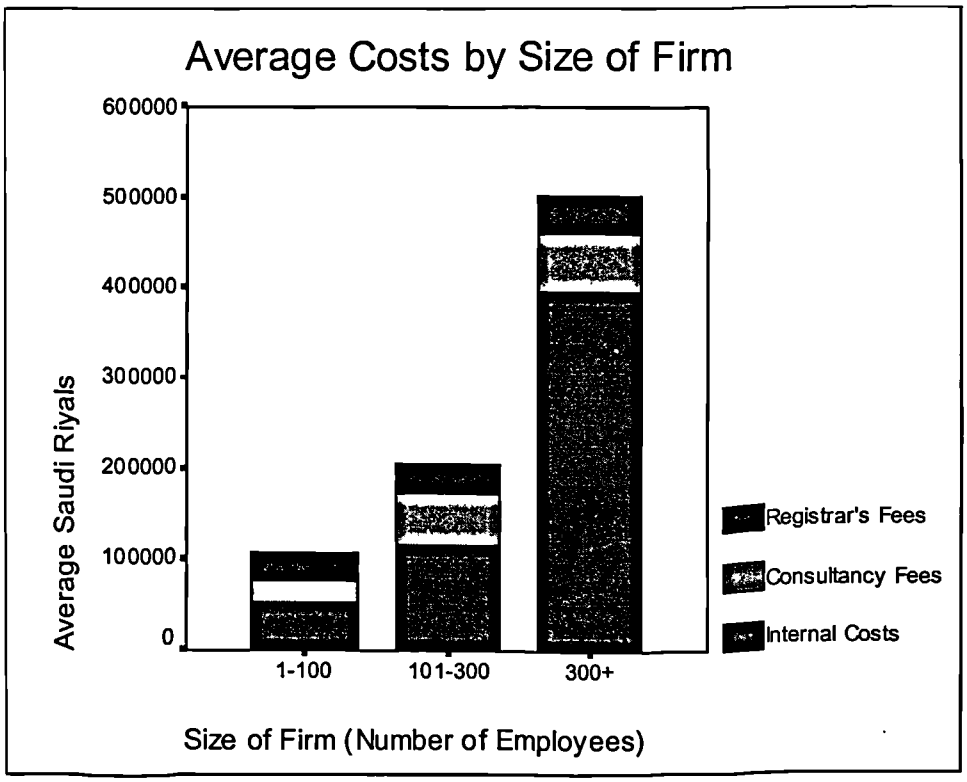

Figure 9.14 Average costs of implementing ISO by size of firm

Table 9.34 shows that the bigger the firm, the higher the cost of implementing ISO 9000. The greater differences between the sizes of firms occurred in terms of internal costs. Consultancy fee differences were smaller than internal costs but greater than the

registration fees. Registration fee differences were close to each other for the three sizes of firms.

Benefits Gained from Registration vs. Costs of Implementing ISO:

This question was about evaluating the benefits gained from ISO 9000 versus the costs of implementation. The respondents were given 6 alternatives in order to measure the evaluation very precisely. In addition, the respondents were given the opportunity not to judge if they were not sure about the benefits of registration weighed against the costs involved. The results are presented in Table 9.35 and Figure 9.15.

Table 9.35 Costs of implementing ISO vs. benefits gained from registration

Criteria	**Frequency**	**%**
Benefits exceed the costs considerably	34	41.5
Benefits exceed the costs	27	32.9
Benefits are equal to the costs	4	4.9
Benefits are less than the costs	6	7.3
Benefits are considerably less than the costs	---	---
It is hard to judge	11	13.4
Total	**82**	**100.00**

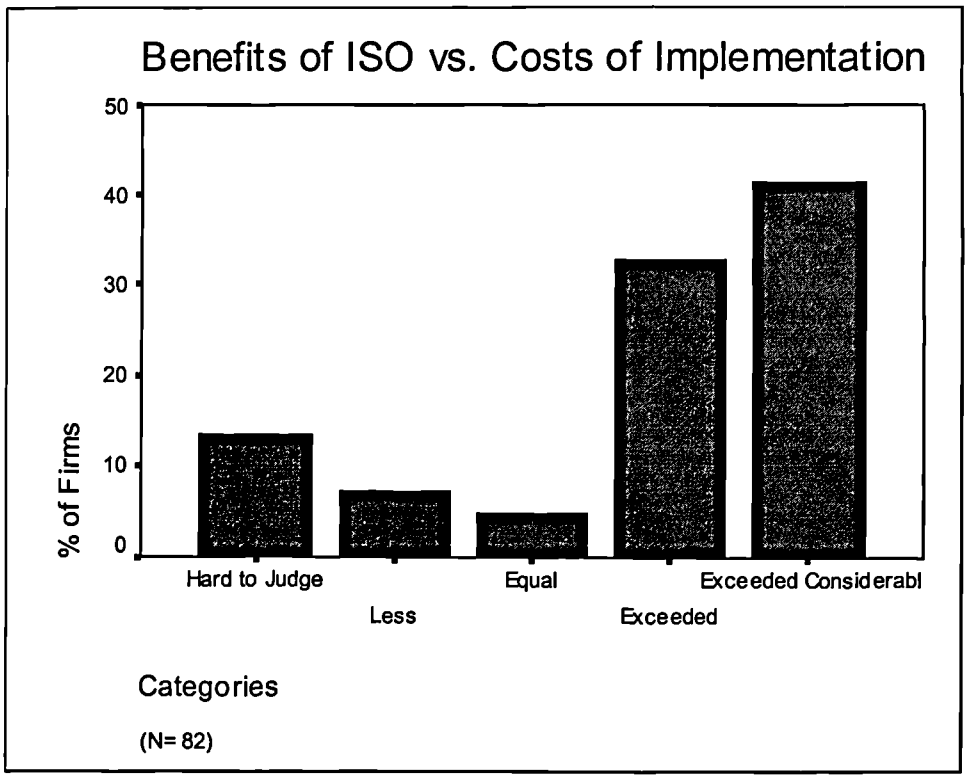

Figure 9.15 Benefits of ISO vs. costs of implementation

The results of the evaluation show that 34 quality managers considered the benefits gained from registration to considerably exceed the costs, representing more than 41% of firms. In addition, 27 respondents felt that the benefits exceeded the costs of implementing ISO 9000, making up almost 33% of all firms. Only 4 firms felt that the benefits of implementation were equal to the costs involved, representing a fractional percentage of almost 5% of respondents. Six quality managers had a negative opinion about the benefits of ISO implementation weighed against the costs, considering the benefits to be less than the costs. No respondent chose the last alternative, which was that the benefits were considerably, less than the costs. Finally, 11 respondents did not give any judgement on this matter, making up 13.4% of all quality managers of ISO 9000 registered firms in Saudi Arabia. The conclusion of this evaluation is that the

majority of ISO 9000 registered firms had a strong positive opinion about the benefits of ISO when compared with the costs of implementation.

9.8 Factors in ISO 9000 Implementation:

Factors Helping in ISO 9000 Implementation:

This question included 15 factors that might have helped firms in implementing ISO 9000. The question measured the degree of help of each factor from 'very helpful' to 'of no help at all'. The results are shown in Table 9.36.

Table 9.36 Factors helping in ISO 9000 implementation*

Rank	Factors	Mean	Std. Dev.
1	Top management commitment	4.7229	.5698
2	A well-structured system of procedures	4.5904	.7657
3	The firm's internal auditor (s)	4.3293	1.1446
4	The ISO 9000 training programmes	4.2651	.9510
5	Employee motivation and commitment	4.2250	.8565
6	Communication between management and employees	4.1687	.8384
7	Experience with the existing quality system	3.9398	1.0971
8	General written publications on ISO 9000	3.0610	1.4085
9	Assistance from the external consultant (s)	2.3735	2.1454
10	Assistance from the parent company or partner	2.1807	2.0371
11	The contribution of the human resources department	2.0494	1.6576
12	SASO written publications on ISO 9000	1.0976	1.5203
13	Software (computer programmes) on ISO 9000	1.0964	1.6720
14	Assistance from the Saudi government	1.0000	1.3343
15	The existing TQM programme	.9880	1.6342

The scale is 5 = very helpful, 4 = fairly helpful, 3 = of average help, 2 = of minor help, 1 = no help at all, 0 = not applicable. * The details of this table are included in Table 27, Appendix F.

The table shows that the most helpful factor in implementing ISO 9000 was the commitment and support of top management. The process of implementing ISO requires the availability of resources that should be provided by top management, and this emphasises the importance of their support. The second factor was the well-structured system of procedures, followed by the contribution of the internal auditor (s) in the firm. The internal auditors are usually the key to implementation since they

continuously assess the quality system capabilities and fix any non-conformity. The fourth most helpful factor was the ISO 9000 training programmes, while the fifth was the motivation and commitment of the employees.

We notice from the second 5 factors (6-10) that experience with the existing quality system did not contribute very significantly in the implementation process. The reason could be that such systems needed major modifications to comply with ISO 9000 requirements. Another point was that written publications on ISO did not help very much with its implementation. The assistance of external consultants and a partner or parent company was not helpful in general terms since not all firms had external consultants or partners. This caused the firms that did not use external consultants or the firms that had no partners to mark "not applicable" against those factors. To investigate how helpful external consultants were alone to those firms that used them, a comparison of means was conducted. The result was that the use of external consultants ranked 7^{th} among other factors with a mean of 3.9796. This indicates that the contribution of external consultants was, in fact, helpful.

The last 5 factors (11-15) started with the contribution of the human resource department, which was not very helpful. The reason for this could be that the department might not be involved in the process for organisational reasons. SASO written publications did not contribute very much to the implementation of ISO 9000. The use of computer software was also not popular in ISO 9000 registered firms. Help from the Saudi Government was minimal, possibly because of a lack of dealing between the firms and the government in this matter. Finally, not all firms had TQM programmes, which made this factor the least helpful amongst them. Among the TQM

firms only, the assistance of the programme ranked 9th among all factors with a mean of 2.8276. This means that TQM programmes provided moderate assistance (for TQM firms only) in implementing ISO 9000.

The importance of the commitment of top managers in implementing ISO supports the claims of many scholars who consider this commitment to be of crucial importance (Johnson, 1997; Durand *et al.*, 1997; Hockman *et al.*, 1994; Arora, 1996; Lal, 1996; Johnson, 1997). In Belgium, Vloeberghs and Bellens (1996) found that the most and positive factor in implementing ISO was the strong commitment of senior management, which was similar to the case in Saudi Arabia. The second most helpful element in Belgium was the presence of a well-structured system of procedures, which was the same as in the Saudi case. The third most useful feature in Belgium was experience with the existing quality system, but this ranked only 7th in Saudi Arabia. This could be because the Belgian industries may have had better quality systems prior to ISO 9000 than did Saudi industries. In Belgium, the fourth most helpful factor was employee commitment and motivation, which was ranked 5th in Saudi Arabia. Another distinction in Saudi industries was the importance of the internal auditors and ISO 9000 training, ranking 3rd and 4th, respectively in Saudi Arabia.

Problems with ISO 9000 Implementation:

This question was about the extent of agreement of respondents with 10 statements that were considered by the researcher as disadvantages or problems with ISO 9000 implementation. The results of this question are shown in Table 9.37.

Table 9.37 Problems with ISO 9000 implementation

Rank	Problems	Valid %					Mean	Std. Dev.
		SA	A	N	D	SD		
1	There was a need to change the regular system to fit ISO	6.2	42.0	7.4	39.5	4.9	3.0494	1.1281
2	There was a resistance to the introduction of ISO	4.9	31.7	11.0	48.8	3.7	2.8537	1.0672
3	Lack of understanding of the importance of ISO by all departments	4.9	28.0	9.8	46.3	11.0	2.6951	1.1406
4	ISO implementation is time consuming	2.4	28.9	3.6	55.4	9.6	2.5904	1.0824
5	ISO implementation involves high costs	1.2	15.7	21.7	55.4	6.0	2.5060	.8748
6	ISO involves long and bureaucratic documentation	3.6	20.5	7.2	50.6	18.1	2.4096	1.1157
7	Maintaining registration involves high costs	1.2	13.3	13.3	51.8	20.5	2.2289	.9668
8	The firms lack well-trained and experienced internal auditors	4.9	11.0	6.1	48.8	29.3	2.1341	1.1085
9	ISO standards are vague and complicated	---	7.2	4.8	63.9	24.1	1.9518	.7636
10	The surveillance visits are difficult to cope with	---	1.2	2.4	59.8	36.6	1.6829	.5854

The scale is 5 = strongly agree (SA), 4 = agree (A), 3 = neither agree nor disagree (N), 2 = disagree (D), and 1 = strongly disagree (SD)

The table shows that the most significant problem was the need for the firms to change their old systems to fit the requirements of ISO 9000. Just under 50% of the respondents either strongly agreed or agreed on this being problem. Some firms had lost a considerable amount of money for re-organisation, such as in the case of one of the Sabic firms when they spent between 5 and 6 million Saudi Riyals. The second most significant problem was the resistance of employees to the introduction of ISO 9000. More than 36% of quality managers strongly agreed or agreed that this was an issue. Sometimes people resist changes because they are afraid of the implications for them and for their functions. The third highest-ranking problem with ISO implementation was the lack of understanding of ISO by all departments. Approximately 33% of respondents strongly agreed or agreed on this statement. The fourth most important problem was that ISO is time-consuming; about one third of the

quality managers (31.3%) either strongly agreed or agreed on this matter. The fifth most significant problem was the costs associated with ISO implementation. Approximately 17% of the respondents strongly agreed or agreed on this being problem.

In addition, long and bureaucratic documentation was ranked 6th among the other problems of ISO 9000. About a quarter of the respondents strongly agreed or agreed that this presented a difficulty. The costs of maintaining ISO, which involve mainly the fees of surveillance visits, did not matter for the respondents. Less than 15% of the respondents considered this a problem while the majority did not. The respondents disagreed in general with the statement that their firms lacked of well-trained internal auditors. The vagueness of ISO standards was not a difficulty for the vast majority of respondents. Finally, surveillance visits did not represent a problem for ISO 9000 registered firms in Saudi Arabia.

Assessors working in Saudi Arabia presented their views about the major problems facing Saudi firms when implementing ISO 9000. Price (1999) of Lloyds mentioned that document control is a problem around the world, and that firms are not willing to spend money on the calibration of equipment. Bound (1999) of Moody agrees that documentation is a problem to firms when they try to do this independently, and a lack of awareness and understanding as another two problems. Alyah (1999) who, as he said, deals with large firms in Saudi Arabia, made some comments about ISO implementation in the country. He said that Saudi firms are very precise and detailed in their implementation, which made them introduce more complicated methods of control, which, in turn made it difficult for Saudi firms to accept changes, thus making

the system more static. Alyah (1999) added that these large firms usually have a tendency to implement TQM, and thereby create impractical goals of perfection, which increase costs and often obscure the long-term view. This concept of quality equalling excellence causes them to be defensive and to refuse to accept findings as areas of improvement. In addition, he mentioned that in many excellent Saudi firms, they still seek improvement. He gave an example of a quality manger in a firm with 250 employees, who was upset when he had three minor non-conformities. Although, as Alyah said, this means a high level of commitment, it is also very expensive.

Table 28, Appendix F shows a comparison between Saudi Arabia and two other countries; Sweden and Turkey. The table shows the five most significant problems associated with ISO implementation in the three countries, which were the changes needed, resistance to the introduction of ISO, bureaucratic documentation, and time and cost consumption.

9.9 Benefits of ISO 9000:

The researcher in this question suggested 20 possible benefits of ISO 9000 and asked the respondents to rate how ISO affected such elements. The rating was from 'crucial effect' to 'no effect'. The results are shown in Table 9.38 in brief, and in Table 29, Appendix F in detail.

Table 9.38 Benefits of ISO 9000 implementation*

Rank	Benefits	Mean	Std. Dev.
1	Increased quality awareness in the firms	4.2593	.6667
2	Improved the efficiency of the quality system	4.1605	.7658
3	Improved customer service	3.6750	.9109
4	Improved the quality of products	3.5750	1.1338
5	Improved inspection methods and time to produce finished goods	3.5366	1.1779
6	Reduced customer complaints	3.4684	1.023
7	Improved inspection methods and time to receive incoming materials	3.4250	1.1776
8	Improved the quality of incoming materials	3.3659	1.0601
9	Reduced defective rate and wastes	3.3247	.8950
10	Improved staff motivation	3.3086	1.0080
11	Improved employee relations	3.1463	1.1013
12	Improved the speed of good delivery	3.1375	1.0403
13	Improved productivity	3.0625	1.1063
14	Improved supplier relations	3.0250	1.1063
15	Maintained / gained market share	2.9873	1.1821
16	Improved process design	2.9487	1.3666
17	Reduced costs	2.8734	.9523
18	Improved profitability	2.7564	1.1071
19	Improved product design	2.5443	1.3849
20	Increased exports	2.3875	1.3168

The scale is 5 = crucial effect, 4 = great effect, 3 = some effect, 2 = little effect, 1 = no effect.
* The details of this table are included in Table 29, Appendix F.

The table shows that the most significant benefit of ISO was the increase in quality awareness inside the firms. Abdullah Al-Shehri, the quality manager of the Saudi Lubricating Company in Jeddah, mentioned to the researcher that one of the most significant advantages of ISO is that of creating awareness about quality in the firm. He added that during surveillance visits, all employees feel as if they are in a state of alert, which in turn makes them care more about quality. ISO then acted like an alarm to all employees, signalling the importance of quality in their firm. This supports the claim of Yung (1997) that ISO provides quality awareness. The second most significant benefit of ISO was the improvement of quality system efficiency. This is a tangible direct effect since ISO 9000 includes mainly requirements for a better quality system. The improvement of the quality of products ranked 4th among all benefits, which was reasonable since ISO is not design to address the quality of product but the efficiency of

the quality system. However, an efficient quality system may contribute to a better quality of product. In addition, ISO apparently contributed to better customer care since the two elements associated with customers ranked 3rd and 6th. Those elements were an improvement in customer service and a reduction in customer complaints. The marketing benefits of ISO were not among the leading ones. The increase of market share ranked 15th and the improvement of exports was the least significant benefit. Finally, the monetary benefits of ISO were not tangible since the reduction in costs associated with ISO 9000 implementation ranked 17th among other benefits. Moreover, the respondents generally did not think that ISO improved profitability. This element ranked 18 among ISO 9000 benefits in Saudi Arabia.

We can compare the findings in Saudi Arabia with those in three other countries; Turkey, the UK and in Western Australia. Table 30, Appendix F shows this comparison, including the five most significant benefits in the four countries. It is evident that an increase in quality awareness represented the most important benefit in Saudi Arabia and in two other countries. Other common and significant benefits among the three studies were the improvement in customer service, the improvement of the quality system's efficiency, and the improvement of product quality.

Factor Analysis of the Benefits of ISO 9000:[7]

The purpose of factor analysis is to condense the number of benefits and group benefits into factors and try to find a relationship between the factors in each group. The principal component approach was used with varimax rotation. Table 9.39 shows the results of the factor analysis.

[7] For the definition of the terms included in this section and for more clarification, see factor analysis of motivation for ISO registration in a previous section.

Table 9.39 Factor analysis of the benefits of ISO 9000

Benefits of ISO 9000		Loadings
Factor 1	**Internal Benefits** (eigenvalue = 3.446: % of Variance = 17.230)	
1	Improved staff motivation	.761
2	Improved customer service	.715
3	Increased quality awareness within the firm	.714
4	Improve the efficiency of the quality system	.679
Factor 2	**Marketing Benefits** (eigenvalue = 3.168: % of Variance = 15.838)	
1	Maintained / gained market share	.821
2	Increased exports	.732
Factor 3	**Efficiency Benefits** (eigenvalue = 3.044: % of Variance = 15.222)	
1	Improved the speed of good delivery	.803
2	Reduced costs	.704
3	Improved supplier's relations	.651
Factor 4	**Inspection Benefits** (eigenvalue = 3.041: % of Variance = 15.205)	
1	Improved inspection methods and time to produce finished goods	.764
2	Improved inspection methods and time to receive incoming materials	.750
Factor 5	**Quality Benefits** (eigenvalue = 2.006: % of Variance = 10.032)	
1	Reduced defective rate and wastes	.734
Statistical Tests:		
Kaise-Meyer-Olkin Measure of Sampling Adequacy (KMO test) = .853		
Bartlett's Test of Sphericity:	Approximate Chi-square = 921.567 df = 190 Sig. = .000	

The analysis resulted in 5 factors, each of which included a number of benefits of ISO. The researcher chose the benefits that had loadings of .65 or greater based on the sample size (Hair *et al.*, 1995). Therefore, the remaining benefits under all 5 factors were 11 out of 20. The percentage of variance was that explained by each factor (de Vaus, 1996). The total variance explained by factor analysis was 73.528, which is good, according to Hair *et al.* (1995).

The 5 factors were given names (labels) by the researcher based on the common similarities of their elements. Benefits with large loadings influenced the name of each factor. Factor 1 was named 'internal benefits', including four benefits: improved staff motivation, improved customer service, increased quality awareness and improved efficiency of the quality system. Factor 2 was labelled 'marketing benefits', and

included two benefits: maintained market share and increased exports. Factor 3 was named 'efficiency benefits', and had three 3 benefits: improved speed of goods delivery, reduced costs and improved supplier relations. Factor 4 was given the name 'inspection benefits', and included two benefits: improved inspection methods for finished goods and improved inspection methods for incoming materials. Finally, factor 5 was given the name 'quality benefits', and encompassed one benefit of ISO 9000, which was the reduction in defective rate and waste.

In order to test the factor analysis, the Kaiser-Meyer-Olkin test (KMO) is an indicator of how well suited the sample data is for such analysis and its value is less than 1. The acceptable value should be between .5 and .99 (Kaiser, 1974). Therefore, the value of the KMO, at the bottom of the table, was good (.853). This means that the data was suitable for factor analysis and, consequently, the factor analysis was valid. The second test was Bartlett's test of sphericity, which measures the correlation among variables. The test was significant (.000), which means that there was a correlation among benefits of ISO 9000 in Saudi Arabia (SPSS Inc., 1999).[8]

The Use of ISO 9000 as a Promotional Tool:

This section has two parts; the first covers ISO as a promotional tool as a motive for registration to ISO, while the second covers the promotional uses of ISO. The International Organisation for Standardisation (ISO) in Geneva issued a small booklet as a guideline for publicising ISO 9000,[9] which gives the rules for using ISO examples of the good uses of ISO as a promotional tool. Table 9.40 and Figure 9.16 show the importance of the promotional motive for ISO 9000 registration.

[8] SPSS Inc. (1999) *SPSS Training Course Library*, Advance Statistics, Chapter seven, p.15.

Table 9.40 The importance of the promotional motive for ISO 9000*

Degrees of Importance	Frequency	Valid %
Very important	27	32.9
Fairly important	34	41.5
Of average importance	12	14.6
Of minor importance	1	1.2
Not important	8	9.8
Total	**82**	**100.00**

* This is element no. 12 in motives for ISO 9000 registration (Question 33, Appendices A and B).

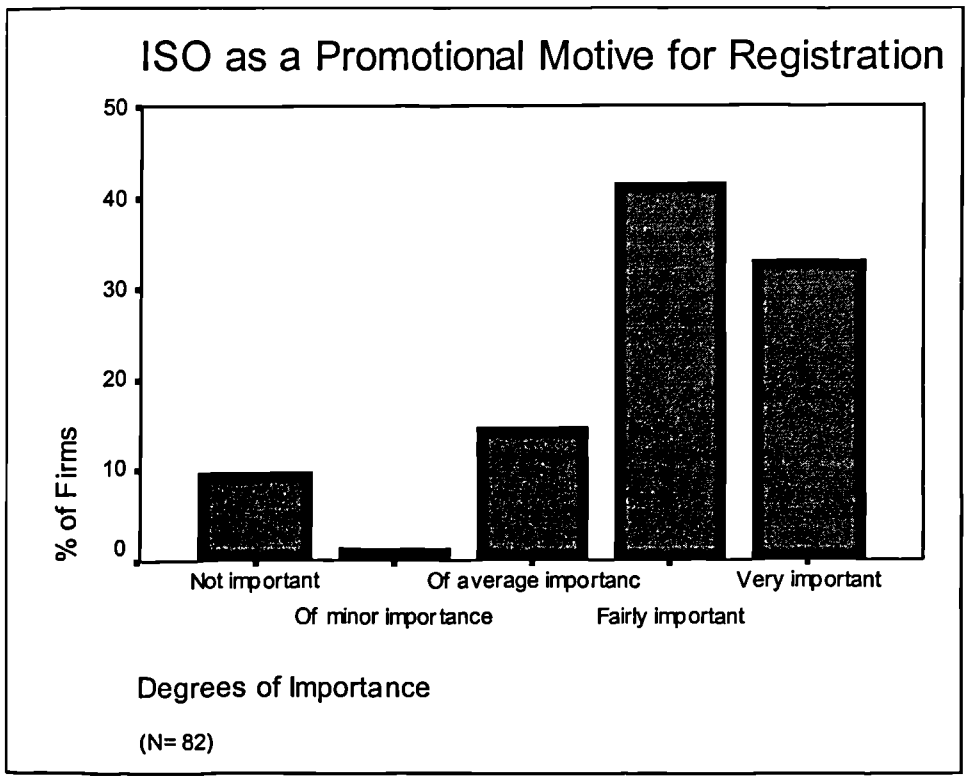

Figure 9.16 ISO as a promotional motive for registration

Table 9.40 shows that the use of ISO as a promotional tool was, in general, an important motive for ISO 9000 registration and ranked 9th among all 19 motives for registration to ISO 9000, which placed the promotional importance of ISO in the middle of the other reasons. We notice from the table that approximately one third of the respondents thought that this motive was very important, more than 41% of them

[9] The International Organisation for Standardisation (ISO) *Publicizing Your ISO 9000 Registration*, Central Secretariat, Geneva, Switzerland. (no date of publication)

considered it as an important one, while around 10% of quality managers thought it was either of minor importance or not important at all. Buttle (1997) found that the use of ISO as a promotional tool ranked 4th in the UK among 23 motives. This might mean that the promotional motive for registration was more important in the UK than in Saudi Arabia.

The second part of ISO as a promotional tool is the use of ISO in two aspects of publicity: the publications of the firm and in advertising campaigns. The use of ISO for product quality is prohibited according to the previous guideline and ISO 62 (1996) since ISO relates to a quality system and not to product specifications. Table 9.41 shows the results of those two points.

Table 9.41 The use of ISO 9000 as a promotional tool

No.	Promotional Uses of ISO	Yes		No	
		Freq.	Valid %	Freq.	Valid %
1	The firm publicises ISO in its publications	64	78.0	18	22.0
2	The firm publicises ISO in its advertising	60	73.2	22	26.8

The table shows that the vast majority of firms (64) used ISO in their publications, making up 78% of all firms. In addition, another large number of firms (60) used ISO in their advertising, representing approximately 73% of ISO 9000 registered firms in Saudi Arabia.

The conclusion as to the use of ISO as a promotional tool is that ISO is an important instrument. ISO is not just a quality system that helps the internal functions of the firms, but it serves as a prestigious sign for them. A firm uses ISO to show others that they have an efficient, reliable quality system, which in turn may imply that their

products are good as well. Therefore, firms may choose ISO not just to provide a better quality system, but as a sign of their power and efficiency.

9.10 Overall Evaluation of ISO 9000 as a Quality System:

Satisfaction with ISO 9000:

The first part of this section is about the level of satisfaction Saudi firms felt with ISO 9000. The results are shown in Table 9.42 and Figure 9.17.

Table 9.42 Levels of Satisfaction with ISO 9000

Level of Satisfaction	Frequency	Valid %
Very satisfied	35	43.2
Satisfied	42	51.9
Indifferent	3	3.7
Dissatisfied	---	---
Very dissatisfied	1	1.2
Total	**81**	**100.00**

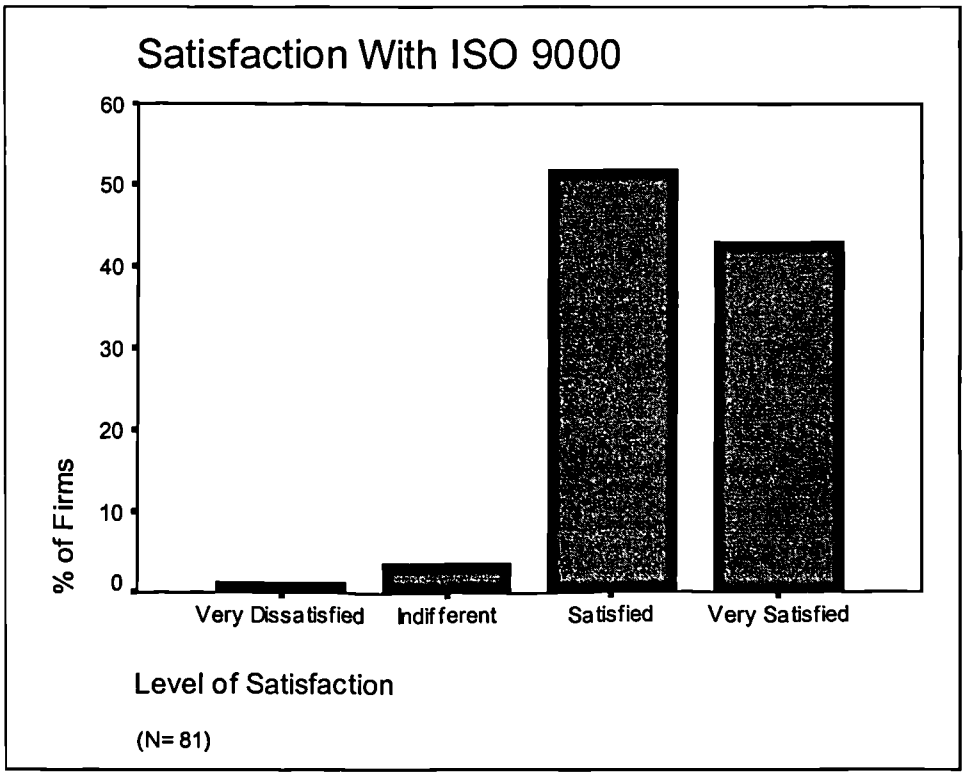

Figure 9.17 Satisfaction with ISO 9000 in Saudi Arabia

Table 9.42 shows that 35 respondents were very satisfied with ISO, representing more than 43% of all quality managers. The majority of firms, however, were just satisfied with the standard, making up more than half of the respondents. Three quality managers were neither satisfied nor dissatisfied with ISO 9000, representing 3.7% of all firms surveyed. Finally, only one respondent was very dissatisfied with ISO 9000, making a fraction of 1.2% of all firms. The conclusion of these findings is that ISO 9000 registered firms in Saudi Arabia were generally satisfied with the standard.

These findings from Saudi industry support the claims of many scholars who have written about the benefits of ISO 9000, such as Fox (1994) who considers it a cost-effective quality system. Other writers praise it for different benefits, namely, Laszlo (1996), Arora (1996), Lal (1996), Kangi and Asher (1996), Johnson (1997), and Yung (1997). However, the high level of satisfaction with ISO in Saudi industry does not support the claims of Seddon (1997) who wrote a book criticising ISO 9000.

In addition, these findings support the findings of Vloeberghs and Bellens (1996) in their study of ISO 9000 in Belgium. They found that 65% of the Belgian respondents were satisfied with ISO and 22% were very satisfied with the standard. In addition, 11% were neither satisfied nor dissatisfied, and only 2% were dissatisfied with the ISO standard. The conclusion of this comparison is that both sets of findings were close in that there was a high level of satisfaction in both countries with ISO 9000.

The second part of this section relates to two elements in ISO evaluation. The first is about recommendation of ISO to others, while the second concerns whether or not ISO

guarantees the manufacture of good quality products. The results of those items are shown in Table 9.43.

Table 9.43 Elements in satisfaction with ISO 9000 implementation

No.	Statements	Valid %					Mean	Std. Dev.
		SA	A	N	D	SD		
1	Recommend ISO to other firms	46.3	46.3	3.8	3.8	---	4.3500	.7309
2	ISO guarantees the manufacture of good quality products	13.6	30.9	12.3	29.6	13.6	3.0123	1.3086

The scale is 5 = strongly agree (SA), 4 = agree (A), 3 = neither agree nor disagree (N), 2 = disagree (D), and 1 = strongly disagree (SD).

The table shows that more than 90% of respondents strongly agreed or agreed that they would recommend ISO to other firms that had not implemented the standard. Less than 4% of quality managers did not recommend others to implement ISO 9000 in their firms. There was a split in the opinions of the respondents concerning the second item in the table, as they were divided in judging if ISO guarantees the manufacture of good quality products. Approximately 44% of respondents agreed while another 44% disagreed and 12% were neutral about this matter. Figure 9.18 shows the extent of agreement on this point.

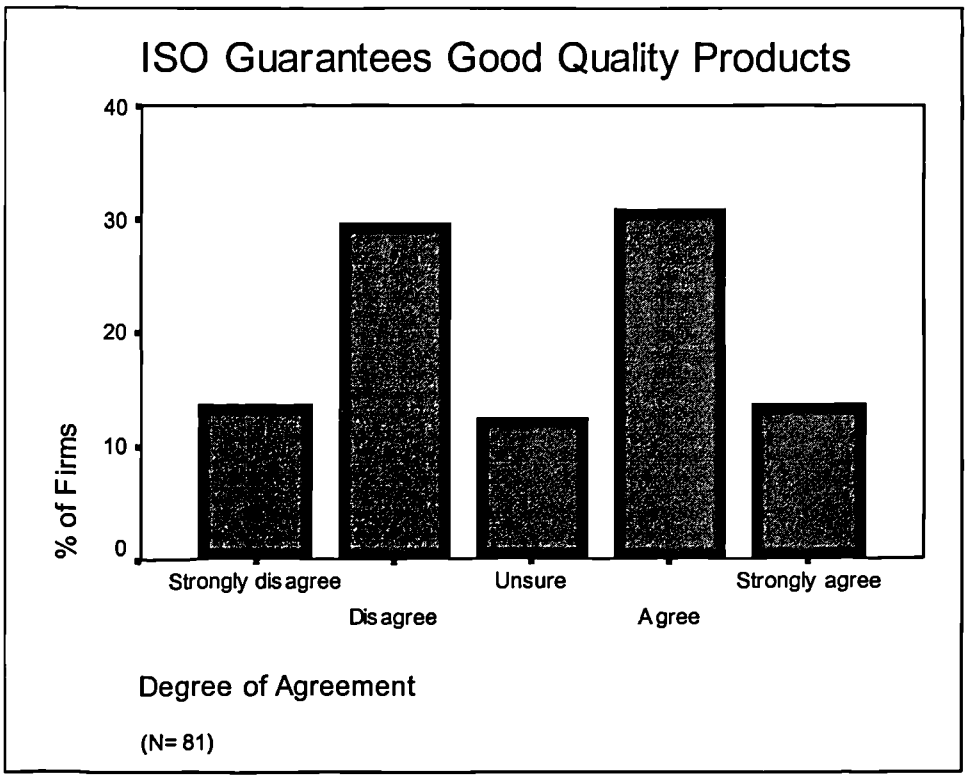

Figure 9.18 Does ISO guarantee the manufacturing of good quality products?

Satisfaction with ISO by Size of Firm:

The purpose here was to find out the satisfaction with ISO 9000 as a quality system in the different sizes of firms. Two statistical procedures were performed for this purpose. The first was comparing the means of the three sizes of firms; the higher the mean, the higher the level of satisfaction, and the second was the use of the Kruskal-Wallis test; the alternative to the One Way Anova. The results are shown in Table 31, Appendix F. The table shows that the larger the firms the higher their level of satisfaction with ISO 9000. This meant that large firms tended to be more satisfied with ISO 9000 than smaller ones. However, the differences in satisfaction were slight and not significant since there was no significant difference (.05 or less) according to the Kruskal-Wallis test. Figure 9.19 shows the differences between the three sizes of firms in their satisfaction with ISO 9000.

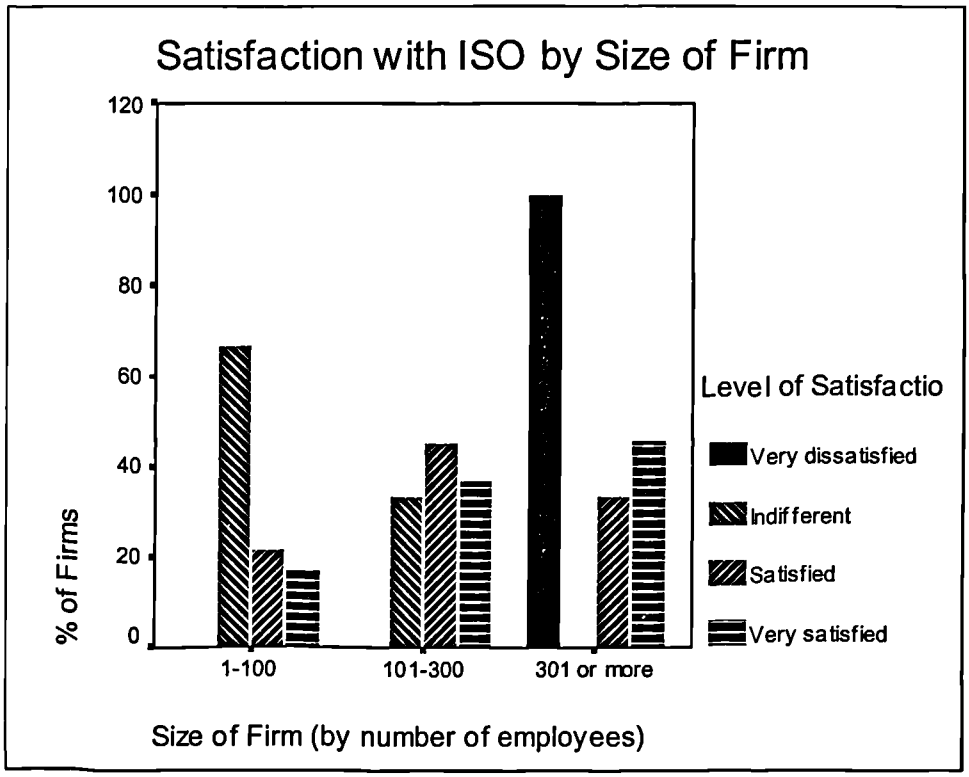

Figure 9.19 Satisfaction with ISO 9000 by size of firm

ISO 9000 vs. TQM:

This section consists of two parts; the first concerns the satisfaction of the respondents from firms with both ISO and TQM (29), while the second is for all firms. The results of this part are shown in Table 9.44 and Figure 9.20.

Table 9.44 Satisfaction with ISO or TQM (for firms with both ISO and TQM only)

Criteria	Frequency	Valid %
Satisfied with ISO 9000 more than TQM	3	11.5
Satisfied with TQM more than ISO 9000	2	7.7
Equally satisfied with both ISO 9000 and TQM	20	76.9
Equally dissatisfied with both ISO 9000 and TQM	1	3.8
Total	**26**	**100.00**

All TQM firms were 29, here there were 3 missing values.

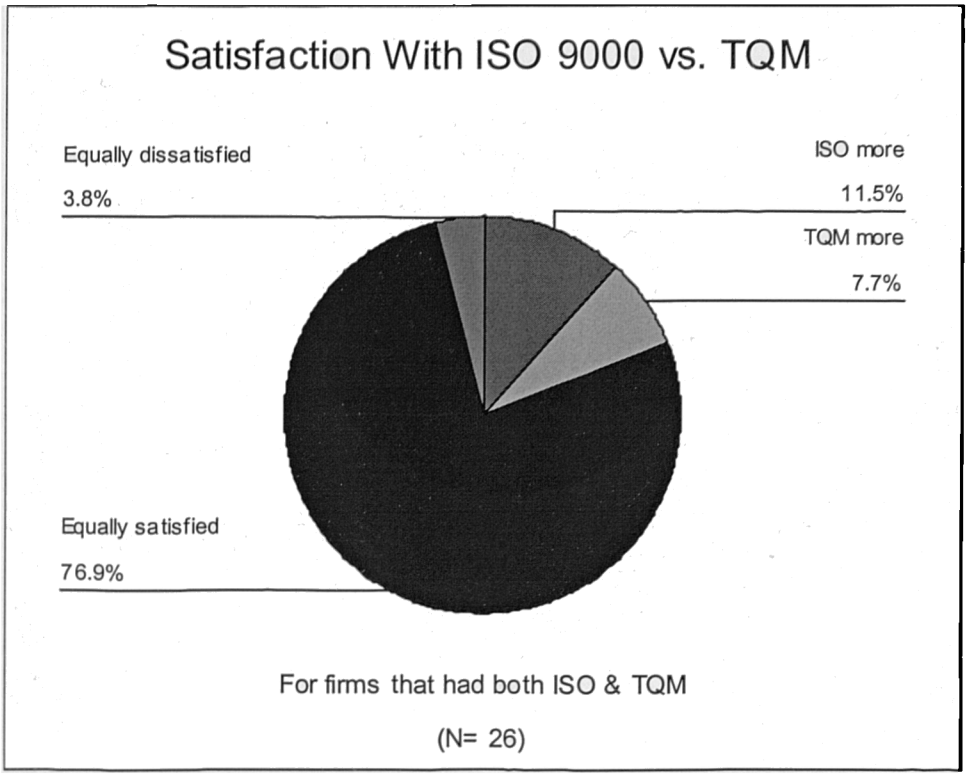

Figure 9.20 Satisfaction of respondents with ISO 9000 vs. TQM

Table 9.44 shows that the vast majority of respondents (20) were equally satisfied with both ISO and TQM, representing approximately 77% of all firms. The remaining firms were split, three were more satisfied with ISO, two were more satisfied with TQM, and one firm was not satisfied with either of them. Almost all the scholars in the literature review contend that ISO is a part of a TQM programme. Similarly, some of the respondents such as the quality managers of the Eastern Petrochemical Company, the Saudi Arabian Lubricating Oil Company, and the Saudi Petrochemical Company mentioned this to the researcher. They all considered ISO to be part of a more comprehensive TQM programme that includes the ISO 20 clauses and some other TQM elements. Therefore, the respondents of the 26 firms that had ISO and TQM did maintain that they were equally satisfied with both, since both of them were integrated.

The second part of this section deals with elements in the relationship between ISO and TQM. Those 3 elements were surveyed in all firms in the study, whether they combined ISO and TQM or not. The results are shown in Table 9.45.

Table 9.45 The relationship between ISO 9000 and TQM

No.	Statements	Valid %					Mean	Std. Dev.
		SA	A	N	D	SD		
1	ISO is a barrier to TQM implementation	5.1	9.0	19.2	33.3	33.3	2.1923	1.1516
2	ISO by itself is enough to have a sufficient quality system	8.6	37.0	17.3	24.7	12.3	3.0494	1.2135
3	Both ISO and TQM together are sufficient for a quality system	22.5	37.5	28.8	---	11.3	3.7125	.9439

The scale is 5 = strongly agree (SA), 4 = agree (A), 3 = neither agree nor disagree (N), 2 = disagree (D), and 1 = strongly disagree (SD). * This element is no. 6 of Question 32, Appendices A and B.

The first element in the table relates to whether ISO was a barrier to the implementation of TQM. More than two thirds of the respondents (66.6%) strongly disagreed or disagreed on this statement. Just under 20% of the quality managers had no opinion on this matter. On the other hand, approximately 14% of the respondents agreed or disagreed with this statement. The conclusion is that the majority of ISO 9000 registered firms did not think that ISO was a barrier to the implementation of TQM.

The second element in Table 9.45 questioned whether or not ISO 9000 by itself was enough to establish a sufficient quality system. The majority of respondents (45.6%) did believe that ISO 9000 alone established a good quality system. More than 17% of the quality managers had no opinion on this matter. Disagreement with this statement was felt by 37% of respondents. Either they strongly disagreed or disagreed that ISO 9000 clauses could establish a sufficient quality system. The conclusion on this point is that the respondents' opinion about ISO as a comprehensive quality system were not decisive. The quality managers seemed to be divided on this matter, which might

signify that ISO needs some changes and amendments to ensure a sufficient quality system. Figure 9.21 shows the results of this point.

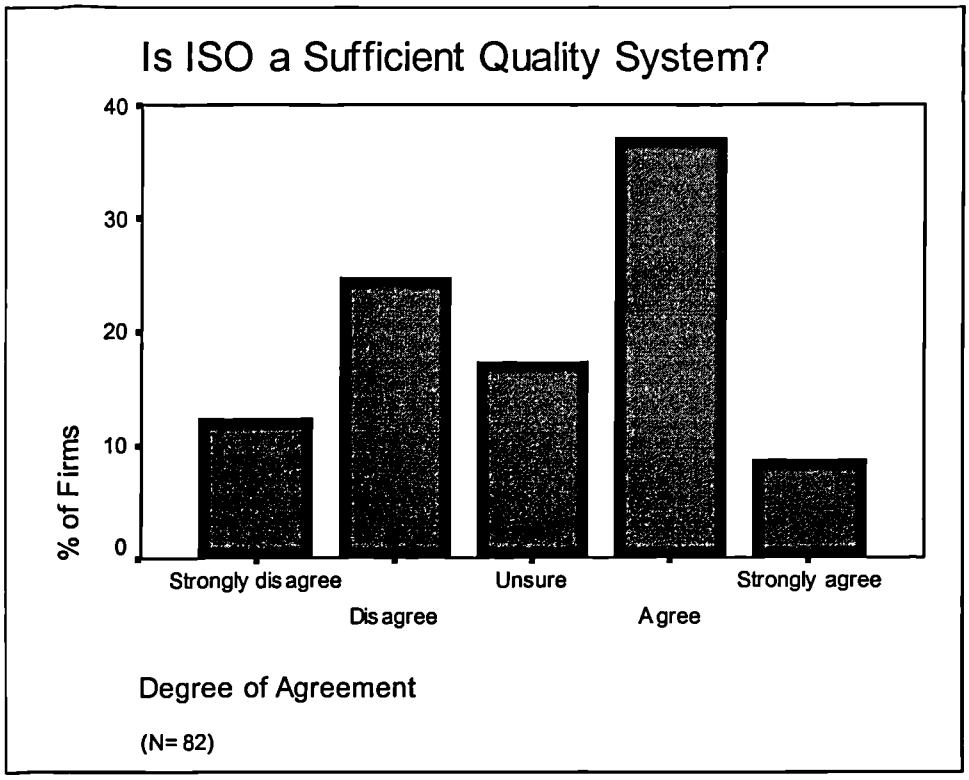

Figure 9.21 Is ISO alone enough to establish a sufficient quality system?

The third element in Table 9.45 discussed whether or not both ISO and TQM could establish a sufficient quality system. The results confirmed the previous point, that ISO alone could not establish a sufficient quality system. The vast majority of the respondents (60%) believed that ISO combined with TQM could establish a good quality system. They implied that the ISO 20 clauses were not adequate and there is a need for more elements of quality in order to have a sufficient quality system. Around 29% of the quality managers had no opinion on this matter and only 11.3% strongly disagreed on this. The conclusion on this point is that the respondents did not feel that the ISO 20 clauses could, by themselves, satisfactorily establishe a sufficient quality

system and there is a need for more elements that could be derived from a TQM programme. Figure 9.22 shows the degree of agreement or disagreement on this point.

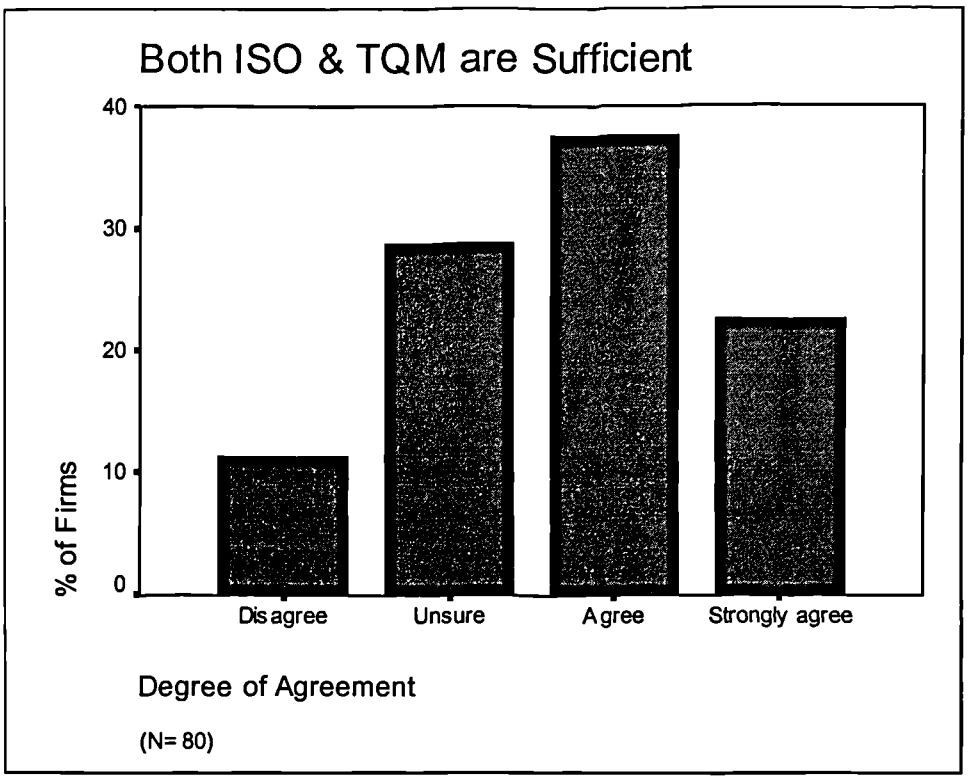

Figure 9.22 Can ISO and TQM together establish a sufficient quality system?

The findings that both ISO and TQM may establish a sufficient quality system rather than ISO only support the claims in the literature by many scholars that firms should go beyond ISO 9000 to TQM. Among them, Fox (1994); Corrigon (1994); Arora (1996); Lal (1996); Iizuka (1996); and Ho (1995b; 1996; 1999), who suggests a model of TQM that includes ISO 9000 as a component. In addition, the Saudi findings support those of Sun (1999) who found that implementing both ISO and TQM contributed to quality improvement much more than ISO alone.

Evaluation of ISO 9000's Clauses:

The question here was about the need for an amendment of ISO 9000 of 1994. In general, ISO 9001 and ISO 9002 (1994) are the most common standards that firms register to in the world. Saudi firms in this study were all registered to either ISO 9001 or 9002 of 1994. The question was about the degree of agreement or disagreement as to the need for amendment to ISO 9000's 20 clauses. The results are shown in Table 9.46 and Figure 9.23.

Table 9.46 The need to amend ISO 9000's clauses

Degree of Agreement	Frequency	Valid %
Strongly agree	6	7.5
Agree	28	35.0
Neither agree nor disagree	30	37.5
Disagree	14	17.5
Strongly disagree	2	2.5
Total	**80**	**100.00**

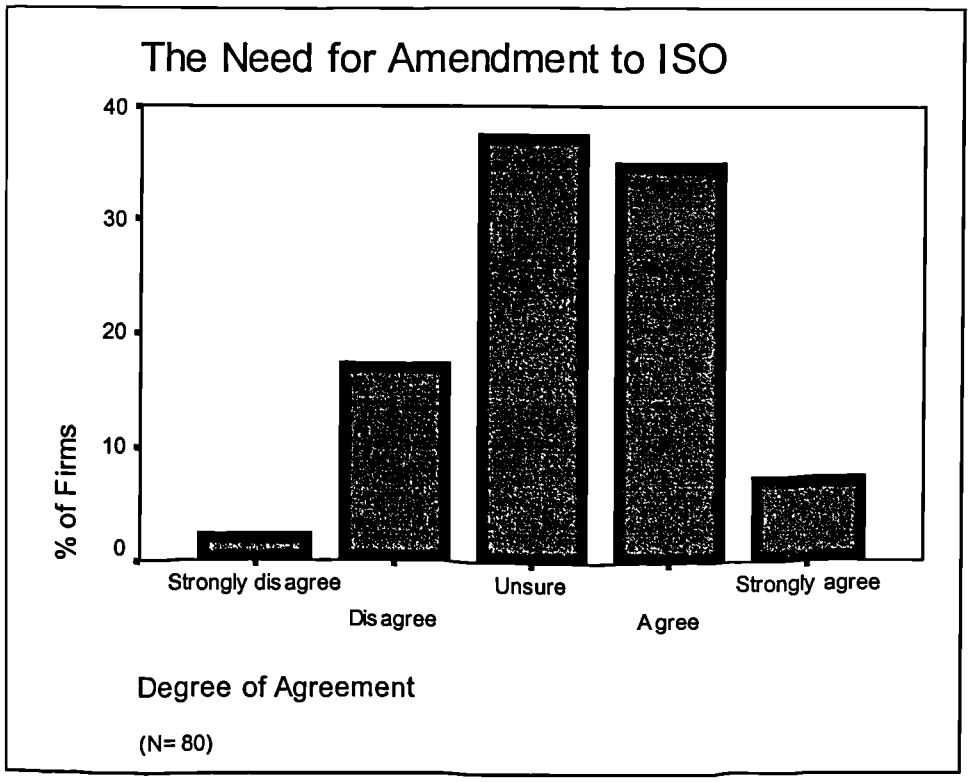

Figure 9.23 Is there a need to amend ISO 9000 (1994) clauses?

Table 9.46 shows that the majority of the respondents thought that there was a need to amend ISO 9000 (1994) clauses. More than 42% of quality managers strongly agreed or agreed on this matter. A substantial portion of the respondents (37.5%) did not have any opinion about changing ISO 9000 clauses. On the other hand, 20% of the respondents did not agree with the need for any amendment to ISO 9000 (1994) clauses. The conclusion of this finding is that the majority of quality managers in ISO 9000 registered firms thought that there was a need to amend ISO 9000's 20 clauses.

The researcher asked some of the quality managers and the lead assessors about the deficiencies of ISO 9000 of 1994 and whether or not they wanted to see them changed in the next version of ISO 9000, which is expected during the year 2000. Bas-ham (1998), a Lead Assessor at SASO, mentioned that ISO does not deal with customer needs and does not address business results. Saeed Al-Gahtani of the Eastern Petrochemical Company criticised ISO for not covering safety in the factory and for not addressing financial business results. Muaath Alyah, a Lead Assessor at Det Norske Veritas, operating in Saudi Arabia, mentioned some criticisms of ISO 9000. Firstly, the standard includes non-objective measures for management responsibilities. Secondly, ISO 9000 does not include safety for human working conditions although does include some control of equipment and related working conditions. He added that human beings are much less reliable than machines and, hence, human malfunctions are more likely to occur since the working conditions of employees influence their performance more than machines. Consequently, he demanded the control of working conditions. Thirdly, the statistical techniques section, he mentioned, is useless in the current standard. Fourthly, servicing should be the same as process control. Finally, he demanded that the control of non-conforming products should be included in the control

of corrective and preventive action. It should be mentioned that the new ISO 9001 draft of 2000 includes safety issues in the organisation, it makes the customer the focal point of the quality system, and it includes a measurement of performance.

Beyond ISO 9000:

This question included actions that ISO 9000-registered firms might take in the future after ISO. The question asked if they were going to renew their registration, implement ISO 14000, TQM, or other standards. The results are shown in Table 9.47.

Table 9.47 Future actions after ISO 9000

No.	Criteria	Yes		No	
		Freq.	Valid %	Freq.	Valid %
1	Maintain registration to ISO 9000	83	100	---	---
2	Implement ISO 14000	31	37.3	52	62.7
3	Implement TQM*	19	33.3	38	66.7

* 29 firms had already implemented TQM

The first item in the table shows that all 83 firms were planning to maintain their registration to ISO 9000. The experience of ISO, in general, is still in its infancy since the standard started in 1987 and most Saudi firms started ISO implementation in the 90's. In addition, maintaining registration does not require a lot of effort nor are high costs involved for surveillance visits. Therefore, it is unlikely that firms would not maintain registration.

The second item in the table was about the planning of ISO 9000 registered firms to implement ISO 14000. Approximately one third of the firms were planning to implement ISO 14001, which deals with the environment. However, it was simply planning and did not involve any starting preparation. Therefore, saying that one third

of those firms are going to implement ISO 14001 is a very optimistic opinion. As yet, no environmental regulations or pressures have been exerted on Saudi firms to implement such a standard. Moreover, the problems associated with the environment, such as air pollution and industry wastes, are not visible in Saudi Arabia.

The third item in Table 9.47 was about the implementation of TQM. As we have seen from previous sections, the majority of the respondents thought that both ISO and TQM together could establish a better quality system. They implied that there were some other elements in TQM that could be added to ISO 9000 in order to have a more effective quality system. As a result, one third of the firms that did not already have TQM were planning to implement the programme. The majority of such firms, however, did not plan to implement TQM. This could imply that they could implement any other necessary element of quality without actually declaring that they were implementing TQM.

The respondents were asked to add any other standard that they were planning to implement. Two respondents said that their firms were planning to achieve the CE mark. Another two firms were pursuing the ASME code relating to pressure vessels. Three firms that already had ISO 9002 were planning to implement ISO 9001 in the future. Two ISO 9000 registered firms were interested in implementing EN 46001, while another firm was planning to achieve EN 46000. Finally, one respondent mentioned that his firm was in the process of obtaining the SASO quality mark.

9.11 The Role of SASO and the Saudi Government in ISO 9000 Implementation:

The Role of SASO in ISO Implementation:

The Saudi Arabian Standards Organisation (SASO) has played a minimal role in the process of ISO 9000 implementation in Saudi Arabia. As we discovered from previous sections, SASO as a registration agency certified only two firms by its own efforts and nine firms with the co-operation of BSI or SGS. In addition, SASO, as the national accreditation body, had trained only 10 firms in ISO 9000 subjects, making up only a fraction in the Saudi training market. The publications of SASO in the field of ISO 9000 have been very limited; more than 53% of the respondents had never seen or used such materials. Even when quality managers had used them, 17.1% of them mentioned that such materials had been of no help at all and 22.2% of them said that the usefulness was minor. Figure 9.24 shows the help of SASO written materials in implementing ISO 9000.

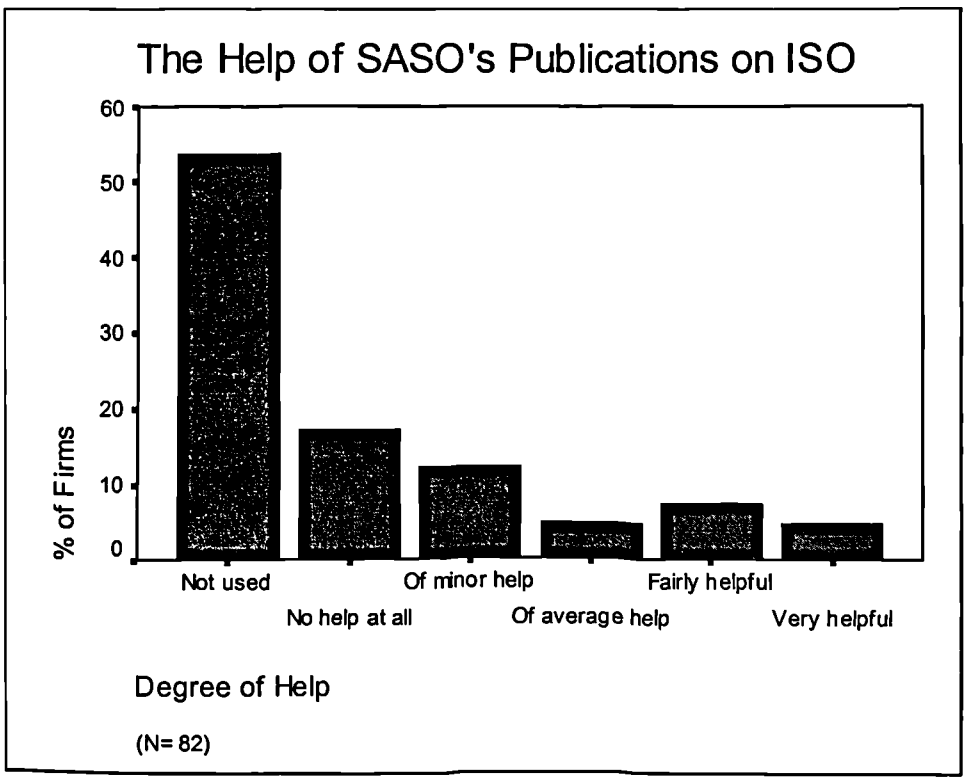

Figure 9.24 The help of SASO's publications on ISO 9000

The Director of the Quality Assurance Department of SASO, Khalid Bas-ham (1998) mentioned that SASO had started its assessment in conjunction with BSI in the Saudi market. The reason for this co-operation was that SASO did not have ISO 62, which was necessary to be accredited as a registration agency by the ISO organisation. By July 1995, SASO had stopped dealing with BSI and had turned to SGS in a dual registration scheme. As of 1998, SASO started assessing firms against ISO 9001 and 9002 by its own efforts, with no co-operation from other agencies. He added that the organisation had 12 auditors, one lead auditor, five certified auditors and six auditors under certification, all of them Saudi nationals. SASO charge SR 3000 per person per day for assessment and pre-assessment audit and SR 2000 per person per day for surveillance visits.

Evaluation of the Role of SASO:

At the end of the questionnaire, the researcher asked quality managers in all ISO 9000 registered firms to evaluate SASO. The question was about the overall evaluation of the role of SASO in implementing ISO 9000 in Saudi Arabia. This included all the activities concerning ISO, such as registration, training, publications and so forth. The results of the evaluation are shown in Table 9.48 and Figure 9.25.

Table 9.48 Evaluation of the role of SASO in implementing ISO 9000 in Saudi Arabia

Evaluation Categories	Frequency	Valid %
Excellent	5	6.1
Good	13	15.9
Reasonable	8	9.8
Poor	11	13.4
Don't know	45	54.9
Total	**82**	**100.00**

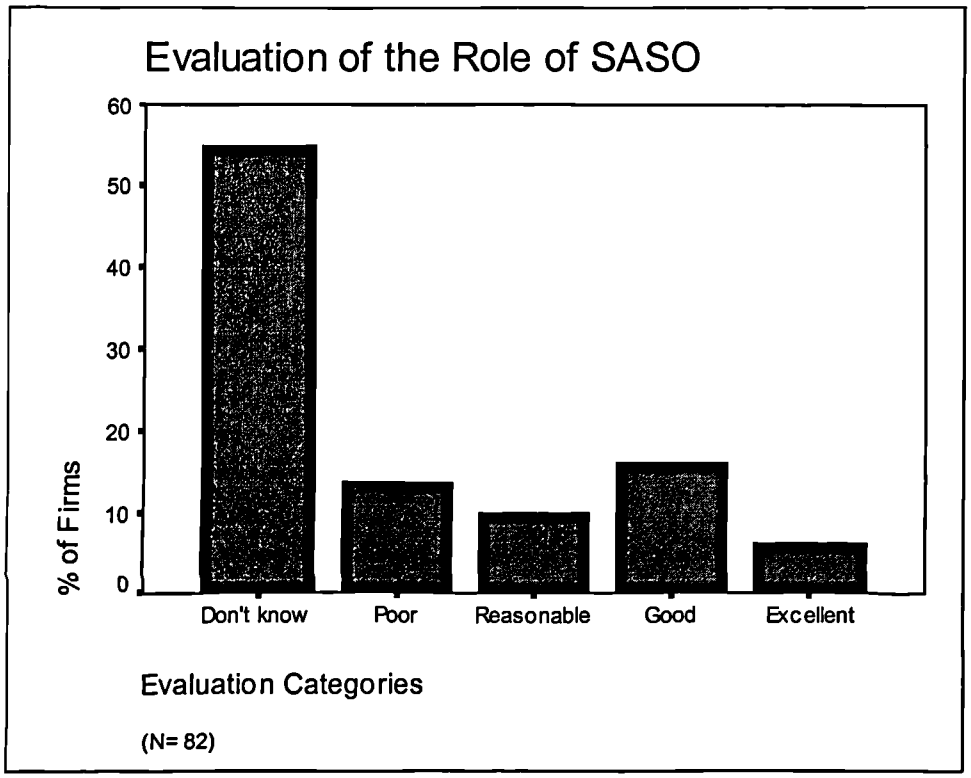

Figure 9.25 Evaluation of the overall role of SASO in implementing ISO 9000

Table 9.48 shows that more than half of the respondents (54.9%) did not like to evaluate the role of SASO. Either the role was not visible and consequently they could not evaluate something that they never seen, nor did they want to criticise SASO for whatever reason. However, the table shows that approximately 6% of the respondents thought that the role of SASO was excellent, and 15.7% said that it was good. Almost 10% of quality managers, thought SASO was reasonable and 13.4% considered the role of SASO as poor.

The conclusion on the role of SASO from the previous section and this section is that SASO, as a national certification body and as a registration agency, is just beginning. The role it has played so far has apparently been minimal in all activities, including training, publication and registration to ISO 9000. In addition, SASO had not achieved

ISO 62 in order to be accredited by ISO as a registration agency at the time of data collection. In addition, firms wanted more prestigious, foreign names with a global reputation. Moreover, SASO still lack the knowledge about specific industries. Some of the firms need very highly qualified auditors; those who have the technical information about the specific industry and not just auditing abilities.

The Saudi Government and ISO 9000:

From previous sections, it is apparent that the role of the Saudi Government has been minimal in ISO 9000 implementation in the country. As a motive for ISO 9000 registration, the need to meet Government demands, requirements or pressures was, in general, not important. This motive ranked 17th among 19 reasons for ISO 9000 implementation and was not considered an important motive at all. In addition, among the factors helping in the implementation of ISO, the assistance of the Government ranked 14th among 15 factors. This means that the help of the Government, represented by its various ministries such as the Ministry of Industry and the Ministry of Commerce, was very minimal. Moreover, the researcher asked respondents if the Saudi Government preferred ISO 9000 registered firms in bidding and contracts. The results are shown in Table 9.49 and Figure 9.26.

Table 9.49 The Saudi Government prefers ISO registered firms in bidding & contracts

Degree of Agreement	Frequency	Valid %
Strongly agree	10	12.0
Agree	19	22.9
Neither agree nor disagree	41	49.4
Disagree	12	14.5
Strongly disagree	1	1.2
Total	**83**	**100.00**

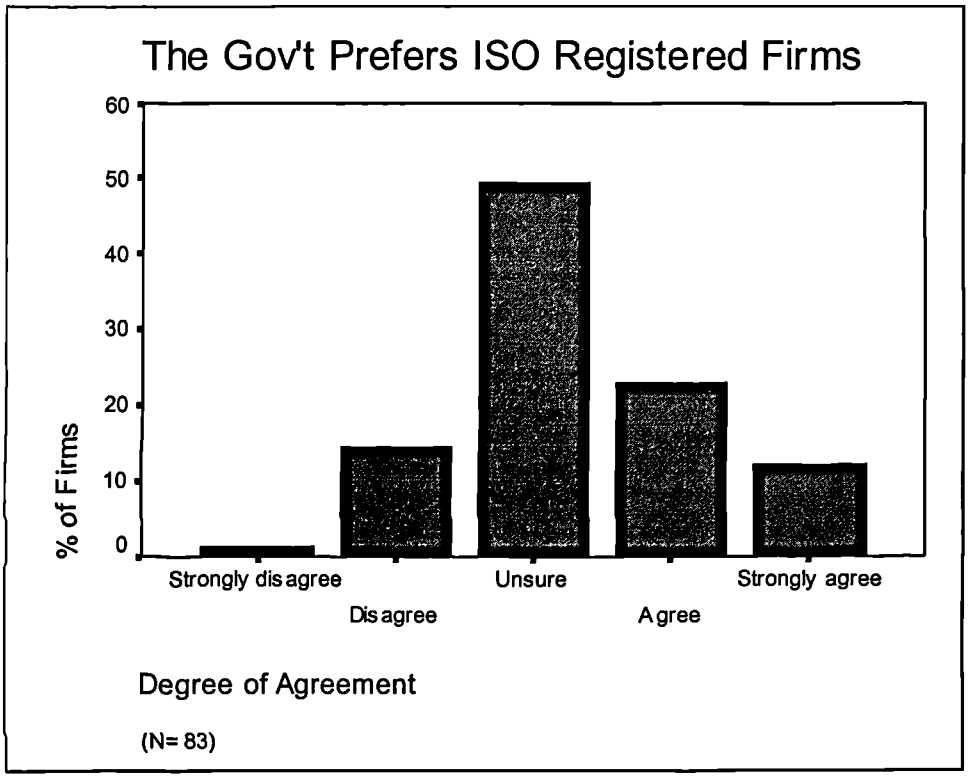

Figure 9.26 If the Government prefers ISO registered firms in bidding and contracts

Table 9.49 shows that almost half of the firms (49.45) had no opinion on this matter. This might mean that the Government actually did not demand such registration in its bidding, therefore the respondents were unaware of this. Moreover, about 15% of the respondents either strongly disagreed or disagreed that the Government preferred ISO registered firms in bidding and contracts. On the other hand, approximately, one third of the respondents (34.9%) either strongly agreed or agreed on this issue. One would conclude that the Saudi Government sometimes gives consideration to ISO registered firms in its contracts with the private sector. In Saudi Arabia, obtaining an ISO 9000 certificate is not a mandatory requirement, as in the case of some other countries, such as those in the European Community.

9.12 Summary:

Chapter nine covered all aspects related to ISO 9000 implementation in the Kingdom of Saudi Arabia. It included top management commitment and motives for ISO 9000 and studied the marketing motives of ISO and the difference between the commitment of ISO with that to quality in general. In addition, the chapter discussed issues on the preparation measures before implementing ISO, which included hiring employees, using consultants, and all aspects of training. The registration process of ISO was fully investigated, which encompassed the evaluation and choosing of registration agencies, the agencies in Saudi Arabia, and the steps of the registration process. The problems of ISO and the satisfaction and benefits of implementing the quality system were fully studied. Certain aspects of ISO documentation, which involved the quality manual and quality records, were covered in this chapter. The costs and benefits of ISO 9000 were also investigated and the roles of the Saudi Government and SASO were evaluated. Importantly, the relationships of those factors with the different sizes of firms were studied using the appropriate statistical tests where necessary. Factor analysis was employed twice in examining motives for registration and benefits of ISO 9000. A summary of this chapter is included in the next chapter, the final part, which is committed to a conclusion and summary of the findings of this study.

CHAPTER TEN

SUMMARY OF FINDINGS

CHAPTER TEN

SUMMARY OF FINDINGS

10.1 Introduction:

The previous three chapters presented the results, analysis and discussion of data collected from quality managers of ISO 9000 registered firms, from concerned SASO officials, and from lead assessors working in Saudi Arabia. This chapter includes, in its second section, a summary of the major findings of the study divided into three parts, which contain an overview of the findings on characteristics of firms, quality system elements, and ISO 9000 implementation. The research contributions are presented in the third section of this chapter. The fourth section addresses some limitations of this research. In the fifth section, the researcher suggests directions for further research that might be conducted in the future, and finally the chapter ends with a summary.

10.2 Summary of the Findings:

10.2.1 Findings on the Characteristics of Firms:

In this section, the findings of chapter seven (Characteristics of Firms) are summarised. The study showed that chemical and petrochemical firms ranked first, while metal products firms came second among the firms surveyed in the country. Another finding was that ISO 9000 was not just for the big firms, all sizes of firms registered to ISO, from under 50 employees to over a thousand. The study showed, however, that the majority of firms were medium-sized (101-300 employees). In addition, Saudi nationals were the minority among the employees in quality-related positions representing 40% of all employees, but Sabic firms were generally better than the rest in employing Saudi nationals. The study revealed that small firms had an average of

five employees whose their major functions related to quality; medium firms had 13 and large firms had 34. Moreover, the larger the firm, the more likely it employed Saudi nationals.

Another finding is that the majority of firms were of a joint venture type, followed by the private firms. The study also showed that the vast majority of ISO 9000 registered firms (88.7%) were involved in export and the majority of these firms export less than 10% of their sales outside the country. Chemical and petrochemical firms and metal firms, respectively, led other firms in terms of export percentage of sales volume, and joint venture type of firms led other types in terms of exporting abroad. Another finding of Chapter seven is that approximately two thirds of the firms were registered to ISO 9002 and one third to ISO 9001, while no firms were registered to ISO 9003 or to ISO 14000 or to QS-9000. In addition, less than 10% of firms have been registered for more than five years while a third, for less than three years, and another third of the firms, for less than five years. Another finding relates to the distribution of ISO registered firms between TQM and Non-TQM firms; approximately two thirds of the firms were Non-TQM and one third were TQM firms. When relating this distribution to the size of firms, it was found that large firms tend to implement TQM in addition to ISO more than did small ones. The study also found that Sabic firms tended to implement TQM in addition to ISO 9000 more than did other firms.

Finally, Chapter seven showed that Jeddah housed the largest number of ISO registered firms, followed by Riyadh and then Jubail. Moreover, the Western Region had the highest number of firms while the Eastern Region came second, and the Middle Region third in terms of ISO registration. Each of these regions were led by Jeddah, Jubail and

Riyadh, respectively, in terms of ISO 9000 registration. Chapter seven also included comparisons between the findings from Saudi industry in this study and findings in other countries relating to most of the characteristics of firms.

10.2.2 Findings on Quality System Elements:

This section includes a summary of the findings of Chapter eight (Quality System Elements). The chapter includes an investigation into the quality system elements of ISO 9000 registered firms in Saudi Arabia and the compliance of those firms to some of the ISO 9000 clauses. It also presents a comparison between TQM and Non-TQM firms in terms of executing certain elements of the quality system.

People Issues:

In the first section of people issues, the commitment of top management to quality was high, providing the required resources for quality in compliance with Sub-clause 4.1.2.2. However, in some firms, top managers did not review progress in quality matters. The use of steering committees to deal with quality issues was high, problem solving-teams came second, while cross-functional teams were used to the least extent. This might imply that some firms lack co-ordination in quality issues. Quality circles were used by less than 40% of firms in the study. When studying employee involvement in quality, it was found that firms gave line workers the authority and resources to deal with quality problems that arose. In addition, the study investigated training aspects, which ensure compliance with Clause 4.18 of ISO 9000, and revealed that the most commonly used training programmes were process improvement, leadership training, team building training and defect prevention training. However,

many firms did not provide training, ranging from 16% of firms making frequent use of training programmes to 45% of firms making the least use of such programmes.

Customer Focus:

In the second section on customer focus, the chapter showed that in some firms, the different departments did not participate in developing products and many firms did not use QFD to convey customer demands into all levels of production. When studying methods for measuring customer satisfaction, the study showed that customer complaints, customer returns and the feedback from the salespeople were the most common tools. In addition, the study revealed that many firms did not, however, use the more sophisticated tools of measuring customer satisfaction. It was evident that the most important criterion for evaluating suppliers was credible, timely delivery, followed by the quality of products. It also emerged that many firms did not use sophisticated techniques in evaluating suppliers, such as using a vendor rating system and failure mode and effect analysis. Another point is that firms sometimes evaluated their suppliers subjectively. In a related matter, the study showed satisfactory compliance with Sub-clause 4.6.3, which demands that suppliers should be provided with clear product specifications. However, some weaknesses were found in other attributes of the relations with suppliers, and many firms did not rely on fewer suppliers. Also, 13% of firms did not assess or monitor the quality system and the financial capabilities of their suppliers. Moreover, although firms had positive thoughts about ISO in managing suppliers, many firms did not think that ISO would increase competition among suppliers and did not think that purchased materials from ISO firms were better than those from firms. Most importantly, many firms thought that ISO procedures lengthened the time needed for the supplier verification process.

Product Issues:

The study investigated certain issues related to product, such as the identification of products during manufacturing and during inspection; it was found that there was a satisfactory compliance with Clause 4.8 of ISO 9000. In addition, inspection of goods from the beginning to the end of manufacturing was found to be satisfactory as a response to Clause 4.10 of ISO. The study showed that automated inspection was the most commonly used method of assessment, many firms were still using the manual method, while using the computer was still not common. The calibration of testing equipment was observed satisfactorily among firms, complying with Sub-clause 4.11.2 of ISO 9000. Moreover, all five requirements of dealing with non-conforming products were adhered to by firms in compliance with Clause 4.13. However, a few firms did not segregate non-conforming products when it was practical to do so. When dealing with the defective goods, most firms reworked them to meet the specific requirements, some firms rejected them and the minority used them for other purposes.

Tools for Quality Improvement:

This study also investigated the tools for quality; qualitative tools, SPC and benchmarking. It was found that among the qualitative tools, firms used task lists, flow charts and brainstorming more often, while other techniques, that may be more sophisticated were not used by many firms. In SPC, the most commonly used tools were sampling inspection control charts, and similar to the case of the qualitative tools, many firms did not use the advanced SPC techniques. Moreover, benchmarking was used by approximately half of the ISO 9000 registered firms in the study, and among the firms that used benchmarking, the majority benchmarked against products of others.

Quality Culture & Measuring Performance:

The fostering of quality culture was found to be relatively high among ISO 9000 registered firms. However, some firms did not measure and report the results of fostering quality culture, and many others did not provide incentives for the same purpose. In addition, the chapter included methods for measuring the performance in the organisation and it was found that the most commonly used techniques were feedback from customers followed by audit results, while quality failure costs came third. Many firms, ranging from 9% to 50%, did not use some of the advanced techniques in measuring performance. Such tools include financial accounts, SPC, costs of warranty and product liability. In addition, Chapter eight presented a comparison between those findings and other findings in other countries relating to most of the quality system elements.

TQM vs. Non-TQM:

Finally, the chapter includes a comparison between TQM and Non-TQM firms in executing some of those quality system elements. In general, TQM firms showed better performance in most items of the quality system. However, when the Mann-Whitney test and the Pearson Chi-square test were used in the comparison, it was found that there were significant differences in favour of the TQM firms in some items of training, relations with suppliers, qualitative tools, SPC, quality culture and measuring performance.

10.2.3 Findings on ISO 9000 Implementation:

The following sections include a summary of Chapter nine (ISO 9000 Implementation). The chapter fully investigated ISO 9000 implementation in Saudi Arabia, which

includes ISO implementation, registration aspects, ISO documentation, costs and benefits of ISO, the overall evaluation of ISO and the evaluation of the role of SASO and the Saudi Government in ISO implementation.

ISO 9000 Implementation:

The study revealed that top managers demanded the implementation of ISO significantly more than did the quality departments in the firms. Also, their commitment to ISO was significantly higher than their commitment to quality in general. The study revealed that the most important motives for implementing ISO were: improving the efficiency of the quality system, maintaining a market share, and meeting customer-supplier demands. Factor analysis was used to reduce those motives and to group them to 5 factors. Two statistical tests proved that data were suitable for factor analysis and there was a correlation among the motives. The results of the factor analysis emerged as 5 factors representing all motives; increasing market share, improvement of functions, international marketing, cost reductions, and joint-venture influence. Moreover, it was found that the higher the percentages of exports, the more important the two international marketing motives were, and that there was a significant positive correlation between the extent of export and the importance of those two factors. This meant that the higher the involvement of the firm in export, the more important these two motives were for the firm.

The study also investigated the planning measures the firms had taken before implementing ISO and found that many firms did not plan well for the process, and that there was no significance difference between firms based on their size in planning for ISO. In addition, the majority of firms had ISO project teams and the vast majority of

them did not hire new employees to implement ISO. However, almost 60% hired external consultants to help them; and no significant difference between large and small firms was shown on that issue. In violation to ISO 62, it was found that some firms received consultancy from their registration agencies. Also, the participation of the registration agencies in training their clients may question the conflict of interests matter and the integrity of the registration process.

In addition, the study showed that while the majority of firms received training for ISO, some of the firms did not. In a related issue, the study showed that the private training agencies ranked first in the training scene for ISO followed by the chambers of commerce, then the registration agencies, while SASO ranked fourth. Among the private providers of ISO training, the British agencies provided more than 80% of such training. When evaluating the chambers of commerce in terms of providing training for ISO, it was found that Jubail and Dammam chambers ranked first and second followed by Riyadh's.

When studying the factors helping in implementing ISO, the respondents revealed that the most significant factors helping in the implementation of ISO 9000 were top management commitment followed by a well-structured system of procedures and then the contribution of the internal auditors. Moreover, the most significant problems associated with implementation were the need to change the regular system, resistance to change by employees, and a lack of understanding of ISO by all departments.

The Registration Aspects:

The study investigated the registration aspects of ISO 9000. It was found that when choosing their agencies, firms considered their reputation and image first, then their knowledge of the industry, followed by their previous experience in Saudi. It was also found that small firms, significantly, considered two subjective factors when choosing their agencies more than did large firms. In terms of evaluating their agencies before choosing them, the study showed that more than one third of the firms did not check their internal operation nor their fees, and more than half of the firms did not check their long-term financial capabilities. When studying the shares of the registration agencies, it was found that BSI ranked first, followed by DNV, while SGS came third. In examination of the registration agencies revealed that some of them are operating out of the Kingdom, and more than 80% of registered firms were audited by British agencies, indicating the British dominant in both training and auditing. The respondents who did not chose SASO as their auditors did so because the certificate of the foreign agencies was more prestigious, valid and credible in the world. The research revealed that all firms performed internal auditing and the vast majority received a pre-assessment audit prior to full assessment. As for achieving full registration, it was found that 88% of firms did so in the first audit and the remaining during the second audit. Moreover, smaller firms are more likely to pass on the first audit. In addition, more than half of firms achieved registration in less than a year, 41% in two years, 6% in three years while one firm spent longer than three years. The study showed that BSI offered a certificate that does not expire, SASO offered one with two years' validity and the remaining agencies had a certificate valid for three years. In performing surveillance visits, the study showed that SASO and the British agencies conducted two visits a year while the German and the American agencies did so once a

year. When asked about problems with registration agencies, the respondents revealed that the most important problem related to the high fees, and that sometimes choosing the appropriate agency is difficult, and that auditing procedures are complicated. The respondents showed a high level of satisfaction with their agencies in general, and when those agencies were ranked in terms of the levels of satisfaction of their clients, Lloyds came first, followed by AOQC: Moody, and then Germanischer Lloyds in third place.

ISO 9000 Documentation:

The study investigated the documentation in ISO 9000, which included the quality manual and quality records. It was shown that all the firms had quality manuals and quality procedures while the vast majority had work instructions. The compliance to the terms of Clauses 4.5 and 4.16, related to maintaining quality records, was reasonable, although some firms did not dispose of obsolete quality records. When writing the quality manual, more than half of the firms relied on external consultants, while about a third of the employees did not participate in writing the part of the manual related to their jobs. It was found that more than 85% of firms arranged the quality manual according to the sequence of ISO clauses. When evaluating the quality manual, the majority of respondents demonstrated a high degree of satisfaction, and showed that the most significant problems with the manual were the involvement of a large administrative burden, it being too theoretical, and leading to a loss of flexibility.

Costs and Benefits of ISO 9000:

The study investigated the costs and benefits of ISO 9000 in Saudi Arabia. It was found that internal costs represented approximately 67% of total costs, followed by consultancy fees, making up 21%, while fees of registration agencies accounted for

12%. The approximate average amount for internal costs were SR 208,000, the consultatancy fees were SR 66,000, and the registration fees were SR 38,000. It was found that the smaller the firm, the lower the costs of implementation and vice versa. It was also found that SASO charged lower fees than the other known fees of the foreign agencies. When the respondents were asked if the benefits of ISO exceeded the costs or not, the majority showed a strong positive opinion of this. When studying the benefits gained from ISO, it was found that the most significant one were an increase in quality awareness, an improvement in quality system efficiency, and an improvement in customer service. As regards the motives for implementing ISO, factor analysis was used to group the benefits of ISO into 5 factors, while two statistical tests proved that the data were suitable for factor analysis and there was a correlation among the motives. The results of the analysis were in the form of 5 factors representing all of the benefits; these were internal benefits, marketing benefits, efficiency benefits, inspection benefits, and quality benefits. In using ISO as a promotional tool, the majority of the respondents considered it as a fairly important motive and more than two thirds of the firms used ISO in both their publications and advertising.

The Overall Evaluation of ISO 9000 as a Quality System:

When evaluating ISO 9000, the majority of the respondents seemed to be satisfied with ISO: the larger the firm, the more likely it was to be satisfied, and therefore recommend it to other firms. However, many of the respondents did not think that ISO guaranteed the manufacture of a good quality product. Moreover, many respondents thought that ISO by itself could not establish a sufficient quality system suggesting implementing TQM alongside ISO 9000. In addition, the respondents seemed to be divided as to the amendment of ISO clauses. However, along with the assessors, they felt the need to

add some topics to ISO. When asked what they considered to be beyond ISO 9000, many of the respondents were planning to implement ISO 14000 for the environment, some considered implementing TQM, but nobody was planning to halt registration.

The Role of SASO and the Saudi Government in ISO Implementation:

The study investigated the role of both SASO and the Saudi Government in implementing ISO in the country. It was found that the role of SASO was minimal in activities related to ISO, such as registration, publications and training. Moreover, SASO had not achieved ISO 62, which is required to be certified ISO auditor, which meant that the organisation, at certain times, had to audit firms in co-operation with BSI or SGS. When asked to evaluate SASO, many of the respondents seemed to be reluctant to do so, and the general impression about SASO was that it was not active in ISO implementation. In the case of the Saudi Government, it seemed that despite its representation by various ministries, it did not play an active role in the ISO arena. The Government sometimes gave consideration to firms with an ISO certificate in its contracts and bidding, although the Government was not enthusiastic about it.

10.3 Research Contributions:

This research offers contributions to the body of knowledge especially as this study is unique and innovative. Although previous studies have investigated some aspects of ISO 9000, this research was probably the first to incorporate ISO and TQM, presenting both the requirements of ISO 9000 and other important tools of quality management. The questionnaire includes several questions that investigated the degree of compliance to ISO 9000 clauses, such as Question 18 that presented the different alternatives for dealing with non-conforming products (Clause 4.13). The researcher considers this

translation of clauses' requirements into questions to be unique and innovative to this research and consequently provides a contribution to the body of knowledge in the field of ISO 9000. Furthermore, this research is the first to include generic elements of quality alongside the ISO 9000 elements. Two examples are: the practice of quality culture (Question seven) and line worker involvement in quality (Question 20).

In addition, this research investigated several elements of ISO 9000 implementation that had not been investigated in previous studies, further underlining the uniqueness and innovation of the design of the questionnaire. Previous studies investigated limited elements of ISO, such studies as that of Erel and Ghosh (1997) in Turkey, Brown and Van der Weile (1995) in Australia and Vloebergh and Bellens (1996) in Belgium among others. However, this particular study in Saudi Arabia is innovative in tackling all aspects of ISO clauses, including implementation, registration and future plans. Two examples are: the procedures that had been undertaken before the choice of registration agency (Question 38) and planning measures before implementing ISO (Question 39). Although customer focus, benchmarking and measuring performance were not mentioned in ISO 9000 (1994), this study investigated such elements which happen to be included in the new version of ISO 9000: 2000. It is a unique contribution to incorporate those elements into the quality system and their inclusion in ISO 9000:2000 confirms both their relevance to quality systems and underlines the researcher's efforts to be anticipatory and predictive, rather than just sticking rigidly to the existing version of ISO 9000 (1994).

Another contribution to the body of knowledge is provided by the researcher using ISO 10013 (1995) of the quality manual in questions such as 50 and 51; the first asked about

existing documentation while the second asked about the layout of the quality manual. In addition, ISO 62 (1996) governing the work of the registration agencies, was used in the questionnaire (Question 54). Furthermore, the researcher was able to employ BS 7850 Part 2 (1992) in Question 21 by selecting the SPC and qualitative tools mentioned in the standard to be the basis for respondents to select probably the most commonly used tools. Overall, the questionnaire design has been unique in the rigour of its contribution and the scope of quality management related issues it investigated.

In contributing to the body of knowledge, this study was also able to identify differences between TQM and Non-TQM firms, in that it evaluated generic elements obtained from the literature as to what constitutes TQM and these elements were applied to the questionnaire. This study was able through the questionnaire to dismiss some elements from the comparison between TQM and Non-TQM firms, since compliance to those elements is a matter of choice. In another contribution to the body of knowledge, this study touches on some important issues in quality management, such as the importance of employee involvement, empowerment, training, changing the culture, and challenging established practices. Furthermore, chapters four and five include a substantial and comprehensive coverage of ISO 9000 and TQM offering useful information on these subjects. Although these data are secondary, the researcher considered them important to enhance the knowledge and awareness of scholars and practitioners in quality management.

This study is probably the first to cover the quality management systems of ISO 9000 registered firms and the implementation of the standard in Saudi Arabia, and therefore represents originality to this field. Therefore, it may contribute greatly to the field of

studying the quality systems of ISO 9000 and the implementation of the standard in the country. Moreover, this study incorporates ISO in the quality system as a whole and investigates both quality system elements and ISO 9000 implementation. Additionally, all ISO 9000 aspects are exposed to the reader so that ISO implementation is covered and exposed from the beginning stages to the end. The motives, the costs, and the benefits of ISO are also examined. In many countries, several studies have examined many parts of ISO 9000 implementation and evaluated them. In Saudi Arabia, although ISO registration started in the beginning of the 1990's, neither its evaluation nor investigation had been accomplished, nor had the quality scene in Saudi Arabia been exposed thoroughly prior to this research. Therefore, it is expected that this study will constitute a significant for the researcher and practitioners in the country.

As there has been some confusion about adopting a TQM approach in the organisation, this study clarifies the difference between TQM and Non-TQM firms among ISO 9000 registered firms. Taking into consideration the case of Saudi firms, it is probably clear which approach is more appropriate. Such firms now know that they need to go beyond ISO towards a more comprehensive approach that incorporates some elements of quality that are not included in ISO 9000. This study has also included a large number of comparisons between the Saudi industry and those of many other countries in terms of their characteristics, quality system elements and ISO 9000. These comparisons may help to enlighten Saudi industries to evaluate their position among other countries, and to take the necessary measures to correct any problems in their firms.

One important contribution this study has made has been its coverage of the vast geographical area that forms the Kingdom of Saudi Arabia. Firms from all of the major

cities from the Eastern, Western, and Middle regions are dealt with in this research and the reader can become familiar with the distribution of ISO registration in the country. In addition, this study is probably the first to analyse the quality systems and ISO implementation of the Sabic firms in the Kingdom. It also adds new findings regarding the employment of Saudi vs. non-Saudi employees in the manufacturing sector of Saudi Arabia. Another point to be made is that since Saudi Arabia is a less developed country, many similar countries might benefit from the findings of this research for their own firms. The similarity of the Saudi economy and industry to other Arab, Middle-Eastern, or Third World countries might be of great benefit to scholars and practitioners in this field.

This study has paved the way for firms pursuing registration to ISO 9000 in its implementation to the standard. It offers a number of recommendations and guidelines to other firms pursuing registration to ISO in clarifying its different aspects, such as the registration process, its implementation and the costs involved. Certain firms might benefit from the information included in this study on how to implement ISO from its planning to the full registration and beyond. Subsequent to this study, firms might be able to decide whether or not to pursue registration to ISO 9000.

By using cross-tabulation and other statistical techniques, it was possible to examine the relationships among variables. Such relationships included employees by size of firms, export by sector of activity, number of audits by size of firms, ranking of registration agencies and satisfaction by size of firms, among many others. Furthermore, this study added to the field of factor analysis use in social sciences as it was used successfully with an explanation of variables of no less than 60% in this study.

10.4 Limitations of the Research:

The limitations of time and financial resources represent constraints for all research and this study was no exception. Such limitations caused the study to be concentrated, to some extent, on quantitative techniques as a data collection method. Had there been substantial resources and more time, the researcher could have used qualitative techniques, such as interviews, to look into issues in more depth and provide greater insight into the quality scene in Saudi Arabia. The researcher therefore lost an opportunity to answer some of the 'how' questions that might have enriched this research.

Another limitation is that the sample could have included Non-ISO 9000 firms so that the study could compare the performance of ISO vs. Non-ISO firms in the country. The study could also have included service industries in order to provide the representation of both industry types in the private sector; the manufacturing and the service sectors. Moreover, it could have included other Arab countries or Gulf Co-operation Council (GCC) countries such as Kuwait, Egypt and the United Arab Emirates, so that further comparisons could have been made. Those opportunities were missed due to the limitations of time and financial resources.

Another limitation of the study was the questionnaire design and length as it was devised to include scales to help in statistical calculations. This, in turn, made it somewhat difficult for the respondents to answer the questions. In addition, the questionnaire had to include many aspects, such as quality system elements and ISO implementation, which made it somewhat lengthy. A further limitation was the size of

the sample, which comprised approximately 140 firms. However, the researcher had no solution for this limitation since this number represents all known manufacturing firms that were registered to ISO 9000 at the time of the data collection. Therefore, there was no way of increasing the sample size. Had the size been larger, the statistical analysis would have given more weight to the findings. Another limitation related to the size of the population is that it is possible that there were other ISO 9000 registered firms in Saudi Arabia that had been certified by other registration agencies. If so, the researcher was not aware of such firms and they were therefore not included in the study.

Furthermore, this study did not cover product design in the questionnaire. While this was included in the draft questionnaire, the respondents in the pilot study, as well as academics in Saudi Arabia, advised the researcher not to include designs for manufacturing. The reason was that firms in Saudi Arabia mainly import design from foreign corporations, either from their joint venture partners or by buying the right to manufacture the products in the country. This is the case in most of the developing countries.

The method of examining compliance of firms to some of the ISO clauses is considered limited. Since the answers of the respondents are confidential, the researcher assumed that their responses to the questions relating to their compliance to ISO clauses were true. In reality, examining compliance requires the scrutiny of important documents, which was not possible for the researcher. Therefore, the degree of compliance of ISO 9000 registered firms with the standard reflected merely the answers of respondents in a voluntary manner, which were not verifiable.

Finally, the last limitation was the absence of any examination of the relation between *quality and ISO 9000* to the profitability of firms. Such a relationship would have been of great benefit to this study. Participants in the pilot study told the researcher that obtaining profitability figures from questionnaire respondents would be almost impossible as they may consider it a release of confidential information. Therefore, the researcher did not ask about the profitability of the ISO 9000 registered firms, and this must be considered a shortcoming.

10.5 Direction for Further Research:

The first suggestion for further research is to start with a validation of this study. This research is assumed to be the first to investigate ISO 9000 implementation in Saudi Arabia. In addition, the research design of this study was based mainly on quantitative tools to collect data. Therefore, any further research might benefit from the use of triangular approach using both quantitative and qualitative techniques. The later would come as interviewing respondents to obtain more in depth and richer information. In addition, future research could use more sophisticated statistical tools to enrich the analysis and to provide more explanation of the causes of variables.

The limitations of this study may constitute a basis for prospective research and further investigation. Such research might include Non-ISO 9000 firms in the country to explore the differences that ISO might make between ISO and Non-ISO firms. Since certain service agencies, such as banks, had already obtained ISO 9000, any future study could include the service industry in Saudi Arabia. However, such a study could not be undertaken until there are a considerable number of service firms to be surveyed. Up to now, the researcher has found that the number is too small to be studied in

generalised findings. Further research might investigate the next ISO 9000 version that is to be discussed and approved during the 2000. However, this will not be possible for many years as firms are given three years from the date of the publication of the standard to convert to the new standard. Also, even when firms are registered to the new versions of ISO, the effect will not be visible before some time has elapsed.

The sample in this study consisted of quality managers in ISO 9000 registered firms in the country. Any future study might include the senior managers' perceptions of ISO implementation. Furthermore, any research of ISO 9000 implementation in Saudi Arabia might be in the form of a comparative study, such as between Saudi Arabia and other Arab or Gulf countries on the one side and Western industries on the other. This might also include any cultural, political, and legal aspects affecting the implementation of ISO 9000 between the two groups. The researcher suggests that other variables might be considered in any further research into ISO 9000, for instance profitability or other financial indicators might be examined to see the effect of ISO 9000, taking into consideration that quality may not be the only reason for profitability. One example of this is the dwindling of profitability among Sabic firms in the last two years in Saudi Arabia, which can probably be attributed to the financial crisis in South East Asia and the increase in competition, rather than because of quality. Therefore, any use of financial indicators relating to quality should be dealt with carefully, taking into consideration various other external environmental factors. Finally, the study of the marketing aspects of ISO 9000 could be the subject of further research, as could customer aspects of ISO be studied in greater detail.

10.6 Summary:

The chapter included the main findings that were found in the study divided into three parts; characterises of firms, quality system elements and ISO 9000 implementation in Saudi Arabia. It also covered research contributions, limitations of the research and directions for further research. The next chapter will present the final conclusions of this study and recommendation.

CHAPTER ELEVEN

CONCLUSION AND RECOMMENDATION

CHAPTER ELEVEN

CONCLUSION AND RECOMMENDATIONS

11.1 Introduction:

This chapter discusses the main and important conclusions that have been derived from the analysis of the findings of this study relating to the literature review. It includes main conclusions, recommendations and ends with a final conclusion of the study.

11.2 Main Conclusions:

This section involves the evaluation and discussion of the findings of the study covering five main issues in this research. These are: the Saudi quality scene, ISO 9000 quality management systems, the ISO 9000 audit / registration system, ISO 9000 and TQM and SASO and the chambers of commerce, presented in the following sections.

11.2.1 The Saudi Quality Scene:

Characteristics of Firms:

Employment in Saudi industries seems to be dominated by foreign workers as Table 7.4 shows that more than 60% of employees in quality-related roles were non-Saudi's. The problem of foreign labour has been dominating the industrial environment especially as the Government considers it a crucial problem in the Sixth Development Five-year Plan (Chapter two, 2.3.4: Problems in Saudi Industry) and Al-Dakheil (1994) claims that 92% of industry workers were non-Saudi. However, in this study, due to the existence of Sabic and other semi-government firms, the percentage was not as high as that shown in Table 7.5 for Sabic firms. Nevertheless, the picture in industry as a whole is probably something in between 60% and 92%, or more than 80% of foreign workers,

where private firms tend to hire foreign workers for many reasons. They include the low wages for foreign workers and the lack of government regulations preventing foreign employment. Furthermore, many Saudi nationals are not willing to work in certain vocational occupations for different cultural reasons and some technical jobs require highly skilled workers who might not be available among Saudi nationals.

The problem of lack of diversification in Saudi industry mentioned in the Sixth Development Five-year Plan, with a strong focus on petrochemical products, representing 60% of the national income of industry, is still a significant issue. In 1997, Sabic firms alone exported chemicals and petrochemical products worth 58.26% of all Saudi industrial exports (Table 2.6). Almost 30% of the firms surveyed in this study were from the chemical and petrochemical sector as shown in Table 7.1. The reason for this concentration results from the abundance of the raw materials for these products, Saudi Arabia having the largest oil reserves in the world (Figure 2.4). What is more, the country still lacks advanced technology to permit entry into more sophisticated and heavy industries.

The three dominant Saudi regions in terms of ISO 9000 registration were the Western, the Eastern and the Middle respectively (Table 7.20). The absence of the Southern and the Northern regions in terms of ISO registered firms is noticable. One reason for this concentration is that those regions have substantially fewer manufacturing firms than the three other regions. The main provinces in the Southern region are Assir and Jizan, with only 58 and 28 factories respectively, while the main provinces in the Northern region are Tabuk and Jouf with 23 and 11 factories. In contrast, the Eastern region alone has 651 manufacturing firms (Table 2.4). Another reason is that the Eastern

region has oil reserves and production and industrial sea ports, while the Middle contains the capital of the country. The Western region houses Jeddah, the second largest city and important commercial seaport. In addition, Jubail and Yanbu in the East and the West, house the Royal Commission for Jubail & Yanbu, two giant industrial cities having many sophisticated firms, and house Sabic firms (Chapter two, 2.3.3: Regional Development Activity).

Although the number of manufacturing firms identified by the researcher was almost 140 in the middle of 1998 (Chapter six, 6.15: Response Rate) along with more than 20 firms in the service industry, the number of registered firms based on an ISO survey as of 1998 was 280 (Figure 4.5). The growth rate of ISO registration in the country was high; the number of firms jumped from 30 in 1994 to 280; almost ten times or 1000% in five years, representing almost 9% of all manufacturing firms in 1998 (Figure 4.6). When comparing Saudi Arabia to other Arab countries in terms of ISO registration, it was ranked 3rd after the UAE and Egypt (Figure 4.7), which was an advance ranking.

The study shows that there were no firms registered to ISO 14000 for the environment (Table 7.13) and the number of firms appeared to be only one based on an ISO survey (Chapter four, 4.13.1: ISO 9000 Registration in Saudi Arabia). This may imply that Saudi industry is less concerned about the environment but could in fact be because industry has not grown to such an extent that it poses a threat to the cleanness of the air and the environment. In addition, the industrial cities are situated out of the cities, given the vast geographic area of the country and the abundance of its resources. Nevertheless, the main reason could be a lack of awareness in industry about the

environment, an unwillingness to bear extra costs for this matter, and the absence of regulations relating to environmental issues in the country.

Quality System Elements:

The study concluded that ISO 9000 registered firms in Saudi Arabia performed well in terms of executing the quality system elements (Chapter eight). However, it can be argued that ISO 9000 alone was not the reason for this efficiency. The 83 firms under study were among the elite in the country and the success of their quality systems may be attributed to several reasons. Firstly, more than 45% of the firms were joint venture with some of the best international corporations, such as Mobil, Texaco, Shell, BP, Mercedes Benz and Mitsubishi (Table 7.7). Those firms surely benefited from the expertise and knowledge of these corporations. Secondly, more than 10% of the firms had a Government partnership and used highly sophisticated systems of production and invested large sums of capital (Table 7.7). Thirdly, the 12 Sabic firms or 14.5% of all companies that participated in the study employed the self-assessment EFQM model of business excellence (Chapter eight, 8.7: Measuring Performance in the organisation). Employing this model might have contributed positively to the well being of the quality systems of those Sabic firms.

In terms of quality system elements, the study revealed that sometimes many of the ISO 9000 registered firms did not use some of the more sophisticated techniques for quality. However, this cannot be necessarily considered a shortcoming since comparison of these findings with those of other countries, appears to show that this is in fact common practice. Table 2, Appendix F shows that Saudi firms in their use of SPC or qualitative tools were sometimes better than those of the USA in comparison of the two studies. It

is also possible that some of these tools are not always used or sometimes are not needed.

One point that is related to the final customer in Saudi Arabia and is worth mentioning here is that of warranty and product liability issues. It appears that the ISO 9000 registered firms under survey did not give this matter adequate attention, as shown in Table 8.6 where the use of 'warranty costs as a percentage of sales' ranked last in the methods used to measure customer satisfaction (39% of firms did not use it). Moreover, in Table 8.25 'costs of warranty and product liability' also ranked last as a method of measuring performance in the organisation (40% of firms did not use it). This low use of warranty and product liability cost as a measurement of performance could be the result of the absence of clear product liability laws in the Kingdom. Moreover, many consumers in the less developed countries do not understand their rights concerning product liability and warranty of their purchased products.

ISO 9000 Implementation:

Although the most important motive for registering to ISO 9000 was to improve the efficiency of the quality system, the study revealed that there was some kind of pressure, other than the quality system, for the firms to obtain ISO 9000 as Fox (1994) and Havard (1994) contended. It appeared that there was a demand from the suppliers to have ISO since this motive ranked 3rd (Table 9.4). Entering the international markets was probably an important motive, as there was a correlation between this motive and the extent of involvement in exports. The more the firm was involved in export the more important was this motive (Table 17, Appendix F). In addition, factor analysis gave this motive high consideration, being Factor 3 and including two motives 'to avoid

being excluded from the European market' and 'to market products in the international arena' (Table 9.5). Furthermore, almost 90% of firms were involved in export in a country that is not a leading exporting nation (Table 7.9). Moreover, as Sabic firms export almost 60% of the Kingdom's industrial exports (Table 2.6), it was found that about 67% of the largest amount of exports (51% or more) were from the chemical sector (Table 7.11). In addition, the joint venture firms were leading other firms in terms of extent of exports (Table 7.12), which may imply their desire to market their products in the international arena in co-operation with their partners abroad.

The transfer of expertise to Saudi Arabia in terms of ISO services such as registration, training and consultancy seems not to be promising. Approximately 90% of the firms were registered by foreign agencies mainly British (Table 9.15), which appears to be the case in the developing countries such as India (Ray, 2000), which may be attributed to many reasons. Firstly, firms usually look for the big and prestigious agencies to lend their certificate more acceptance (item 1, Table 9.16). Secondly, SASO has not obtained ISO 62 (1996) to be accredited as a registration agency (Chapter nine, 9.11: The Role of SASO in ISO Implementation), which rendered the organisation not appealing to firms (Weightman, 1997). Thirdly, firms feel, although this may not be in fact the case, that the foreign agencies were more competent than the national agency (item 3, Table 9.16).

The second issue in the transfer of expertise was training with 61% of the training, provided by agencies other than SASO or the chambers of commerce, being given by private agencies (Table 9.11), of which 82% was carried out by British training agencies (Table 20, Appendix F). The third issue in the transfer of expertise is

consultancy, which is usually carried out by the same agencies operating in the country (Table 20, Appendix F). This foreign domination will present a barrier to the transfer of expertise to Saudi nationals and institutions.

The previous paragraph shows that the British agencies were dominating the ISO 9000 scene in Saudi Arabia, which may be attributed to many reasons. Firstly, the UK was leading the world in terms of ISO registration, having approximately 59,000 registered firms in 1998, more than the USA and Germany combined (Figure 4.3). This might imply that strong infrastructures for ISO exist in the UK. Secondly, the British agencies were the first group to start operating in the Kingdom; BSI, DNV and LRQA (Table 22, Appendix F). Thirdly, business and industry in Saudi Arabia use the English language in addition to Arabic in their dealings, making Britain a preferable partnership country along with its relative closeness to the Kingdom compared to the USA.

As to whether the benefits of implementing ISO 9000 were tangible or monetary, this is an important question. The study revealed that the most significant benefit of ISO was that of creating quality awareness in the organisation (Table 9.38). And that is exactly what Yung (1997) is saying. Also Erel and Ghosh (1997) in Turkey, and Brown and Van der Wiele (1995) in Western Australia found that creating quality awareness as the most important benefit of ISO (Table 30, Appendix F). In support of that, the quality culture among ISO 9000 registered firms was found to be strong (Table 8.24). Therefore, it appears that when the firm is registered to ISO, this creates an overwhelming and strong feeling and consensus among employees about quality matters. The monetary benefits of ISO 'reduced costs' and 'improved profitability', ranked 17th and 18th out of 20 benefits, which meant that ISO probably did not

contribute financially directly (Table 9.38). It appears that the intangible benefits of ISO 9000 were feasible and important. The case of Saudi Arabia shows that firms with ISO 9000 used it as a symbol and an indication of strength and prestige. To the Saudi final customers who see the advertisements of a firm holding the ISO certificate, it means good quality since the vast majority of them think that way. That is why more than 60% of the firms used ISO as a promotional tool in their advertising and publications (Table 9.41). Moreover, the majority of respondents considered ISO as an important promotional motive (Table 9.40).

The study included some comparisons between the different sizes of firms in order to investigate if size represents a significant factor in the context of ISO implementation. A summary of these differences is shown in Table 11.1.

Table 11.1 Summary of the differences between small and large firms

No.	Small Firms	Large Firms	Reference Table
1		More likely to employ Saudi nationals	7.6
2		Tended to be Saudi corporate then the mix of Government and private types	7.8
3		Tended to implement TQM	7.17
4	Used subjective factors when choosing registration agencies		21, Appendix F
5	Tended to achieve registration during the first audit		9.20
6		Higher costs of ISO implementation	9.34
7		Tended to be more satisfied with ISO	31, Appendix F

Item1, Table 11.1 shows that large firms tended to employ Saudi nationals more than did small firms. This is probably because large firms tended to be Saudi corporate, Government (see item 2), and Sabic firms. The Saudi corporate firms are established by strict regulations to hire Saudi nationals since they are not privately owned and the Government partnership firms are established by even stricter regulations to do so.

Regarding Sabic firms, they were established by the Government in 1976 and started having a majority of Saudi employees since then and by 1999 70% of Sabic employees were Saudi nationals. Item 2 shows that Saudi corporate and the Government partnership firms tend to be large comoanies. This is probably because Saudi corporate firms are joint stocks firms with large number of shares providing substantial capital investment. The Government partnership firms were established by huge financial contributions from the Government to establish important projects in the fields of oil and gas exploration and production.

Regarding item 3 in Table 11.1, large firms, and among them Sabic firms (Table 7.18) tended to implement TQM more than did small firms. In both cases, we are dealing with large corporations since Sabic firms are all large ones. It is maybe reasonable, as a matter of speculation, to find large ISO firms implementing TQM as a more comprehensive way of handling quality. Large corporations usually invest large amounts of capital and have sophisticated systems for quality. Such firms may consider ISO to be only a complementary part of their quality system.

Item 4 concluded that smaller firms tended to choose their registration agencies based on subjective matters: personal relationship and advice by another company or person. Smaller firms are usually privately owned by a person and have relatively fewer employees and small amount of capital. Therefore, the choice of the registration agency was usually performed in a less systematic way and relationship and social suggestions probably played a significant role in the choice. Concerning item 5, smaller firms tended to achieve ISO registration during the first audit. As a speculation, it is possible that smaller firms may have encountered fewer problems and

requirements, and had less documentation. In addition, such firms may have relied on external help in preparing for ISO. In item 6, Table 11.1, larger firms incurred higher costs of implementing ISO 9000 in all three types of ISO costs. This is probably logical since large firms have more operations, more employees, more procedures and more work functions, which require longer auditing days, more preparation and training, more consultancy days and so forth. Finally, item 7 shows that larger firms were on average more satisfied (slightly not significantly) than smaller ones with ISO 9000. It is possible that large firms were more capable of employing ISO inside their firms, benefited more in term of quality systems efficiency and in exporting their goods and being able to use it in their massive promotional campaigns.

On another point, the study included several comparisons[1], especially in terms of ISO 9000 implementation, between Saudi Arabia and other world countries; some of them were more developed, while others were from the less developed countries. Such countries were Belgium (Vloebergh and Bellens, 1996), Thailand (Krasachol *et al.*, 1998), Turkey (Erel and Ghosh, 1997), the UK (Buttle, 1997; Taylor, 1995a; Taylor and Meegan, 1997), Greece (Stathori, 1994), Malaysia (Idris *et al.*, 1996), Western Australia (Brown and Van der Weile, 1995), India (Acharya and Ray, 2000) and Sweden (Carlsson and Carlsson, 1996). The study revealed that, in general terms, the findings of Saudi Arabia were close to those of other countries, developed and under-developed alike. Therefore, it can be argued that the similarities showed some conclusions. Firstly, the consistency, validity and reliability of the data of this study. Secondly, this study served the purpose of validating previous studies. Finally, Saudi industries had similar structure, operations, expertise and technology with other more

[1] The details of the comparisons are included in the analysis chapters; seven, eight and nine in the relevant sections and their related tables in Appendix F.

developed countries, which creates the expectation that they be similar to other world industries in implementing ISO. Nevertheless, one difference that worth mentioning is in the case of the costs of implementing ISO between Saudi Arabia and the US (Table 26, Appendix F). From this it can be seen that the percentages of each type of cost, internal, consultancy and registration fees, to the total average of the costs are very similar. Internal costs in both countries represented more than 66% of the average costs in both countries. The other two types of costs represented percentages that are very close. However, the costs in the US were almost double those of Saudi Arabia. Those big differences could be for two reasons. Firstly, the sample in the US included very large corporations with capital of more than one billion dollars, which meant higher costs. Secondly, the standard of living in the US is much higher than that in Saudi Arabia, which contributed to the high costs of ISO 9000 implementation in the former.

11.2.2 ISO 9000 and TQM:

It was evident in the study that ISO alone was probably not sufficient to establish a quality system and firms therefore may go beyond that to TQM. When asked if ISO alone can establish a sufficient quality system, it appears that there was a division of opinion among the respondents. However, when asked about ISO and TQM together, it was found that the vast majority believed that both of them might establish a sufficient quality system (Table 9.45). Nevertheless, this matter was investigated earlier in this study when comparing between TQM and Non-TQM firms among ISO 9000 registered firms in Saudi Arabia. It was found that 29 firms, or almost 35% of firms, claimed to have TQM in addition to ISO 9000 (Table 7.16). When the statistical tests were conducted to compare between the two types (Tables 3 to 14, Appendix F), it was found

that TQM firms performed generally better in most of the TQM elements (a summary is in *Table 8.26*).

Earlier in the literature review (Chapter five, 5.9: TQM and ISO 9000), Fox (1994) considers ISO not to be sufficient alone and recommends ISO as a complementary part of a more comprehensive TQM programme. Corrigon (1994) also considers ISO and TQM to supplement each other. In addition Arora (1996) contends that ISO is a pillar in a company's approach to TQM, and Iizuka (1996) suggests the firm go beyond ISO to TQM. Ho (1995b; 1996; 1999) in his model TQMEX includes ISO as a component, and Oakland (1996) also provides a model for TQM that includes ISO 9000. Mahoony (1995) offers a trilogy model that includes ISO 9000 along with the EFQM model and the Baldrige Prize. Finally, Sun (1999) analysed data obtained by the London Business School and Chalmers University of Technology, covering 20 countries in the world. He found that implementing ISO 9000 alone did not contribute much to quality improvement in the organisation. However, implementing both ISO and TQM contributed the most and this finding is just what this study revealed about Saudi industries.

11.2.3 ISO 9000 Quality Management Systems:

This study was conducted on the basis of ISO 9000 (1994), which will be valid for up to three years after the publication of the new ISO 9000: 2000 (Zuckerma, 2000; West *et al.* 2000). The respondents in this study demanded amendment of the ISO 9000 (1994) clauses (Table 9.46); their opinions were however given at the end of 1998, and before the publication of the draft ISO 9000: 2000. ISO 9000 has been limited since 1987 in its first version and will always be so as long as it is subject to assessment its by a third

party auditor. The reason for this is mainly two folds: limited clauses to which the assessor can examine compliance with, and the clause of the standard can be verified and audited. Therefore, not every tool or element of excellence can be tested, hence the dilemma about ISO not satisfying everyone will remain valid. When we say TQM, do we really determine what its components are? Or what elements it should include? If so, then TQM is also limited and criticised for not satisfying all parties. Therefore, ISO 9000 was intended to establish the minimum requirements for a sufficient quality system and firms might go beyond ISO 9000 to choose whatever tools for success they want. Moreover, ISO 9000 is not a rigid standard, it is quite the opposite; in 1987 came the first version which was then modified in 1994 and in 2000; scores of international experts and 28 organisations participated in its amendment (see Chapter four, 4.14: The New Version of ISO 9000: 2000).

The first limitation of ISO 9000 (1994) is that it does not address customer needs (Basham, 1998). Secondly, it does not address employee involvement (Yung, 1997). Thirdly, it is not concerned with business results nor financial indicators (Al-Gahtani, 1998). Fourthly, it does little to address the activities that produce a high quality product (Iizuka, 1999). Fifthly, it does not include safety for human working conditions, and finally the statistical techniques clause is useless in the standard (Alyah, 1999). In addition to the limitations of ISO 9000, the study revealed some problems with the implementation process: the changes needed to fit the ISO template; resistance to the introduction of ISO; ISO being time consuming and involves much bureaucratic documentation (Table 9.37). Finally, there is the problem of the three standards, 9001, 9002 and 9003, where some firms, although they have design functions, may escape from assessing them by registering to ISO 9002 instead ISO 9001.

The new ISO 9000: 2000 (1999) tries to include some of the limitation of the ISO 9000 (1994) and correct some of its deficiencies. Firstly, there is only one standard 9001 with the ability to reduce to the scope to fit the functions of the organisation (Clause 1.2). Secondly, the final customer becomes the focal point of the quality system (Clause 0.2 and 5.3). Thirdly, it includes measurement of quality system performance (Clause 8.2). Fourthly, ISO 9000: 2000 addresses the work environment, including health and safety conditions. However, it includes some clauses that might pose a problem to the auditors assessing them, such as work ethics (6.5) and legal requirements (5.3). In addition, Lamprecht (1999) criticised the standard for including repetitions (see Chapter four, 4.14.1: ISO CD 2 9001: 2000).

In assessing the new standard, it seems that it covers other important TQM elements that the former did not, such as customer focus and measuring and monitoring performance. In addition, it unifies the previous three standards into one, has a reduction in scope, includes an annex for implementing ISO 9001 along with ISO 14001 for the environment, and comes with a new ISO 9004 that is a TQM explanatory guide for implementing ISO 9001. Therefore, the new standard is promising and with a little adjustment, which is expected to be done probably by the end of 2000, it is more appropriate and acceptable than the ISO 9000 of 1994.

Before the end of 2000, the voting on ISO: 2000 approval will be probably take place and, once approved, it can co-exist with the former one for three years from the date of publication (Zuckerman, 2000; West *et al.* 2000). However, assessment and feedback will continue for this standard for another possible versions of ISO 9000 to accommodate any future changes in the environment of business and technology.

Therefore, we can expect to see a couple of new ISO versions in the next two decades, especially as the standard is an international one in the era of globalisation and the world is "one village". In this study, all firms were planning to continue registration for ISO 9000 in the future (Table 9.47).

11.2.4 ISO 9000 Audit / Registration System:

Ten out of 11 registration agencies were foreign affiliates of an international organisation (Table 9.15), and this raises the question of who control their work in the Kingdom. They are licensed by the Ministry of Commerce as commercial companies and SASO does not have the power to control their operations. Therefore, their technical operations are not governed by an accreditation body, such as UKAS of the UK. This means that the observation of the relevant regulations is not possible, which renders these agencies immune to any questioning when they violate ISO 62 (1996). This was probably the reason for the findings that 11 firms did in fact receive consultancy from their registration agencies in violation of Sub-clause 2.1.2 of ISO 62 (1996) (Chapter nine, 9.3: Conflict of Interests and the Use of Consultants). In a related issue, it was also found that 14 firms received training from their registration agencies (Table 9.11), which raises again the subject of conflict of interests.

It was found that five out of 11 registration agencies were operating from abroad and had no offices in the Kingdom (Table 23, Appendix F). Although their communication systems are no doubt developed, this still may pose a barrier to communication between the Saudi firms and their agencies abroad. It also may add extra costs for the firms either by having to go to that location or having to pay for the travel expenses of the

auditors. For all these reasons, it is better for the firms to be close to their registration agencies.

Another matter relating to the registration agencies is their fees, which was found to be the most annoying problem with the registration agencies (Table 9.24). The fees that the agencies charged were between SR 3,000 (Bas-ham, 1998) and SR 4,400 (Price, 1999) per day per auditor. Those fees are high according to the standard of living in Saudi Arabia, which is significantly lower than those of the western countries. These high fees will probably present a barrier to many firms from pursuing registration.

11.2.5 SASO and the Chambers of Commerce:

As the study revealed, the role of SASO in ISO 9000 was minimal. It has not been accredited to ISO 62 (1996); it started auditing firms with the co-operation of BSI then SGS; only in 1998 did SASO work independently to register firms to ISO 9000 (Chapter nine, 9.11: The Role of SASO). Furthermore, its share of registration in percentage terms was minimal (Table 9.15). In addition, SASO provided minimal training sessions for ISO 9000 (Table 9.10); and more than 50% of firms did not use SASO's limited publications, and when used, they did not contribute much (Figure 9.24). Finally, respondents seemed to be reluctant to evaluate SASO's role in ISO implementation (Table 9.48). Although the organisation did not contribute significantly, it is not fair to put all the blame on the organisation alone. SASO has operated in an environment that lacks the strong infrastructure in standards and accreditation. The chambers of commerce, the Ministry of Industry, the Ministry of Commerce, the educational institutions, the quality societies; all of these entities may create that environment which might contribute to the success of SASO. Moreover,

SASO needs the confidence of and trust of industries and the necessary supporting financial and other resources from the relevant ministries of the country.

The role of the chambers of commerce in training for ISO 9000 seemed also to be minimal (Table 9.10). However, those of the Eastern region in Dammam and in Jubail appeared to provide more training sessions, in relation to the number of registered firms in the city than did the others (Table 9.12). The chambers of commerce in the Kingdom charge high fees for firms' annual subscriptions, that is almost mandatory since all outside dealings of these firms have to be ratified by the chambers. However, the accumulated wealth accruing to the chambers of commerce seemed not to be made available to help the organisations in many needed services, of which ISO 9000 is just one.

11.3 Recommendations:

The first recommendation is to academics in the new era of introducing the new ISO 9000: 2000 facing the challenge of implementing this new standard. This is a challenge to firms shifting from the down stream compliance standard of 1994 to the strategic customer oriented standard that aims to promote a continuous improvement and greater efficiency in the quality system. This challenge requires academics and consultants to conduct studies on how to accommodate the new requirements of the standard and to take the required steps to change the culture, although difficult, and to use all possible tools and resources to implement the standard. Furthermore, academics should investigate thoroughly solutions to the problems of changing the environment in which management operates and has to confront these challenges to facilitate the transition from the function-oriented standard of 1994 to the process-oriented one of 2000. The

implications are considerable, especially in the less developed countries where a firm's culture tends to be generally conservative and requires brave and enthusiastic measures to accommodate the new requirements of ISO 9000: 2000. As this study conducted an exploratory investigation into the quality scene, other studies may continue to investigate the different aspects of ISO in more detail by using other qualitative means, such as in depth interviews in order to answer the 'how' questions and go beyond the 'what' questions, thus providing more insight into how the requisite changes and challenges might best be tackled.

Another recommendation to academics, consultants and auditors in the era of the new ISO 9000: 2000 is that they should strive to translate the clauses of the standards into practical attainable steps that can be implemented and therefore fulfil the standard. They should come up with measures that lead to the improvement of the quality system and not just to comply with the requirements of the standard, as tends to be the case with the old ISO 9000 of 1994. In a related recommendation, academics and consultants should strive to change the behaviour of top management and drive them to accommodate the changes in the work environment as an implication of the new standard. Resistance to change tends to be widespread so training and education, as well as culture changes, are pillars in the shift to the new ISO 9000: 2000. Furthermore, academics and consultants should use benchmarking, as it is both a requirement of the new standard and a tool for improvement. It is a tool for improvement since it requires the firm to compare its products, services, functions, and departments to the best in the industry. By doing so, the firm will come closer to achieving both compliance to the standard and continuous improvement, which will lead to its greater success.

The researcher recommends that firms, regardless of their size or sector, should establish a quality system to control their quality-related activities and organise their operations. ISO 9000, the quality management system, is just the minimum that firms are recommended to implement. Firms should seek more quality tools that are appropriate to their individual needs, depending on their circumstances. Those tools go beyond ISO 9000 elements, and will help lead firms towards TQM.

Firms in Saudi Arabia should give Saudi nationals the opportunity to be employed in the private sector. The percentage of Saudi employees is still far lower than that of foreign workers, and therefore the Saudi Government should gradually tighten the regulations and laws for employing its nationals in the private sector. Most importantly, the private sector should voluntarily put the interests of the whole country above short-term benefits. The private sector could accommodate Saudi employees, providing them with the necessary training and orientation. The Sabic firms could set an example for the private sector, in general, in terms of employing Saudi nationals. In addition, the Government should enact regulations demanding that foreign registration and consultancy agencies hire Saudi nationals so those foreign firms may reduce the unemployment rate and transfer knowledge and expertise to the country.

Firms should offer all types of incentives to create a quality culture and a quality environment. Moreover, they should establish a system of measuring and reporting the results of a quality culture. Quality Function Deployment, as an important marketing-production tool, should be explained and implemented in Saudi industry after any necessary training has been carried out. In addition, firms should use more sophisticated techniques to measure customer satisfaction, such as customer surveys, a customer satisfaction index and focus groups. Furthermore, firms in Saudi Arabia

should respect the warranty and liability of products as an important part of their quality system.

Another recommendation is that firms should give more emphasis to the inspection of incoming materials since they form the input of quality products. In addition, they should segregate non-conforming products, where practical. Moreover, firms should benefit from use of the computer in both the inspection and the production processes, based on their actual needs. Regarding quality teams and committees, the researcher recommends that firms in Saudi Arabia should establish a steering committee, including one or more of the senior managers, to be responsible for the overall planning of quality matters. Problem-solving teams and cross-functional teams should be established as well to solve and co-ordinate quality functions in the firms.

Because of the importance of using qualitative and quantitative tools, the researcher recommends that firms use them in order to contribute to the overall efficiency of their operations. Although firms may adopt some of these tools, others could be helpful as well; such as cause-and-effect diagrams, tree diagrams, multi-voting, histograms, Pareto diagrams, scatter diagrams, Taguchi methods and Shingo methods. Another important tool that should be used in the industry is benchmarking against best products, services, operations or practices in industry, and even internal benchmarking.

Saudi firms should give more consideration to all training programmes for quality purposes. Moreover, internal training has been used lightly and therefore firms should consider training their employees inside their organisation to save money and gain from on-the-job training benefits. When evaluating suppliers, firms are recommended to

avoid subjective judgement, and to evaluate the financial and technical aspects of suppliers. Failure mode and effect analysis may be recommended, if necessary, to evaluate suppliers. In addition, firms should work closely with suppliers, providing them with clear product specifications. Moreover, the researcher recommends that firms evaluate their performance periodically, not ignoring financial accounts, SPC and costs of warranty as important tools in the measuring process.

Before implementing ISO, firms should plan carefully, measuring internal as well as external aspects and conducting cost-effective analysis of the implementation process. They should also use gap analysis to assess their actual abilities against ISO requirements. In addition, firms are encouraged to educate their employees about ISO benefits before the implementation process to reduce their fear and resistance and to help ensure the realisation of these benefits. Firms in Saudi Arabia are recommended to exert all their efforts when changing their old system to an ISO system so that the transfer process goes smoothly. It is recommended that firms have an ISO project team to carry out actual implementation, making the quality manager the management representative for ISO 9000.

It is recommended that firms evaluate the internal operations of registration agencies, their costs, and their long-term financial capabilities before contracting them. In addition, small firms should avoid subjective judgement of their registration agencies. Moreover, the researcher recommends that firms should avoid using their registration agencies for private consultancy since this practice creates a conflict of interests and constitutes a violation of ISO 62. It is therefore advisable to have somebody other than their own consultants to carry out such assessment. More importantly, the researcher

suggests that the Ministry of Commerce in Saudi Arabia should relinquish its power of monitoring the registration agencies to SASO in order to control any misconduct that might arise.

Since internal costs and consultancy fees represented about 90% of the costs and were therefore considered high, the researcher recommends that firms train and educate their employees, and use internal resources wisely. This might reduce the reliance on external consultancy and help to ensure the system is more closely aligned to the business. The researcher recommends that firms pay more attention to internal auditors, selecting the more qualified personnel and training them. Moreover, firms are advised to segregate or destroy obsolete quality records, thereby meeting ISO requirements. When writing the quality manual, firms should benefit from their own employees' expertise; for example, each person may explain his job to the person who writes the quality manual. As document control tends to be a cumbersome problem world-wide, so top managers and quality managers should educate and train their employees in document control.

The researcher recommends that ISO 9000 of 1994 should be amended to accommodate the needs of industry. ISO 9001 and 9002 could be combined as one standard and be reviewed regularly, giving all parties concerned the chance to evaluate the standards. Third World countries sometimes have special needs, which could be covered in any new standards. The researcher recommends that any future version of ISO 9000 considers reducing the administrative burden of the ISO quality manual, thus making it more practical and less theoretical, and if possible, more flexible. Moreover, ISO 9000 should include business results, final customer needs, and address safety requirements

in the factory. The SPC clause (20) should include real measures to be evaluated. Furthermore, ISO 9000 should give greater consideration to the human side in firms in order to pave to the way for TQM and to provide an appropriate balance between tools / techniques and the people aspects.

ISO 9004, either of 1994 or the new version of 2000, is considered as complementary to ISO 9001 and provides crucial information and guidelines in quality management. It also suggests some tools and techniques for quality improvement. Therefore, the researcher recommends that firms use it alongside ISO 9001 to train and educate their employees in using the standards. Other standards might be of use to firms when implementing ISO 9000; some examples are the ISO 10011 family of standards in helping to audit the quality system, and ISO 10013 (1995) for writing the quality manual.[2] In addition, firms may benefit from the publications and materials of international quality organisations and societies, such as ISO of Geneva and the American and British societies among others. In addition, ISO 9000 registered firms could audit themselves against other quality models, if they wish, such as the European model EFQM, the Baldrige award of the USA or the Deming prize of Japan. These frameworks may help to improve their quality system efficiency, especially since they have aspects not included in ISO, such as considerations of business results and customer issues.

The Saudi Arabian Standards Organisation (SASO) should work towards ISO 62 and obtain it in order to be accredited as a registration agency. In turn, this might increase its share of ISO registrations in the country. In addition, SASO and the chambers of

[2] For more of ISO standards and their uses, see table 4.2 "ISO 9000 supporting standards" in Chapter four.

commerce and industry should increase their participation in ISO implementation in Saudi Arabia. They might provide more training programmes, generate publications on ISO 9000 and publicise ISO in the country. Educational and vocational institutions should provide education and training in ISO and in other quality subjects. Moreover, the Saudi government, SASO, the chambers of commerce, the educational institutions and all stakeholders should create a quality environment in Saudi Arabia. They could provide quality prizes, expand the role of the quality societies, encourage the existence of Saudi private consultancy and registration agencies and participate more in quality matters world-wide. This would ultimately help in the exchange of learning, knowledge, and technology transfer.

11.4 Conclusion of the Study:

The study has shown that ISO 9000 registered firms in Saudi Arabia have performed well in executing the quality system elements and have probably benefited from ISO implementation. However, it is possible that ISO 9000 was not the only contributor to the well being of their quality systems since the 83 firms under the survey were among the best firms in the country. Consequently, they may have used other tools and resources to organise and improve their quality systems other than ISO 9000. Nevertheless, it appears that ISO 9000 experience in the country has been positive and firms freely and confidentially expressed their satisfaction with it. Moreover, the study showed that ISO 9000 has created a high level of quality culture among the firms in the survey. The study has proven that firms that went beyond ISO 9000 to a TQM concept performed better in quality matters, and concluded that firms may use ISO as a basis for a quality system and implement other quality improvement tools based on their environment as a way towards implementing TQM.

The study also concludes that the ISO implementation scene in Saudi Arabia has been dominated substantially by foreign involvement, mainly British, in areas such as employment, registration, training, and consultancy, and that the largest type of firm was joint venture. The involvement of the national entities in ISO implementation, such as SASO, the chambers of commerce, the educational institutions, and the government, has been limited.

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APPENDICES

APPENDIX A

QUESTIONNAIRE TO QUALITY MANAGERS (ARABIC VERSION)

السيد المحترم

السلام عليكم ورحمة الله وبركاته

أفيدكـــم أنـــي طـــالب دكتوراه في جامعة سترلنق في بريطانيا وموضوع رسالتي هو تطبيقات الآيزو ٩٠٠٠ على المصانع في المملكة العربية السعودية .

الـــرجاء التكرم بتعبئة الاستبيان المرفق والذي سيعامل بأعلى درجات السرية وسوف يستخدم لاغراض البحث فقط .

راجياً منكم التجاوب في الاجابة على الاسئلة بكل صدق وموضوعية .

شاكرين لكم حسن تعاونكم

الباحث

ناصر عقيل كدسه

إن استمارة الاستبيان هذه هي للمنشآت المسجلة في الآيزو ٩٠٠٠ فقط

١. إسم منشأتكم هو (_____)

٢. ما هو القطاع الذي تندرج تحته منشأتكم ؟

[ ] الآلات المنزلية

[ ] المنتجات المعدنية والحديد

[ ] المنتجات الكيماوية والبتروكيمائية

[ ] المنتجات البلاستيكية

[ ] المنتجات البترولية

[ ] المواد الغذائية (حدد نوعها) _____

[ ] الأثاث المنزلي

[ ] الصناعات الزراعية

[ ] الصناعة الورقية

[ ] صناعة الأدوية

[ ] المستلزمات الطبية

[ ] الاقمشة والملابس

[ ] الكابلات

[ ] العطورات ومستحضرات التجميل

[ ] السجاد والموكيت

[ ] أخرى (حدد) _____

٣. كم هو العدد الاجمالي للموظفين في منشاتكم ؟

[ ] أقل من ٥٠ موظف [ ] من ٥٠ – ١٠٠ [ ] ١٠١ – ٢٠٠

[ ] ٢٠١ – ٣٠٠ [ ] ٣٠١ – ٥٠٠

[ ] أكثر من ٥٠٠ موظف.

٤. كم هو عدد العاملين الذين يؤدون أعمالاً تتصل بالجودة ؟

( ) من السعوديين (الرجاء ذكر عدد العاملين)

( ) من غير السعوديين (الرجاء ذكر عدد العاملين)

٥. ما هو نوع منشأتكم من حيث الملكية ؟

[ ] خليط قطاع حكومي مع قطاع خاص

[ ] منشأة خاصة

[ ] رأس مال وطني مع رأس مال أجنبي مشترك

[ ] شركة

[ ] أخرى (حدد) _____

٦. ما نسبة التصدير إلى حجم مبيعاتكم الاجمالي ؟

[ ] لا يوجد تصدير [ ] أقل من ١٠% [ ] ١٠- ٣٠ %

[ ] ٣١-٥٠% [ ] اكثر من ٥٠%

٧. إلى أي مدى يتم تطبيق العناصر التالية التي تتصل ببيئة الجودة في منشأتكم ؟

الرجاء التأشير بـ (√) في المكان المناسب

	العناصر	دائماً	غالباً	احياناً	نادراً	مطلقاً
١	وضع قيم ومبادىء تتعلق بالجودة وايصالها إلى العاملين					
٢	منح حوافز لتشجيع العاملين لتطبيق قيم ومبادىء جديدة من أجل الجودة					
٣	تدريب العاملين لكي تنمو لديهم مهارات تتعلق بالقيم والمبادىء الخاصة بالجودة					
٤	قياس نتائج تطبيقات التغيرات في بيئة الجودة وتقديم تقارير بخصوص ذلك					

٨. ما هي درجة موافقتكم على العبارات التالية التي تتعلق بالتزام ودعم الادارة العليا للجودة؟

	العبارات	موافق بقوة	موافق	غير متأكد	غير موافق	غير موافق بقوة
١	الادارة العليا تكرس وقتاً للجودة					
٢	الادارة العليا تقدم موارد كافية من أجل تطوير الجودة					
٣	الادارة العليا تحدد أهدافها واغراضها المتعلقة بالجودة بوضوح					
٤	الادارة العليا تراجع أي تقدم في عملية الجودة					

٩. إلى أي مدى تقوم منشأتكم بعمل العناصر التالية من أجل تلبية رغبات وحاجات المستهلكين ؟

	العناصر	دائماً	غالباً	احياناً	نادراً	مطلقاً
١	توزيع متطلبات المستهلكين إلى كل الإدارات في المنشأة					
٢	كل الاقسام تشارك في تطوير السلعة					
٣	استخدام اسلوب " نشر عملية الجودة " " Quality Function Deployment " من أجل توصيل طلبات المستهلكين في كل مرحلة من مراحل الانتاج					

١٠. إلى أي مدى تستخدم منشأتكم العناصر التالية من أجل قياس رضاء المستهلكين ؟

	العناصر	دائماً	غالباً	احياناً	نادراً	مطلقاً
١	عن طريق شكاوى المستهلكين					
٢	عن طريق الحصة السوقية					
٣	نتائج استطلاعات المستهلكين					
٤	مؤشر رضاء المستهلكين					
٥	السلع المرجعة (الرجيع)					
٦	تكلفة الضمان كنسبة من حجم المبيعات					
٧	النتائج المالية للمنشأة					
٨	المعلومات المرجعة من رجال البيع أو وكلاء البيع					
٩	عن طريق مجموعة التركيز(Focus group)					
١٠	أخرى(حدد) _____					

١١. إلى أي مدى تستخدم منشأتكم الاساليب التالية من أجل تعريف السلعة اثناء الانتاج ؟

	الأساليب	دائماً	غالباً	احياناً	نادراً	إطلاقاً
١	استخدام رقم تسلسلي					
٢	ترقيم دفعة (lot) الانتاج					
٣	وضع تاريخ الانتاج كتعريفه					
٤	أخرى (حدد) _____					

١٢. عندما تكون السلعة تحت الفحص والتفتيش إلى أي مدى تستخدم الحالات التالية ؟

	الحالات	دائماً	غالباً	احياناً	نادراً	إطلاقاً
١	تعلق بطاقة على السعلة تحت الفحص					
٢	يوضع ملصق على السلعة تحت الفحص					
٣	استخدام كروت مسار(routing cards)					
٤	تخصيص مكان للسلع تحت الفحص					
٥	أخرى (حدد) _____					

١٣. إلى أي مدى تستخدم منشأتكم طرق الفحص والتفتيش التالية ؟

	الطرق	دائماً	غالباً	احياناً	نادراً	إطلاقاً
١	التفتيش بطريقة يدوية					
٢	التفتيش بواسطة آلة فحص					
٣	الفحص بواسطة الحاسب الآلي (الكمبيوتر)					
٤	اخرى (حدد) _____					

١٤. إلى أي مدى تفحص السلعة حسب الآتي :

	العناصر	دائماً	غالباً	احياناً	نادراً	إطلاقاً
١	فحص المواد والاجزاء اثناء دخولها المنشأة					
٢	التفتيش أثناء العملية الانتاجية					
٣	التفتيش النهائي على السلعة					

١٥. هل لديكم معدات للفحص والتفتيش ؟

[ ] نعم [ ] لا

١٦. إذا اجـبت بـنعم عـلى السـؤال السابق (١٥) فالرجاء الاجابة بنعم أو لا على العبارات التالية المتعلقة بمعدات وآلات الفحص والتفتيش ؟

	العبارات	نعم	لا
١	نحن نراقب آلات الفحص ونقوم بصيانتها		
٢	نحن نجري عملية المعايره لآلات الفحص داخل المنشأة		
٣	نحن نجري عملية المعايرة لآلات الفحص خارج المنشأة		
٤	نحن نحفظ السجلات الخاصة بآلات الفحص والتفتيش		

١٧.بعـد اجـراء عملية الفحص والتفتيش على سلعكم ، إلى أي مدى تجري التالي بخصوص السلع غير المطابقة (المعيبة) ؟

	العبارات	دائماً	غالباً	احياناً	نادراً	إطلاقاً
١	نحن نحدد السلع غير المطابقة					
٢	نحن نوثق السلع غير المطابقة					
٣	نحن نقيم عملية غير المطابقة					
٤	نحن نفصل السلع غير المطابقة ان أمكن					
٥	نحـن نبـلغ القسـم أو الوحدة التي أنتجت السلعة غير المطابقة					

١٨.عند اكتشاف السلع غير المطابقة (المعيبة) فإلى أي مدى تتعاملون مع تلك السلع مما يلي ؟

	العناصر	دائماً	غالباً	احياناً	نادراً	إطلاقاً
١	إعادة تصنيعها حتى تصبح مطابقة للمواصفات					
٢	استخدامها لكي تخدم أغراضاً أخرى					
٣	رفض السلعة المعيبة نهائياً والتخلص منها					
٤	أخرى (حدد) _____					

١٩ . هل لديكم الفرق واللجان التالية من أجل التعامل مع موضوعات الجودة ؟

الرجاء وضع علامة (√) تحت نعم أو لا

	اللجان	نعم	لا
١	لجنة توجيه عليا والتي تحتوي على عضو أو أكثر من الادارة العـليا وتكون مسؤولة عن رسم سياسات الجودة ومنها الآيزو ٩٠٠٠		
٢	لجنة (لجان) لحل مشكلات الجودة		
٣	حلقة (حلقات) الجودة (Quality Circles) وهي فرق تدار ذاتياً وهي غير رسمية تهتم بمعالجة قضايا ومشاكل الجودة .		
٤	فـرق تتكون من اعضاء من عدة أقسام من أجل التنسيق لحل مشاكل الجودة		

٢٠.ما هي درجة موافقتكم على العبارات التالية والتي تتعلق بمشاركة العاملين وتفويضهم في عمليات الجودة ؟

	العبارات	موافق بقوة	موافق	غير متأكد	غير موافق	غير موافق بقوة
١	عمال خط الانتاج يتم تشجيعهم لفحص وتصليح أي مشكلات في الجودة تعترضهم					
٢	عمـال خط الانتاج يمنحون الامكانات اللازمة لحل أي مشكلات في الجودة تعترضهم					
٣	يقـدم التدريب والمساعدة الفنية اللازمة لعمال خط الانتاج من أجل حل أي مشاكل في الجودة					
٤	الادارة عامـة تشـجع وتكـافيء وتقبل وتقيِّم الاقتراحات الخاصة بالجودة					

٢١.إلى أي مدى تستخدم منشأتكم الطرق الكيفية والكمية التالية في معالجة أمور الجودة :

	أ. الطرق الكيفية	دائماً	غالباً	احياناً	نادراً	إطلاقاً
١	خريطة سير العمليات (خريطة التدفق) (Flow Chart)					
٢	رسم بياني يوضح العلاقة بين السبب والنتيجة Cause-and- effect diagrams					
٣	التصويت المتعدد " Multi – voting "					
٤	رسم المطابقة البياني " Affinity diagrams " وهي عملية تجميع عدد كبير من الافكار والآراء والامور في مجموعات					
٥	الاستحثاث " Brainstorming " وهي خلق وتوضيح وتقييم قائمة كبيرة من الأفكار والمشاكل والشؤون					
٦	قوائم المهام " Task lists (check lists)					
٧	اسلوب الشجرة " Tree diagrams " وهي عملية تجزيء موضوع معين إلى محتوياته الأساسية					
٨	أخرى (حدد) _____					

	ب . الطرق الكمية	دائماً	غالباً	احياناً	نادراً	مطلقاً
١	رسومات الضبط(خرائط المراقبة)" Control Charts " وهو عملية مراقبة اداء عملية معينة عن طريق مخرجات متتالية لكي نحدد ما إذا كان هنالك تغير طبيعي أو غير طبيعي					
٢	رسومات التشتت " Scatter diagram " وهي لاكتشاف وتأكيد أو إظهار العلاقة بين مجموعتين من البيانات					
٣	رسومات باريتو " Pareto diagrams " وهي عملية تحدد عوامل رئيسية والتفريق بين أهم مسببات خسائر الجودة					
٤	طرق أخذ العينات للفحص " Sampling inspection "					
٥	مخطط توزيع التواتر – المدرج التكراري " Histograms والذي يظهر التشتت أو توزيع البيانات					
٦	طرق تاقوتشي " Taguch " من اجل تحسين كفاءة العمليات					
٧	طريقة شنقو " Shingo " من أجل منع الخطأ في تصميم العمليات					
٨	أخرى (حدد) _____					

٢٢.ما هي مواضيع التدريب التي يتلقاها موظفوكم وتتعلق بموضوع الجودة (يستثنى من ذلك تدريب الآيزو) ؟

يرجى التأشير بـــ (√) تحت نعم أو لا

	موضوع التدريب	نعم	لا
١	تصميم المنتجات		
٢	طرق المعالجة الاحصائية		
٣	إدارة الجودة الشاملة		
٤	تدريبات عن منع العيوب الانتاجية		
٥	تدريب قيادي للادارة الوسطى والمشرفين عن كيفية بناء بيئة للجودة في المنظمة		
٦	تكاليف الجودة		
٧	تطوير العمليات		
٨	المقارنة المرجعية (Benchmarking)		
٩	تدريب على حل المشكلات في الجودة		
١٠	تحليل العمليات (مثل نموذج تطوير النظم ونظم القياس)		
١١	مهارات بناء الفرق واللجان (مثل المهارات الشخصية والاتصالات)		
١٢	تدريب العناية بالمستهلك		
١٣	أخرى (حدد) _____		

٢٣. هل تستخدم المقارنة المرجعية (Benchmarking) كأداة لمقارنة منشأتكم مع أفضل انجازات المصانع الاخرى ؟

[ ] نعم [ ] لا

٢٤. إذا كـــنت تســـتخدم المقارنـــة المـــرجعية (إذا أجبت بنعم في السؤال السابق) فما هي العناصر التي تستخدمها في المقارنة ؟ يرجى التأشير (√) تحت نعم أو لا

	العناصر	نعم	لا
١	مقارنة مع السلع والخدمات في المنشآت الأخرى		
٢	مقارنة مع الوظائف أو العمليات في المنشآت الأخرى		
٣	مقارنة داخلية أي مقارنة قسم بقسم آخر متميز داخل المنشأة		
٤	مقارنة مع المنشأة الشريكة لنا أو المقارنة مع منشأة الشريك الاجنبي		

٢٥. أي من الطرق التالية تستخدم منشأتكم من أجل قياس وتقييم أداء موردكم ؟

يرجى التأشير بـــ (√) تحت نعم أو لا

	طريقة القياس والتقييم	نعم	لا
١	بطريقة شخصية تخمينية		
٢	حسب جودة منتجاتهم		
٣	حسب عدد الوحدات التي نجدها معيبة ونرجعها لهم		
٤	حسب كفاءة دقة مواعيد تسليم المواد المطلوبة منهم.		
٥	بواسطة استخدام نظام تصنيف درجات الموردين " Vendor rating system "		
٦	باستخدام تحليل الفشل والنتيجة " Failure mode and effect analysis "		
٧	بتقييم القدرات الفنية والهندسية للموردين		
٨	بتقييم القدرات والمؤشرات المالية للموردين		
٩	أخرى (حدد) _____		

٢٦. رجاء ايضاح درجة موافقتكم على العبارات التالية التي تتعلق بموردكم ؟

	العبارات	موافق بقوة	موافق	غير متأكد	غير موافق	غير موافق بقوة
١	نحن لدينا عقوداً طويلة الأجل مع موردينا					
٢	نحن لدينا تخطيط مشترك للجودة مع موردينا					
٣	نحـــن نقدم مواصفات واضحة لموردينا عن المواد والسلع التي نرغب في شرائها					
٤	نحن نقدم مساعدات فنية لموردينا					
٥	نحن نعتمد على عدد محدود نسبياً من الموردين					

٢٧. إلى أي مدى تستخدم الطرق التالية من أجل قياس وتقييم الجودة داخل منشاتكم؟

	الطريقة	دائماً	غالباً	احياناً	نادراً	إطلاقاً
١	بواسطة طرق المعالجة الاحصائية					
٢	عن طريق المعلومات المرجعة من المستهلكين					
٣	نسبة العادم والمرفوض من السلع المنتجة					
٤	بواسطة معدل الانتاج والالتزام بجدولة الانتاج					
٥	عن طريق التغييرات الحاصلة في قيمة المبيعات					
٦	عن طرق نتائج المراجعة والتدقيق					
٧	بحساب تكلفة النزاعات القانونية والمسؤولية القانونية					
٨	اخرى (حدد) ــــــــــــــــــــــــــــ					

٢٨. إلى أي مدى يستخدم الآتي والذي يتعلق بسجلات الجودة ؟

	العبارات	دائماً	غالباً	احياناً	نادراً	إطلاقاً
١	نحن نجمع بيانات الجودة (مثل نسبة الخردة)					
٢	نحن نفهرس سجلات الجودة					
٣	نحن ندون سجلات الجودة ونضع لها إرشيف					
٤	نحن نستطيع الاطلاع على سجلات الجودة					
٥	نحن نحافظ على سجلات الجودة ونصونها					
٦	نحن نفصل السجلات المنتهية أو نتخلص منها					

٢٩. ما هي المواصفة التي انتم مسجلون فيها ؟

[ ] آيزو ٩٠٠١ [ ] آيزو ٩٠٠٢ [ ] آيزو ٩٠٠٣

[ ] آيزو ١٤٠٠٠ [ ] كيو– اس (QS)٩٠٠٠ [ ] أخرى (حدد) ــــــ

٣٠. كم هي المدة التي قضيتموها وانتم مسجلون في الآيزو ؟

[ ] أقل من سنة واحدة [ ] ١ –أقل من ٢ سنة [ ] ٢ – أقل من ٣ سنوات

[ ] ٣– أقل من ٥ سنوات [ ] ٥ سنوات فأكثر

٣١. كـــم هـــي المـــدة التي قضتها منشأتكم منذ بداية التسجيل حتى الحصول التام على شهادة الآيزو ؟

[ ] أقل من سنة واحدة [ ] ١ –أقل من ٢ سنة [ ] ٢–أقل من ٣ سنوات

[ ] ٣ سنوات فأكثر

٣٢. ما هي درجة موافقتكم على العبارات التالية المتعلقة بالآيزو ٩٠٠٠ ؟

	العبارات	موافق بقوة	موافق	غير متأكد	غير موافق	غير موافق بقوة
١	الادارة العليا هي التي طالبت التسجيل في الآيزو					
٢	قســم أو موظفو الجودة هم الذين طالبوا بالتسجيل في الآيزو					
٣	الادارة العـــليا ملـــتزمة وتدعـــم عملية الآيزو في المنشأة					
٤	الادارة العـــليا تفهـــم أغـــراض الآيـــزو وتفاصيل التسجيل بشكل كامل					
٥	الادارة العـــليا تقدم الموارد اللازمة من أجل انجاح عملية تطبيق الآيزو					
٦	ان الحكومة السعودية تفضل الشركات المسجلة في الآيزو في مناقصاتها وعقودها الحكومية					

٣٣. ما هي درجة أهمية الاسباب التي جعلت منشأتكم تسجل في الآيزو ؟

(لماذا سجلتم في الآيزو ٩٠٠٠)

	العبارات	كثير الاهمية	هام	متوسط الاهمية	قليل الاهمية	عديم الاهمية
١	من أجل تحسين جودة المنتجات					
٢	من أجل تحسين كفاءة نظام الجودة في المنشأة					
٣	من أجل الحفاظ على أو زيادة الحصة السوقية					
٤	من أجل تلبية طلب المستهلكين أو الموردين					
٥	مـــن أجل تلبية طلب الحكومة أو متطلباتها أو ضغط منها					
٦	من أجل تسويق منتجاتنا في الاسواق العالمية					
٧	من أجل تقليد ومحاكاة المنافسين لنا					
٨	من أجل تحقيق خفض في التكاليف					
٩	مـــن أجـــل ان يكون الآيزو خطوة نحو تطبيق ادارة الجودة الشاملة					
١٠	من أجل تنفيذ طلب الشريك الأجنبي					
١١	من أجل تقليل نسبة السلع المعيبة وتخفيض العادم					
١٢	من اجل استخدام آيزو كوسيلة دعائية					
١٣	من أجل تنفيذ اهداف المنشأة العليا					
١٤	من أجل الحصول على المناقصات والعقود					
١٥	من أجل تحسين علاقات الموظفين					
١٦	من أجل تحسين الاتصالات في المنشأة					
١٧	من أجل تحسين وتطوير تصميم السلعة أو العملية					
١٨	من أجل تحسين علاقاتنا مع المقاولين من الباطن					
١٩	حتى لا نستثنى من دخول دول السوق الاوروبية					

٣٤ . هل أنت مسجل للآيزو عن طريق الهيئة السعودية للمواصفات ؟

[ ] نعم [ ] لا

٣٥ . إذا كـانت إجابـتك عن السؤال السابق بلا ، أي أن منشأتكم لم تسجل عن طريق الهيئة السـعودية ، فما هي الهيئة التي دققت الجودة لديكم (registration agency) وفي أي دولة يقع مركزها الرئيسي ؟

الهيئة التي سجلنا الآيزو من خلالها هي _____

ويقع مركزها الرئيسي في _____ (الرجاء ذكر اسم الدولة)

٣٦ . إذا كنت مسجل للآيزو عن طريق هيئة تدقيق أجنبية(غير الهيئة السعودية للمواصفات) فمـا هـي درجـة موافقتكم على الاسباب التالية التي جعلتكم تختارون هيئة غير المواصفات السعودية ؟

	الاسباب	موافق بقوة	موافق	غير متأكد	غير موافق	غير موافق بقوة
١	هيـئة الـتدقيق الاجنبية هي اكثر كفاءة من الهيئة السعودية للمواصفات بشكل عام					
٢	شهادة الهيئة الاجنبية اكثر فخامة وشهرة في كافة انحاء العالم					
٣	الهيـئة الاجنـبية التي سجلنا مَعها الآيزو اسعارها أقل من هيئة المواصفات السعودية					
٤	اجراءات التدقيق والمراجعة في الهيئة الاجنبية أقل تعقيداً من اجراءات المواصفات السعودية					
٥	شـهادة الهيـئة الاجنبية اكثر صدقاً وقبولاً ويمكن الاعـتماد عـليها اكثر من شهادة الهيئة السعودية للمواصفات					

٣٧ . ما هي درجة أهمية العوامل التالية في التأثير على اختياركم لهيئة التدقيق والمراجعة (registration agency) للتسجيل من خلالها ؟

	العبارات	كثير الاهمية	هام	متوسط الاهمية	قليل الاهمية	عديم الاهمية
١	تكاليف التدقيق للجودة التي تطلبها هيئة التسجيل للأيزو					
٢	العلاقات الشخصية مع تلك الهيئة					
٣	مدى قرب هيئة التدقيق من منشأتنا					
٤	مدى قوة سمعتهم وشهرتهم					
٥	مدى البساطة النسبية في اجراءات تدقيقهم					
٦	بطلب أو نصيحة من الشركة الأم أو الشريك					
٧	بنصيحة من منشأة أخرى أو شخص آخر					
٨	بسبب معرفتهم ودرايتهم عن نوع نشاط صناعتنا					
٩	بسبب خبرتهم السابقة في السوق السعودية					

٣٨ . قبل اختياركم لهيئة التدقيق والمراجعة (registration agency) ، أي من الاجراءات التالية اتخذتم ؟

الرجاء التأشير بـ (√) تحت نعم أو لا

	الاجراءات	نعم	لا
١	قبل اختيارنا لهم نحن تحققنا من خبراتهم السابقة		
٢	قبل اختيارنا لهم نحن تحققنا من قوتهم المالية البعيدة المدى		
٣	قبل اختيارنا لهم نحن قيمنا عملياتهم الداخلية للتأكد من كفاءتهم ومدى سرية أعمالهم		
٤	قبل اختيارنا لهم نحن راجعنا التكاليف التي سوف يحصلون عليها وهل هي تتناسب مع امكانياتنا المالية		

٣٩ . قبل تطبيق الآيزو ، أي من الاجراءات التالية قامت منشأتكم باتخاذها ؟

يرجى التأشير بـــ (√) تحت نعم أو لا

	الاجراءات	نعم	لا
١	نحـــن اجريـــنا تحليل فاعلية التكاليف (حساب التأثيرات المالية لتطبيق الآيزو)		
٢	نحن قسنا الجوانب الداخلية التي لها علاقة مثل العادم ، واعادة التصنيع وتكلفة الاعمال المكتبية		
٣	نحـــن قسنا الجوانب الخارجية ذات العلاقة مثل نمو المبيعات والإئتمان والسلع المرفوضة المرجعة		
٤	نحـــن اجرينا تحليل الفجوة (Gap analysis) من أجل تقييم قدرات نظام الجودة مقارنة بالآيزو واكتشاف أي نواقص		

٤٠ . مـــا هـــي الـــتكاليف التقريبية التي انفقتموها في عملية تطبيق الآيزو في منشأتكم حتى حصلتم على الشهادة ؟

	التكاليف	التكلفة بالريال السعودي	لا أعرف
١	تكلفة بناء نظام الجودة حسب الآيزو وتطبيقه داخل المنشأة		
٢	رسوم الهيئة الاستشارية الخارجية		
٣	الرسوم التي فرضتها هيئة التدقيق والمراجعة (registration agency)		

٤١ . ما هو تقييمكم بشكل عام لتكلفة تطبيق الآيزو مقارنة بالفوائد التي حققتموها من التسجيل للآيزو ؟ (يرجى اختيار اجابة واحدة فقط مما يلي)

[ ] الفوائد تفوق التكاليف بشكل كبير

[ ] الفوائد تفوق التكاليف

[ ] الفوائد تعادل التكاليف

[ ] الفوائد تقل عن التكاليف

[ ] الفوائد تقل عن التكاليف بشكل كبير

[ ] من الصعوبة الحكم

٤٢ . ما هـــي درجة موافقتكم على العبارات التالية المتعلقة بهيئة التدقيق والمراجعة (registration agency) ؟

	العبارات	موافق بقوة	موافق	غير متأكد	غير موافق	غير موافق بقوة
١	اجراءات المراجعة والتدقيق تعتبر معقدة					
٢	رسوم التسجيل تعتبر عالية					
٣	عملية التدقيق والمراجعة استغرقت وقتاً طويلاً					
٤	هيئة التدقيق لها مطالب لانهاية لها					
٥	هـــنالك شـــكوك حول اخلاقيات المراجعين والمدققين أنفسهم					
٦	هيئة التدقيق ليس لديها دراية كافية بنوع نشاطنا					
٧	إن اختيار هيئة التدقيق المناسبة يعتبر أمراً صعباً					

٤٣ . ما هو مستوى رضاؤكم عن هيئة التدقيق التي سجلتم معها الآيزو (registration agency) ؟

(رقم ١ هو ادنى الرضا ورقم ٥ هو أعلى الرضا) يرجى التدوير على أحد الأرقام أدناه

(رضا منخفض ١ ٢ ٣ ٤ ٥ رضا عالي)

٤٤ . بعد كم تدقيق حققتم شهادة الآيزو ؟

[ ] خلال التدقيق والمراجعة الأولى [ ] خلال التدقيق الثاني

[ ] بعد التدقيق الثاني

٤٥ . كم هي مدة سريان مفعول شهادة الآيزو الممنوحة لكم ؟

[ ] ٣ سنوات [ ] أو ـــــــــــ سنوات (حدد كم سنة)

٤٦. بعـــد اتمامكم الحصول على شهادة الآيزو ، كم عدد الزيارات السنوية التي تقوم بها هيئة التدقيق للتأكد من إستمرارية امتثالكم لشروط الآيزو (زيارات تدقيق دوري) (Surveillance visits) ؟

(يرجى التدوير على أحد الارقام ادناه)

١ ٢ ٣ ٤ مرات في السنة

٤٧. يرجى الاجابة على النقاط التالية والمتعلقة بعملية تطبيق الآيزو في منشأتكم ؟

يرجى التأشير بـــ (√) تحت نعم أو لا

	العبارات	نعم	لا
١	نحـــن لدينا فريق مشروع الآيزو (ISO Project Team) من أجل تنفيذ متطلبات الآيزو في المنشأة		
٢	نحـــن عيـــنا موظفـــاً مختصاً لعملية الآيزو (ISO Facilitator) يكون مسؤولاً مسؤولية مباشرة عن الآيزو		
٣	نحـــن أجريـــنا عملية تدقيق داخلي (مراجعة داخلية) بواسطة موظفينا حتى نتأكد أن منشأتنا جاهزة للمدقق الخارجي		
٤	قبل التدقيق الخارجي الرسمي (Full assessment) ، قمنا باجراء تدقيق تجريبي خارجي (Pre-assessment audit) (ما قبل التدقيق الرسمي)		
٥	بسبب تطبيقات الآيزو في منشأتنا ، نحن عيّنا موظف أو أكثر جدد لتنفيذ عملية تطبيق الآيزو في المنشأة		

٤٨ . أي من انواع التدريب التالية تلقى موظفوكم بخصوص تطبيق الآيزو في منشأتكم ؟

	أنواع التدريب	نعم	لا
١	برنامج تدريبي إطلاعي عام من أجل التعريف بفوائد الآيزو		
٢	برنامج تدريبي خاص بتطبيق الآيزو في المنشأة		
٣	تدريب على التدقيق والمراجعة للآيزو.		
٤	برامج خاصة اخرى للآيزو (حدد) _____		

٤٩ . يـــرجى الإجابـــة عـــلى العبارات التالية المتعلقة بالتدريب الخاص بالآيزو ؟ (يرجى التأشير بـــ (√) تحت نعم أو لا

	العبارات	نعم	لا
١	نحـــن تلقيـــنا تدريـــباً خاصـــاً بالآيزو من الهيئة السعودية للمواصفات والمقاييس		
٢	نحن تلقينا تدريباً خاصاً بالآيزو من الغرفة التجارية		
٣	نحن تلقينا تدريباً خاصاً بالآيزو مقدماً من (حدد) _____ _____		

٥٠ . ما هي أنواع التوثيقات (Documentation) التي تتبعونها في منشأتكم ؟

يرجى التأشير بـــ (√) تحت نعم أو لا

	نوع التوثيقات	نعم	لا
١	كتيب الجودة " Quality Manual "		
٢	إجراءات الجودة " Quality Procedures "		
٣	تعليمات تنفيذ الاعمال المتعلقة بالجودة " Quality work instructions "		
٤	أخرى (حدد) _____		

٥١ . يرجى الإجابة على السؤال التالي المتعلق بكتيب الجودة " Quality manual "

يرجى التأشير بـــ (√) تحت نعم أو لا

	العبارات	نعم	لا
١	إن كتيب الجودة الخاص بمنشأتنا مرتب حسب تسلسل فقرات الآيزو (حسب تسلسل الفقرات العشرون في مواصفة الآيزو)		
٢	إن كتيب الجودة الخاص بمنشأتنا مرتب حسب سير العمل في منشأتنا		
٣	كـــل شـــخص شـــارك في الفقرة الموجودة بكتيب الجودة والتي تتعلق بوظيفته		
٤	كتيب الجودة تم اعداده بمساعدة مستشار من خارج المنشأة		
٥	كتيب الجودة تم اعداده بواسطة موظفينا دون مساعدة خارجية		

٥٢ . ما هي درجة موافقتكم مع العبارات التالية المتعلقة بكتب الجودة المعد حسب الآيزو ؟

	العبارات	موافق بقوة	موافق	غير متأكد	غير موافق	غير موافق بقوة
١	كتيب الجودة يحتاج إلى عبء إداري كبير					
٢	كتيب الجودة يؤدي إلى قلة المرونة					
٣	إن كتيب الجودة نظري أكثر منه عملي					
٤	إن كتيب الجودة مساعد ومفيد					
٥	إن كتيب الجودة عديم الفائدة بعد الحصول على الشهادة					
٦	إن كتيب الجودة صحيح ودقيق					
٧	إن كتيب الجودة معقد					
٨	إن كتيب الجودة طويل جداً وتفاصيله كثيرة					

٥٣. مـــا هي درجة موافقتكم على العبارات التالية المتعلقة بإدارة علاقاتكم مع مورديكم حسب متطلبات الآيزو ؟

	العبارات	موافق بقوة	موافق	غير متأكد	غير موافق	غير موافق بقوة
١	إن اجراءات الآيزو تطول الوقت اللازم لعملية التحقق والتثبت من الموردين					
٢	الآيزو تضمن أن المواد التي تطابق مواصفاتنا هي فقط التي نحصل عليها					
٣	إن المـــواد المشـــتراه مـــن المنشآت التي تحمل شهادة الآيزو هي أفضل من المواد المشتراه من المنشآت التي لا تحمل شهادة الآيزو					
٤	الآيزو تحسِّن من عملية اختيار الموردين					
٥	إن موضوع الآيزو سوف يزيد المنافسة بين الموردين					
٦	نحن نراقب ونقيِّم نظام الجودة والوضع المالي الخاصة بموردينا					
٧	نحن لدينا معايير والتي على اساسها نبعد الموردين من قوائـــم تعاملنا في حالة أن تأديتهم لاعمالهم تكون غير مرضية					

٥٤ . يرجى الاجابة على النقاط التالية والمتعلقة باستعانتكم بمستشار (خبير) خارجي لتطبيق الآيزو في منشأتكم ؟

(يرجى اختيار إجابة واحدة فقط)

[ ] نحن لم نستعين بمستشار أو مكتب استشاري أو خبير خارجي

[ ] نحن استعنا بمستشار خارجي الذي هو نفس هيئة التدقيق والمراجعة

[ ] نحن استعنا بمستشار خارجي الذي ليس هو هيئة التدقيق .

٥٥ . هل لديكم برنامج إدارة الجودة الشاملة (TQM) بالاضافة إلى الآيزو ؟

[ ] نعم [ ] لا

٥٦ . إذا كان لديكم برنامج الجودة الشاملة (TQM) مع الآيزو في نفس الوقت

(أي إذا كانت اجابتكم عن السؤال السابق بنعم) فالرجاء اختيار إجابة واحدة فقط مما يلي :

[ ] نحن راضون عن الآيزو أكثر من برنامج الجودة الشاملة

[ ] نحن راضون عن برنامج الجودة الشاملة أكثر من الآيزو

[ ] نحن راضون عن الجودة الشاملة والآيزو بالتساوي

[ ] نحن غير راضون لا عن الجودة الشاملة ولا عن الآيزو بالتساوي

٥٧ . مـــا هـــي درجـــة مساعدة العوامل التالية لكم في تطبيق الآيزو في منشأتكم ؟ (يرجى التأشير بـــ (√) في المكان المناسب)

	العبارات	كثير المساعدة	مساعد	متوسط المساعدة	قليل المساعدة	عديم المساعدة	غير موجود
١	إلتزام الادارة العليا بالآيزو						
٢	حماس والتزام الموظفين بالآيزو						
٣	المساعدة المقدمة من الحكومة في تطبيق الآيزو						
٤	المساعدة المقدمة من الشركة الأم أو الشريك						
٥	المساعدة المقدمة من الاستشاري الخارجي(الخبير)						
٦	الاتصالات بين الادارة والموظفين						
٧	نظام الاجراءات الفعال الموجود بالمنشأة						
٨	اسهامات ادارة الموارد البشرية						
٩	الخبرة الموجودة في نظام الجودة في المنشأة						
١٠	وجود ادارة الجودة الشاملة (T Q M)						
١١	المدقق الداخلي في منشأتنا						
١٢	برامج التدريب الخاصة بالآيزو						
١٣	برامج الكمبيوتر التي عن الآيزو(Software)						
١٤	المطـبوعات والكـتب التي أصدرتها الهيئة السعودية للمواصفات والمقاييس عن الآيزو						
١٥	الكـتب والمطـبوعات التي أصدرت عن الآيزو من مصادر أخرى						

٥٨ . بعـــد تطـــبيق الآيزو في منشأتكم ، ما هو حجم التأثير الذي أحدثه الآيزو على العوامل التالية ؟

(ماذا استفدتم من الآيزو)

	العبارات	تأثير كبير جداً	تأثير كبير	تأثير متوسط	تأثير قليل	تأثير منعدم
١	تقليل التكاليف					
٢	تقليل الوحدات المعيبه والتالف					
٣	تقليل شكاوى المستهلكين					
٤	تحسين زمن تسليم البضائع					
٥	المحافظة على أو تحسين الحصة السوقية					
٦	إرتفاع حجم التصدير					
٧	تحسن جودة المنتجات					
٨	تحسن كفاءة نظام الجودة					
٩	تحسن الربحية في المنشأة					
١٠	تحسن حماس وتفاعل الموظفين					
١١	تحسن خدمة العملاء					
١٢	تحسن جودة المواد المشتراه					
١٣	تحســـن طـــرق الفحص والوقت المخصص لانتاج السلع					
١٤	تحسن علاقات الموظفين					
١٥	تحســـن طرق الفحص والوقت المخصص لاستلام المواد المشتراه					
١٦	تحسن تصميم السلع					
١٧	تحسن تصميم العمليات					
١٨	تحسن العلاقات مع الموردين					
١٩	تحسن الانتاجية					
٢٠	تحسن الوعي عن الجودة في المنشأة					

٥٩ . ما هي درجة موافقتكم على العبارات التالية المتعلقة بتقييمكم للآيزو ؟

	العبارات	موافق بقوة	موافق	غير متأكد	غير موافق	غير موافق بقوة
١	نحن راضون عن الفوائد التي حققناها من الآيزو					
٢	أنا أوصي المنشآت الأخرى بتطبيق الآيزو					
٣	الآيزو هو عائق لتطبيق ادارة الجودة الشاملة					
٤	هنالك حاجة لتنقيح فقرات الآيزو					
٥	الآيزو بمفرده يكفي كنظام جودة فعال في المنشأة					
٦	الآيــزو وادارة الجودة الشاملة مجتمعين يكفيان لضمان نظام جودة فعال في المنشأة					
٧	أن الآيزو يضمن انتاج سلعة متميزة					

٦٠ . ما هي درجة موافقتكم على العبارات التالية المتعلقة بتطبيق الآيزو في منشأتكم ؟

	العبارات	موافق بقوة	موافق	غير متأكد	غير موافق	غير موافق بقوة
١	كــان هنالك مقاومة من الموظفين في بداية ادخال الآيزو					
٢	كــان هنالك حاجة في البداية لتغيير نظامنا المعتاد حتى يتماشى مع الآيزو					
٣	إن تطبيق الآيزو يستلزم تكاليف عالية					
٤	إن فقرات الآيزو غامضة ومعقدة					
٥	إن تطبيق الآيزو يستحوذ على كثير من الوقت					
٦	هنالك توثيقات طويلة وبيروقراطية مع الآيزو					
٧	هــنالك نقــص في فهم أهمية الآيزو بالنسبة لكافة الاقسام					
٨	نحــن نفــتقد إلى مدققين داخليين (من موظفينا) والذين لديهم الخبرة والتدريب الكافية					
٩	إن زيــارات التدقيق الدورية (Surveillance visits) هي صعبة للتعامل معها					
١٠	إن استمرارنا ومحافظتنا على شهادة الآيزو يستلزم تكاليف عالية					

٦١ . بعـــد حصـــولكم على شهادة الآيزو ، الرجاء التأشير بـــ (√) تحت نعم أو لا بالنسبة للعبارات التالية التي تتعلق باستخدام علامة الآيزو في الاساليب الدعائية ؟

	العبارات	نعم	لا
١	لقد قمنا بوضع علامة الآيزو على مطبوعاتنا		
٢	لقد استخدمنا علامة الآيزو في اعلاناتنا التجارية		

٦٢ . ما هي خططكم المستقبلية بعد حصولكم على شهادة الآيزو ؟

(تستطيع اختيار أكثر من إجابة واحدة)

[ ] المحافظة والاستمرارية في الآيزو

[ ] تطبيق آيزو ١٤٠٠٠ (الخاص بالبيئة)

[ ] تطبيق مواصفة أخرى (حدد) _____

[ ] تطبيق ادارة الجودة الشاملة (TQM)

[ ] نحن لن نجدد شهادتنا وتسجيلنا للآيزو عندما تنتهي

[ ] أخرى (حدد) _____

٦٣ . مـــا هـــو تقييمكم العام لعمل الهيئة السعودية للمواصفات والمقاييس ودورها في تطبيق الآيزو في المملكة العربية السعودية ؟

[ ] متميز [ ] جيد [ ] مقبول

[ ] رديء [ ] رديء جداً [ ] لا أعرف

شكراً لكم على حسن تعاونكم

APPENDIX B

QUESTIONNAIRE TO QUALITY MANAGERS (ENGLISH VERSION)

APPENDIX B
QUESTIONNAIRE TO QUALITY MANAGERS (ENGLISH VERSION)

Dear Sir

I am a doctoral student at the University of Stirling doing my degree in ISO 9000 implementation in Saudi Arabia. I would be most grateful if you could help me by completing the enclosed questionnaire, expressing your view freely and truthfully.

I assure you that the information given will be treated in the very strictest confidence and that this questionnaire will be seen only by me. It is highly structured and in general, the answers just need ticking in the appropriate place.

Thank you very much for your co-operation.

Yours,

Nasser A. Kadasah
University of Stirling

This questionnaire is to firms that are registered to ISO 9000 only

1. The name of your firm is (.....)

2. Under which sector of the following is your firm?
[ ] Appliances (electrical and others)
[ ] Metal Products
[ ] Chemical and Petrochemical Products
[ ] Plastic products
[ ] Petroleum products
[ ] Foodstuffs (please specify) .....
[ ] Furniture (wooden and metallic)
[ ] Agriculture products
[ ] Paper Products and printing
[ ] Pharmaceutical
[ ] Medical supplies
[ ] Textiles and cloths
[ ] Cables
[ ] Perfumes and cosmetics
[ ] Carpets and rugs
[ ] Other (please specify) ....

3. What is the number of employees in your organisation in general?
[ ] less than 50 [ ] 50-100 [ ] 101-200
[ ] 201-300 [ ] 301-500 [ ] More than 500

4. How many employees perform major functions related to quality matters?
( ) Saudi employees (please state the number)
( ) Non-Saudi employees (please state the number)

5. What is the type of ownership is your business?
[ ] Mixed government and private sector (no foreign involvement or joint venture)
[ ] Saudi private
[ ] Joint venture with foreign company
[ ] Saudi corporate
[ ] Other (please specify) .....

6. What percentage of your sales doe exports represent?
[ ] No export [ ] less than 10% [ ] 10-30%
[ ] 31-50% [ ] More than 50%

7. How often have these attributes (related to quality culture) been practised in your organisation: (Please tick (√) in the appropriate space)

No	Practices	Always	Often	Sometimes	Rarely	Never
1	Develop statements of values and beliefs related to quality and communicate them to employees					
2	Offer incentives to encourage employees to implement new values and beliefs for quality					
3	Train employees to develop skills related to values and beliefs towards quality					
4	Measure and report the results of implementing cultural changes associated with quality					

8. What is the extent of your agreement with the following statements that are related to your senior managers' commitment to quality:

No	Statements	Strongly agree	Agree	Neither agree nor disagree	Dis-agree	Strongly disagree
1	Senior managers devote time to quality					
2	Senior managers provide adequate resources to improve quality					
3	Senior managers identify their quality goals and objectives clearly					
4	Senior managers review progress in quality matters					

9. How often does your organisation undertake the following practices in order to meet customer needs:

No	Practices	Always	Often	Sometimes	Rarely	Never
1	Distribute customer requirements to all parts of the organisation					
2	All departments participate in developing the product					
3	The use of Quality Function Deployment (QFD) to convey customer demands at each stage of production process					

10. How often does your organisation use the following items in order to measure customer satisfaction:

No	Items	Always	Often	Sometimes	Rarely	Never
1	Customer complaints					
2	Market share					
3	Customer survey results					
4	Customer satisfaction index					
5	Customer returns					
6	Warranty costs as a percentage of sales					
7	Financial results					
8	Feedback from salespersons or sales agents					
9	Focus groups					
10	Other (please specify) _____					

11. How often do you use the following when identifying your products during manufacturing:

No	Methods	Always	Often	Sometimes	Rarely	Never
1	Serial number					
2	Lot identification					
3	Production date code					
4	Other (please specify) _____					

12. When inspecting your products, how often do you use the following inspection status?

No	Status	Always	Often	Sometimes	Rarely	Never
1	Tags attached to products					
2	Labels attached to products					
3	Routing cards					
4	Use of specific physical location					
5	Other (please specify) _____					

13. How often do you use the following methods to inspect your products?

No	Methods	Always	Often	Sometimes	Rarely	Never
1	Manually					
2	Using testing equipment (automated inspection)					
3	Computer-aided inspection					
4	Other (please specify) _____					

14. How often do you inspect and test the following?

No	Items	Always	Often	Sometimes	Rarely	Never
1	Incoming products and material					
2	The product during the manufacturing process					
3	The product at its final stage					

15. Do you have testing and inspection equipment?
[ ] Yes [ ] No

16. If you answered yes in the previous question, please answer yes or no for the following points relating to testing and inspection equipment:

No	Statements	Yes	No
1	We control and maintain testing and inspection equipment		
2	We calibrate testing and inspection equipment inside our organisation		
3	We calibrate testing and inspection equipment out of our organisation		
4	We keep records of testing and inspection equipment		

17. After inspecting your products, how often do you use the following practices when dealing with non-conforming products?

No	Practices	Always	Often	Sometimes	Rarely	Never
1	We identify the non-conforming products					
2	We document the non-conformity					
3	We evaluate the non-conformity					
4	We segregate the non-conforming product when practical					
5	We notify the responsible unit that manufactured the non-conforming product					

18. How often do you use any of the following practices when dealing with non-conforming products?

No	Practices	Always	Often	Sometimes	Rarely	Never
1	Rework them to meet the specific requirements					
2	Use them for other alternatives					
3	Reject them (e.g. scrap or recycle them)					
4	Other (please specify) _____					

19. Do you have the following teams to deal with quality matters?
Please tick (√) under Yes or No

No	Teams and Committees	Yes	No
1	Steering Committee that include senior manager (s) to be responsible for making policies to implement quality matters including ISO implementation		
2	Problem-solving teams which identify and solve quality problems		
3	Quality Circles (Self-managed teams; autonomous work groups that are self-directed handling quality issues and problems		
4	Cross-functional teams (teams consist of employees from different departments to solve quality problems)		

20. What is the degree of your agreement with the following statements relating to employee involvement and empowerment in quality?

No	Statements	Strongly agree	Agree	Neither agree nor disagree	Dis-agree	Strongly disagree
1	Line workers are encouraged to inspect the quality of their products and fix any quality problems					
2	Line workers are given the necessary resources to solve any quality problems that arise					
3	Training and technical assistance are available to line workers to solve any quality related problems					
4	Management generally encourages, rewards, accepts, evaluates, and implement employee suggestions in quality matters					

21. How often do you use the following tools for quality related matters in your firm?

No	A. Qualitative Tools	Always	Often	Sometimes	Rarely	Never
1	Flow Charts					
2	Cause-and effect diagrams					
3	Multi-voting					
4	Affinity diagrams					
5	Brainstorming					
6	Task lists (Check lists)					
7	Tree diagrams					
8	Other (please specify) _____					

No	B. Quantitative Tools	Always	Often	Sometimes	Rarely	Never
1	Control Charts					
2	Scatter diagrams					
3	Pareto diagrams					
4	Sampling inspection					
5	Histograms					
6	Taguchi methods to improve process efficiency					
7	Shingo error-proofing to prevent error in process design					
8	Other (please specify) _____					

22.What type of general training subjects (exclude ISO training subjects) do you use among the following?

please tick(√) under Yes or No

No	Training Subjects	Yes	No
1	Design for Manufacturing		
2	Statistical Process Control (SPC)		
3	TQM training		
4	Defect prevention		
5	Leadership training for middle managers and supervisors in how to build quality environment		
6	Quality costs		
7	Process improvement		
8	Benchmarking		
9	Problem solving training		
10	Process analysis (e.g., systematic improvement model and measurement systems)		
11	Team-building skills (e.g. interpersonal skills and communication)		
12	Customer care training		
13	Other (please specify) _____		

23. Do you use benchmarking as a tool to compare your company with the best practices in the industry?

[ ] Yes [ ] No

24. If you are using benchmarking (if you answered yes in the previous question) what are the elements that you use for comparison?

Please tick (√) under Yes or No

No	Elements	Yes	No
1	Products or services of others		
2	Processes or functions of others		
3	Internal comparison, comparing one department to other excellent department in the organisation		
4	Benchmark against our partner of the joint venture products or operations		

25. Which of the following methods, if any, do you use to measure the performance of your suppliers?
Please tick (√) under Yes or No

No	Methods	Yes	No
1	Subjectively		
2	The quality of suppliers' products		
3	Number of rejects and defects		
4	Credible, timely delivery		
5	Using vendor rating system		
6	Using failure mode and effect analysis		
7	Suppliers' engineering capabilities		
8	Their financial capabilities		
9	Other (please specify) _____		

26. How often do you practise the following attributes relating to your relations with your suppliers?

No	Attributes	Often	Sometimes	Never
1	We establish long-term contracts with our suppliers			
2	We have joint quality planning with our suppliers			
3	We provide our suppliers with clear product specification data			
4	We provide technical assistance to our suppliers			
5	We rely on relatively few dependable suppliers			

27. How often do you use the following measurement tools to measure performance in the organisation? (e.g. how do you measure quality in your organisation?)

No	Tools	Always	Often	Sometimes	Rarely	Never
1	Statistical Process Control (SPC)					
2	Feedback on customer satisfaction					
3	Quality failure costs (e.g. rejects and scrap rates)					
4	Production rates and adherence to scheduling					
5	Financial accounts (e.g. changes in sales revenue)					
6	Audit results					
7	Costs of warranty and product liability					
8	Other (please specify) _____					

28. How often do you use the following practices relating to quality records?

No	Practices	Always	Often	Sometimes	Rarely	Never
1	We collect and document quality records (e.g. scrap rates)					
2	We index quality records					
3	We store and file quality records					
4	We can access quality records					
5	We maintain quality records					
6	We segregate or dispose of obsolete quality records					

29. To which standard (s) is your firm registered?

[ ] ISO 9001 [ ] ISO 9002 [ ] ISO 9003 [ ] ISO 14000
[ ] QS-9000 [ ] Other (please specify) .....

30. How long have you been registered to ISO?
[ ] Less than 1 year [ ] 1-Less than 2 years [ ] 2-Less than 3 years
[ ] 3-Less than 5 years [ ] 5 years or more

31.How long did your firm spend from the beginning of the registration process till being fully registered to ISO?
[ ] Less than 1 year [ ] 1-Less than 2 years
[ ] 2-Less than 3 years [ ] 3 years or more

32. What is the degree of your agreement with the following statements relating to ISO 9000?

No	Statements	Strongly agree	Agree	Neither agree nor disagree	Dis-agree	Strongly disagree
1	Top management demanded ISO					
2	The quality department demanded ISO					
3	Top management is committed to ISO					
4	Top management fully understands the purpose of ISO and the details of registration					
5	Top management provides the needed resources for the successful implementation of ISO					
6	The Saudi Government prefers ISO 9000 registered organisations in its bidding and contracts					

33. What is the degree of importance of the following motives for registering to ISO 9000?
(Why did you register to ISO 9000)

No	Motives	Very important	Fairly important	Of average importance	Of minor importance	Not important
1	To improve the quality of the product					
2	To improve the efficiency of the quality system					
3	To maintain/increase market share					
4	To meet customer-supplier demands					
5	To meet government demands, requirements, or pressures					
6	To market your products in the international arena					
7	To imitate competitors					
8	To achieve cost reductions					
9	To be a step towards TQM (Total Quality Management)					
10	To meet the requirement of the foreign partner					
11	To reduce defective rates and waste					
12	To use ISO as a promotional tool					
13	To meet corporate objectives					
14	To be eligible for tenders					
15	To improve employee relations					
16	To improve communications					
17	To improve the design of the product or the process					
18	To have better relations with sub-contractors					
19	To avoid being excluded from the European market					

34. Are you registered through SASO (Saudi Arabian Standards Organisation)?
[ ] Yes [ ] No

35. If you are not registered through SASO (if you answered no in the previous question) what is your registration agency, and where its headquarter?

My registration agency is.....

Its headquarter is in .....(please state the country)

36. If you are registered through a foreign agency (not SASO) what is the extent of your agreement with the following reasons that made you select that agency instead of SASO?

No	Reasons	Strongly agree	Agree	Neither agree nor disagree	Dis-agree	Strongly disagree
1	The foreign agency is usually more competent than SASO					
2	The foreign certificate is more prestigious world-wide					
3	The foreign agency is cheaper					
4	The foreign agency's audit procedures are less complicated than SASO's					
5	The foreign certificate is more valid and credible world-wide					

37. How important are the following factors for choosing your registration agency?

No	Factors	Very important	Fairly important	Of average importance	Of minor importance	Not important
1	Their costs					
2	Personal relationship					
3	Their closeness to our firm					
4	Their reputation and image					
5	The relative simplicity of their audit procedures					
6	Demand /advice by parent company or partner					
7	Advice by another company or person					
8	Their knowledge of our industry					
9	Their previous experience in the Saudi market					

38. Before choosing your registration agency, what of the following procedures have you done?

Please tick (√) under Yes or No

No	Procedures	Yes	No
1	We checked their previous experience		
2	We checked their long-term financial viability		
3	We evaluated their internal operations to examine their competence and confidentiality		
4	We evaluated the expenses they charge depending on your financial capability		

39. Prior to implementing ISO 9000, what did you do as of the following procedures? (Please tick (√)under Yes or No)

No	Procedures	Yes	No
1	We performed cost-effective analysis (quantify the financial impact of ISO)		
2	We measured internal aspects, such as waste, rework, or cost of paperwork		
3	We measured external aspects, such as sales increases, credit notes and refused items		
4	We used Gap analysis to assess our quality system capabilities against ISO and discover any gaps		

40. How much, approximately, did you spend in the process of implementing ISO 9000 in your organisation until certified?

No	Items	Cost in SR	Don't know
1	The costs of developing and implementing the ISO quality system inside our organisation		
2	The consultancy fees		
3	The fees charged by the registration agency		

41. What is your overall evaluation of the costs of implementing ISO 9000 versus the benefits gained from registration? (Please select only one answer)

[ ] Benefits exceed the costs considerably
[ ] Benefits exceed the costs
[ ] Benefits are equal to the costs
[ ] Benefits are less than the costs
[ ] Benefits are less than the costs considerably
[ ] It is difficult to judge

42. What is the degree of your agreement with the following statements concerning the registration agency?

No	Statements	Strongly agree	Agree	Neither agree nor disagree	Dis-agree	Strongly disagree
1	Auditing procedures are complicated.					
2	Auditing fees are high					
3	Auditing time is lengthy					
4	The auditing agency has endless demands					
5	There is scepticism about the ethics of assessors					
6	Lack of knowledge about our particular industry					
7	Choosing the appropriate registration body is difficult					

43. What is the level of your satisfaction with your registration agency?
1 is the lowest and 5 is the highest satisfaction (please circle one number only)

(Low satisfaction 1 2 3 4 5 High satisfaction)

44. Did you achieve ISO registration during the:
[ ] 1st audit [ ] 2nd audit [ ] More than 2 audits

45. How long does your ISO 9000 registration certificate last?
[ ] 3 years [ ] Or ..... years (specify how many years)

46. After receiving the ISO certificate, how often does your registration agency visit you to inspect your quality system a year (surveillance visits)?
(Please circle only one number)
1 2 3 4 Time (s) per year

47. Please answer the following points relating to ISO 9000 implementation?
Please tick (√)under Yes or No

No	Statements	Yes	No
1	We have an ISO 9000 project team to carry out the actual implementation of ISO 9000 requirements		
2	We have an ISO 9000 facilitator (an employee who is directly responsible for ISO)		
3	We performed an internal audit to check the readiness of our quality system		
4	Prior to the full assessment, we had a pre-assessment audit to check our readiness for the full assessment		
5	We hired new employee(s) to implement ISO 9000		

48. Which of the following types of training for ISO do your employees receive?
Please tick (√) under Yes or No

No	Types of ISO Training	Yes	No
1	General educational awareness programmes about ISO 9000 benefits		
2	Special training in ISO 9000 implementation		
3	Auditing / Lead Auditing		
4	Other ISO special training (please specify) _____		

49. Please answer the following statements about training for ISO with yes or no:

No	Statements	Yes	No
1	We received training on ISO 9000 provided by SASO		
2	We received training on ISO 9000 provided by the Chamber of Commerce		
3	We received training by other (specify) _____		

50. What types of the following documentation do you have?
Please tick (√)under Yes or No

No	Types of Documentation	Yes	No
1	Quality manual		
2	Quality procedures		
3	Work instructions		
4	Other (please specify) _____		

51. Please answer the following statements relating to the quality manual of ISO?
Please tick(√) under Yes or No

No	Statements	Yes	No
1	Our quality manual is written according to the sequence of ISO elements		
2	Our quality manual is written according to the work flow of our organisation		
3	Each person participated in writing the element of the quality manual that is related to his job		
4	The quality manual was written with assistance from an external consultant		
5	We wrote our quality manual with no external assistance		

52. What is the extent of your agreement with the following statements about the ISO 9000 quality manual?

No	Statements	Strongly agree	Agree	Neither agree nor disagree	Dis-agree	Strongly disagree
1	It involves a large administrative burden					
2	It leads to a loss of flexibility					
3	It is too theoretical					
4	It is helpful					
5	It is useless after achieving registration					
6	It is accurate					
7	It is too complicated					
8	It is too elaborate and long					

53. What is the degree of your agreement with the following statements relating to managing your supplier relations under the ISO registration scheme?

No	Statements	Strongly agree	Agree	Neither agree nor disagree	Dis-agree	Strongly disagree
1	ISO procedures lengthen the time for the supplier verification process					
2	ISO ensures that only materials that meet our specifications are purchased					
3	The purchased materials from ISO firms are of higher quality than those of the non-ISO firms					
4	ISO improves the selection process of suppliers					
5	ISO will increase competition among suppliers					
6	We monitor and assess the quality system and the financial situation of our suppliers					
7	We have criteria for removing suppliers from our lists if their performance is found to be unsatisfactory					

54. Please answer the following points concerning the external consultant:
(Select only one answer)

[ ] We did not an hire external consultant to help in implementing ISO 9000
[ ] We hired an external consultant who is our registration agency
[ ] We hired an external consultant who is not our registration agency

55.In addition to ISO 9000, do you have TQM programme (Total Quality Management)?
[ ] Yes [ ] No

56. If you have ISO and TQM together in your organisation (if you answered yes in the previous question) **(Please select one of the following points only)**

[ ] I am satisfied with ISO more than TQM
[ ] I am satisfied with TQM more than ISO
[ ] I am equally satisfied with both ISO and TQM
[ ] I am equally dissatisfied with both ISO and TQM

57. How helpful were the following factors in contributing to the implementation of ISO 9000 in your organisation?

No	Factors	Very helpful	Fairly helpful	Of average help	Of minor help	No help at all	Not applicable
1	Top management commitment to ISO						
2	Employee motivation and commitment						
3	Assistance from the government						
4	Assistance from the parent company or partner						
5	Assistance from the external consultants						
6	Communication between management and employees						
7	A well-structured system of procedures						
8	The contribution made by the human resource department						
9	Experience with the existing quality system.						
10	The existing TQM programme.						
11	Our internal auditor (s)						
12	The ISO training programmes.						
13	ISO software (computer programmes on ISO.						
14	SASO written publications on ISO						
15	General written publications on ISO						

58. After the implementation of ISO 9000 in your organisation, what is the degree of effect that ISO had on the following benefits in your organisation?
(What did you gain from ISO 9000?)

No	Benefits	Crucial effect	Great Effect	Some Effect	Little Effect	No effect
1	Reduced costs					
2	Reduced defective rate and waste					
3	Reduced customer complaints					
4	Improved the speed of goods delivery					
5	Maintained/ gained market share					
6	Increased exports					
7	Improved product quality					
8	Improved the quality system's efficiency					
9	Improved profitability					
10	Improved staff motivation					
11	Improved customer service					
12	Improved the quality of incoming materials					
13	Improved inspection methods and time to produce finished goods					
14	Improved employee relations					
15	Improved inspection methods and time to receive incoming materials					
16	Improved product design					
17	Improved process design					
18	Improved supplier relations					
19	Improved productivity					
20	Increased quality awareness within the organisation					

59. What is the extent of your agreement with the following statements relating to evaluation of ISO?

No	Statements	Strongly agree	Agree	Neither agree nor disagree	Dis-agree	Strongly disagree
1	I am satisfied with ISO 9000 benefits					
2	I recommend ISO to other firms					
3	ISO is a barrier to TQM implementation					
4	There is a need to amend ISO clauses					
5	ISO by itself is enough to have a sufficient quality system					
6	Both ISO and TQM together are sufficient for a quality system					
7	ISO guarantees the manufacturing of good quality products					

60. What is the degree of your agreement with the following statements concerning ISO 9000 implementation?

No	Statements	Strongly agree	Agree	Neither agree nor disagree	Dis-agree	Strongly disagree
1	There was resistance to the introduction of ISO					
2	We needed to change our regular practices to fit ISO					
3	ISO implementation involves high costs					
4	ISO standards are vague and complicated					
5	ISO implementation is time consuming					
6	Long and bureaucratic documentation					
7	Lack of understanding of the importance of ISO by all departments					
8	We lack (a) well-trained and experienced internal quality auditor(s)					
9	The surveillance visits are difficult to cope with					
10	Maintaining registration involves high costs					

61. After receiving your ISO 9000 certificate, which of the following have you done? (Relating to the use of ISO as a promotional tool)
(Please tick (√) under yes or no)

No	Statements	Yes	No
1	We publicise the ISO 9000 mark in our publications		
2	We publicise the ISO 9000 mark in our advertising		

62. What are your plans since achieving ISO registration?
(You can choose more than one element)

[ ] Maintain the registration status
[ ] Implement ISO 14000 (the environment standard)
[ ] Implement another standard (please specify) .....
[ ] Implement TQM
[ ] Will not renew our registration to ISO when expired
[ ] Other (please specify) .....

63. What is your overall evaluation of the performance of Saudi Arabian Standards Organisation (SASO) concerning its role in the implementation of ISO 9000 in Saudi Arabia?

[ ] Excellent [ ] Good [ ] Reasonable
[ ] Poor [ ] Awful [ ] Don't know

APPENDIX C

QUESTIONNAIRE TO LEAD ASSESSORS

APPENDIX C

POSTAL QUESTIONNAIRE TO ASSESSORS IN SAUDI ARABIA

Dear/

I am a PhD. student at the University of Stirling studying for my degree in ISO 9000 implementation in Saudi Arabia. I have already collected my data from ISO 9000 registered firms in the manufacturing sectors, however, I still have some inquiries regarding the registration process of ISO in Saudi Arabia.

I would appreciate if you would kindly help me by answering the enclosed questionnaire and return it in the enclosed stamped envelope. I assure you that the information you provide will be treated in a very confidential manner. Thank you very much for your co-operation.

Sincerely,

Nasser Kadasah

University of Stirling

The following questions were written on three pages leaving spaces for answers. Here, the questions are presented on one page out of the necessity for spacing.

1. In how many months do Saudi firms usually achieve registration?
2. How many surveillance visits do you conduct to firms after achieving registration? Do you provide one visit to some and two to others?
3. Do you provide consultation to your client? If yes, at what stage of registration do you provide it?
4. Do you provide training in ISO 9000 to your clients or to other companies? If yes what are your typical programmes?
5. Have you registered any firms in ISO 9003 or ISO 14000 in Saudi Arabia?
6. During which audit, the first or the second, do firms usually achieve ISO 9000 registration? What is the percentage of companies?
7. Do companies perform a pre-assessment audit? What is the percentage of companies that do it?
8. During surveillance visits, do you review the whole quality system or part of it?
9. How much do you charge companies for ISO registration and for surveillance visits?
10. Do you provide assistance in writing the quality manual?
11. Do you have any criticism of ISO 9000 (1994), and especially 9001 or 9002? What are their major deficiencies?
12. What are the major obstacles that Saudi companies face when implementing ISO?
13. Do you have any comments? You may use the reverse side or additional pages.

APPENDIX D

NAMES OF THE SURVEYED ISO 9000 REGISTERED FIRMS

APPENDIX D

Names of the Surveyed ISO 9000 Registered Firms in Saudi Arabia (1/2)

No.	Name of Firm	City	Region
1	AVK Saudi Valves Company	Jeddah	Western
2	Abdullah Hashim Industrial Gases & Equipment Co.	Jeddah	Western
3	Abu Dawood Industrial Company Ltd.	Yanbu	Western
4	Advanced Electronics Company Ltd.	Riyadh	Middle
5	Adwan Electronics Company Ltd.	Riyadh	Middle
6	Airspace Accessories & Components	Jeddah	Western
7	Al-Hamrani Industrial Group – Barrel's Factory	Jeddah	Western
8	Al-Hamrani-Fuchs Petroleum Saudi Arabia	Yanbu	Western
9	Al-Jomaih & Shell Lubricating Oil Company Ltd.	Riyadh	Middle
10	Al-Jubail Fertiliser Company – Samad (*Sabic*)	Jubail	Eastern
11	Al-Dabal Company Ltd.	Jubail	Eastern
12	Al-Safi Dairy Establishment	Al-Kharj	Middle
13	Al-Shifa Medical Syringes	Dammam	Eastern
14	Al-Zamil Heavy Industry Ltd.	Jeddah	Western
15	Arabian Agricultural Services (ARASCO)	Riyadh	Middle
16	Arabian Danish Paints Company Ltd.	Riyadh	Middle
17	Arabian Industrial Fibres Co. – Ibn Rushd (*Sabic*)	Yanbu	Western
18	Arabian Petrochemical Co. – Petrokemya (*Sabic*)	Jubail	Eastern
19	Arabian Pipes Company	Riyadh	Middle
20	Banawi Packaging Company	Jeddah	Western
21	Basic Chemical Industry Ltd.	Dammam	Eastern
22	Belleli Saudi Heavy Industries	Jubail	Eastern
23	Best Foods Saudi Arabia Ltd.	Yanbu	Western
24	Binzagr Co-Ro Ltd.	Jeddah	Western
25	CIC Construction Chemicals	Jeddah	Western
26	Continental Can of Saudi Arabia	Dammam	Eastern
27	DWI, Dermabit Waterproofing Industrial Co. Ltd.	Jubail	Eastern
28	Eastern Petrochemical Company – Sharq (*Sabic*)	Jubail	Eastern
29	Gulf Powder Coating Factory – Alwan	Riyadh	Middle
30	Hempel Paints Saudi Arabia Ltd.	Dammam	Eastern
31	Hidada Limited	Jeddah	Western
32	Jamjoom Medical Industries	Jeddah	Western
33	Jeddah Beverage Can Making Company	Jeddah	Western
34	Jotun Saudi Company Ltd.	Yanbu	Western
35	Lubrizol Trans-Arabian Company Ltd.	Yanbu	Western
36	Medical Dialysers Corporation	Jeddah	Western
37	Metito Arabia Industrial Ltd.	Riyadh	Middle
38	Middle East Power Company	Dammam	Eastern
38	Middle East Specialised Cables	Riyadh	Middle
40	Modern Scaffolding Co. – Baroom	Jeddah	Western
41	Nalco Saudi Company Ltd.	Dammam	Eastern
42	National Titanium Dioxide Company – Crystal	Jubail	Eastern

Names of the Surveyed ISO 9000 Registered Firms in Saudi Arabia (2/2)

No.	Name of Firm	City	Region
43	National Automobile Industry	Jeddah	Western
44	National Factory of Air Conditioners, Al-Essa Ind.	Riyadh	Middle
45	National Factory for Can Ends	Jeddah	Western
46	National Industrial Gases Company (*Sabic*)	Jubail	Eastern
47	National Methanol Company – Ibn Sina (*Sabic*)	Jubail	Eastern
48	New Products Industries (NEPRO)	Jeddah	Western
49	Olayan Descon Industrial Company Ltd.	Jubail	Eastern
50	PDM Saudi Arabia	Yanbu	Western
51	Petrolite Saudi Arabia	Dammam	Eastern
52	Radwa Food Production Company	Jeddah	Western
53	Rafid Steel Industries	Riyadh	Middle
54	Raychem Saudi Arabia Ltd.	Dammam	Eastern
55	Red Sea Paints	Jeddah	Western
56	SGB–Al-Dabal Riyadh Company	Riyadh	Middle
57	Safco Ibn Al-Baytar Company (*Sabic*)	Jubail	Eastern
58	Sappco-Texaco Insulation Products Company	Riyadh	Middle
59	Saudi Arabia Markets & Shell Lubricating Co.	Jeddah	Western
60	Saudi Arabian Adhesive Factory (SAAF)	Riyadh	Middle
61	Saudi Arabian Fabricated Metals Co. Ltd (SAFAMI)	Damam	Eastern
62	Saudi Arabian Lube Additives Company	Yanbu	Western
63	Saudi Arabian Lubricating Oil Co. – Petrolube	Jeddah	Western
64	Saudi Building Materials Company	Jeddah	Western
65	Saudi Cable Company	Jeddah	Western
66	Saudi Ceramic Company	Riyadh	Middle
67	Saudi Fruit Juice & Beverages Industries	Jeddah	Western
68	Saudi Industrial Gas Company	Al-Khobar	Eastern
69	Saudi Industrial Paint Company (SIPCO)	Dammam	Eastern
70	Saudi Iron & Steel Company - Hadeed (*Sabic*)	Jubail	Eastern
71	Saudi Lighting Company Ltd.	Riyadh	Middle
72	Saudi Methanol Company – Arrazi (*Sabic*)	Jubail	Eastern
73	Saudi Petrochemical Company – Sadaf (*Sabic*)	Jubail	Eastern
74	Saudi Yanbu Petrochemical Co. – Yanpet (*Sabic*)	Yanbu	Western
75	Saudi Aramco Mobile Refinary (SAMREF)	Yanbu	Western
76	Savola Edible Oils Company	Jeddah	Western
77	Seating & Office Systems Industries	Riyadh	Middle
78	Sigma Paints Saudi Arabia Ltd.	Dammam	Eastern
79	Steel Rolling Company – Sulb (*Sabic*)	Jeddah	Western
80	Steelcase Jeraisy Ltd.	Riyadh	Middle
81	Surgical & Medical Packs –Sterpack	Jeddah	Western
82	United Carton Industries Company	Jeddah	Western
83	Zamil Glass Industries	Dammam	Eastern

Total firms, Jeddah 27, Riyadh 18, Jubail 14, Dammam 12, Yanbu 10, Al-Kharj 1 and Al-Khobar 1 firm.

APPENDIX E

LETERS OF INTEREST

APPENDIX E
LETTERS OF INTEREST

بسم الله الرحمن الرحيم

Royal Embassy of
Saudi Arabia
London

المملكة العربية السعودية
وزارة التعليم العالي
مكتب الملحقية الثقافية في بريطانيا

SAUDI ARABIAN CULTURAL BUREAU
29 BELGRAVE SQUARE
LONDON SW1X 8QB

Telephone: 0171-245 9944/5/6/7
Cable Address: ELMIAH LONDON, S. W. 1
Telex: 299909 ELMIAH G
Fax: 0171 245 9895

الرقم: AN/HM/KA/K297
التاريخ: 19/08/98
المرفقات:

TO WHOM IT MAY CONCERN

We certify that Mr Nasser A.Kadasah is a Saudi Arabian Government scholarship holder to persue his study for the degree of PhD in the department of Management Science at the University of Stirling . This office is responsible for payment of his tuition fees and he also receives a monthly allowance to cover his living expenses.

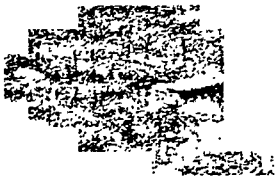
He is currently in a home trip to the Kingdom of Saudi Arabia to collect data for his research .We would appreciate any assistance extended to him .

Abdullah M. Al-Nasser
Cultural Attaché .

بسم الله الرحمن الرحيم

KINGDOM OF SAUDI ARABIA
Ministry of Higher Education
KING ABDULAZIZ UNIVERSITY
Faculty of Economics & Administration
Vice Dean for Graduate Studies & Research

المملكة العربية السعودية
وزارة التعليم العالي
جامعة الملك عبد العزيز
كلية الاقتصاد والإدارة
وكالة الكلية للدراسات العليا والبحث العلمي



الى من يهمه الأمر

السلام عليكم ورحمة الله وبركاته :

تفيد وكالة الكليه للدراسات العليا والبحث العلمي بكلية الاقتصاد والاداره بجامعة الملك عبدالعزيز بأن الاستاذ / ناصر بن عقيل كدسة هو احد المبتعثين للدراسة الدكوراه في (ادارة الاعمال) تخصص دقيق (ادارة الانتاج) ويقوم حالياً برحله علميه لجمع معلومات وبيانات خاصه ببحثه العلمي بعنوان :

" نظم ادارة الجوده وتطبيقاتها على الشركات في المملكه العربيه السعوديه "

لذا نأمل التكرم بمساعدته في جمع المعلومات والبيانات وعمل المقابلات الخاصه برسالته العلميه علماً بأن المعلومات التي سوف يحصل عليها لن تستخدم الا لغرض البحث العلمي وسوف تكون سريه بحيث لن يطلع عليها الا الباحث .

شاكرين لكم كريم تعاونكم ،،،

وتقبلوا وافر تحياتي وتقديري ،،،

عميد كلية الاقتصاد والاداره

د / فريد بن هاشم فلمبان

الرقم ٤٠٥ / ع ح م التاريخ ١٤١٨/٥/١٦ المرفقات

Ref. Date Encl.

☎ 695 2126 – 640 0000 · 5686 / 5546 Fax 640 1667 P.O. Box 9031, Jeddah 21413 ص. ب ٩٠٣١ جدة ٢١٤١٣ فاكس ٦٤٠ ١٦٦٧ ☎ ٦٩٥ ٢١٢٦ - ٦٤٠ ٠٠٠٠ : ٥٦٨٦ / ٥٥٤٦

Facilitating letter provided by King Abdul Aziz University, Saudi Arabia

SGS لخدمات الفحص العربية السعودية المحدودة
SGS Inspection Services Saudi Arabia Ltd. اس جي اس

P.O. Box 30794
Al Khobar 31952
Kingdom of Saudi Arabia
Tel. : (966-3) 896 0542
Fax : (966-3) 894 4887
E-mail: sgs.saudiarabia@sgsgroup.com
C.R. No. 53614/001
C.C. MembersRip No. 1717

ص. ب ٣٠٧٩٤
الخبر: ٣١٩٥٢
المملكة العربية السعودية
تلفون: ٨٩٦ ٠٥٤٢ (٣-٩٦٦)
فاكس: ٨٩٤ ٤٨٨٧ (٣-٩٦٦)
س. ت: ٥٣٦١٤/٠٠١
رقم العضوية: ١٧١٧

17th March 1998

Mr. Nasser Kadash
7 Cleuch Rd.,
Stirling FK9 5EX
United Kingdom

Dear Mr. Kadash,

Please refer your fax dated 16th March 1998 concerning list of ISO 9000 certified by SGS-ICS in Saudi Arabia.

As requested, please find attached a list detailing ISO 9000 certified companies by SGS-ICS in Saudi Arabia.

I hope the list will benefit you for your higher studies.

Wish you every success.

Yours sincerely,

Eknath Shimpi
Certification Manager

Lloyds Register Quality Assurance
DAMMAM OFFICE
c/o Arabian Establishment for Trade,
6th Floor, Al-Ard Building,
SIEI/First Street,
P.O Box 299,
Dammam 31411
Tel. (03) 833 5356
Fax. (03) 832 1395

LLOYD'S REGISTER QUALITY ASSURANCE

Nasser Kadasah
7 Cleuch Road,
Stirling,
FK9 5EX

Scotland
Great Britain

Date : 21/ 03/ 98

Subject : ISO 9000 Certification.

Please find enclosed details of companies in Saudi Arabia who are approved or very close to being approved by Lloyds Register.

I hope this is of help.

I would be very pleased to have a copy of your report on completion as it is very difficult to obtain accurate stats on the number of approved companies in Saudi.

Please note that all of Lloyds approvals are issued under Accreditation, normally British or American.

Certification Bodies that you may which to contact who are active in the region are : BSI, DNV, BVQI, AOQC, ABS, TUV, SGS-Yarsley, NQA.

I did a brief study of ISO in Saudi back in Nov 1996, and at the time I estimated that there were in the region of 160 approved companies. I have since talked to various government departments who estimate 400, but many of these may be non Accredited.

Yours Sincerely

Keith Price
Business Manager/ Lead Auditor

DET NORSKE VERITAS

DET NORSKE VERITAS
Management Systems
Certification
Region Middle East
P.O. Box 11539
Dubai, U.A.E.
Internet: http://www.dnv.com
Tel. (+971) 4 526 626
Fax. (+971) 4 559 433
Org. No. VAT

MR. NASSER KADASAH
7 CLEUCH ROAD
STIRLING FK9 5EX
UNITED KINGDOM

Your ref.	Our ref.	Date
	Q_A-0147/MA	26 March, 1998

LIST OF SAUDI ARABIA COMPANIES

Dear Mr. Kadasah,

Reference your fax of 19th March 1998.

As requested, we are enclosing herewith a list of companies certified in Saudi Arabia by Det Norske Veritas, for your Ph.D. degree in the implementation of ISO 9000 in Saudi Arabia.

Should you require any further information/clarifications, please do not hesitate to contact us.

With best regards,

Yours faithfully
for **DET NORSKE VERITAS**

Muaath Alyah
Lead Assessor, MSC Services

Enclosure

The American Standard for Over 135 Years

Telephone : + 966 (03) 827 4489/8261107
Mobile Tel. (Bah.) +973 9683138
Return Fax : + 966 (03) 827 6109

Fax Message

Page(s) Including Cover - 3

Our Ref.	**:KSA/F/1571/98/TD/rkcn**
Date	**:18 November 1998**
To	**:Naser Kadasah**
From	**:Tom Dwyer**
Subject	**:List of ISO 9000 Certified Companies in Saudi Arabia**

Reference your fax dated 15th November 98 on subject, enclosed please find the list of ISO 9000 certified companies by us in Saudi Arabia.

Best Regards,

Tom Dwyer
General Manager

Germanischer Lloyd

Germanischer Lloyd Office name
Phone: Your phone number(s)
Telefax: Your fax number
Telex: your telex number, place of delivery
Chamber of commerce
Your bank institute
Account number
The bank ID
Also for your bank
HEAD OFFICE
Germanischer Lloyd
Vorsetzen 32 P.O. Box 11 16 06
D-20459 Hamburg D-20416 Hamburg
Telefon: 40/36 14 9-0
Telefax: 40/36 14 92 00
Telegramm: klassenlloyd
Telex: 212 828 glhh d

Germanischer Lloyd Office name
Your Address, Street, City, Country

ATT:MR.NASSER KADASAH

Your Ref	Your Letter of	Diary No. / Our Ref Please indicate in your reply	Date
		217/98/ZD.EW	9/4/98

DEAR SIR,

PLS BE INF. OF THE FOLLOWING :-

NAME OF SAUDI COMPANIES HOLDING ISO CERTIFICATE BY GLC

1-

2-

3- **NAMES AND ADDRESSES ARE OMMITTED**

4-

5-

YOURS TRULY

GL ALEXANDRIA.

BUREAU VERITAS
QUALITY INTERNATIONAL

C/o. Bureau Veritas
P.O. Box 9110
DUBAI - U.A.E.

Tel : (971-4)453560
Fax : (971-4)452391
Tlx : 49023 BVDBA EM

FAX

To : THE ROYAL EMBASSY OF SAUDI ARABIA - LONDON

ATTN : MR. NASSER KADASAH

From : NEIL CORREA - BVQI DUBAI Our Ref.: DBA/BVQI/01-0/NC/NC

Number of Pages including this one : 1 + 22 Date: 08/11/98

Subject: : LIST OF COMPANIES

Dear Mr. Nasser,

We acknowledge receipt of your fax dated 3rd November'98 and thank you for the same.

Please find enclosed herewith a detailed list of Client's Certified by Bureau Veritas Quality International, for your reference and necessary action.

Hoping the above information would assist you in your study towards ISO 9000 registration.

Should you require any further information / clarification, please do not hesitate to contact us. I will be more than happy to assist you, we remain.

Best Regards,

NEIL CORREA
BVQI - DUBAI

بسم الله الرحمن الرحيم

KINGDOM OF SAUDI ARABIA
SAUDI ARABIAN STANDARDS ORGANIZATION

المملكة العربية السعودية
الهيئة العربية السعودية للمواصفات والمقاييس

NO. : .... : الرقم
Attach. : .... : المرفقات
Sub : .... : الموضوع

Dep. : .... : إدارة
DATE. : .... : التاريخ

الاستاذ / ناصر بن عقيل كدسه المحترم
بريطانيا

السلام عليكم ورحمة الله وبركاته وبعد،

إشارة الفاكس الوارد منكم بشأن تطبيق المواصفات العالمية (ISO 9000)على الصناعات السعودية وكذلك الجودة النوعية بشكل عام .

أفيدكم بعدم توفر نسخ من مطبوعات ندوة اثر تطبيق المواصفات القياسية على الصناعات الوطنية. يسرني أن أرفق لكم نسخة من محاضرات الدورة التدريبية الخاصة بإدارة الجودة الشاملة وسلسلة المواصفات القياسية الدولية أيزو ٩٠٠٠ وكذلك قائمة بالمنشآت المسجلة طبقاً لسلسلة المواصفات الدولية آيزو ٩٠٠٠ وإجراءات تسجيل نظم الجودة بالهيئة طبقاً للمواصفات القياسية الدولية أيزو ٩٠٠٠.

وتقبلوا تحياتي

مدير مركز المعلومات

محمد بن عبدالرحمن المشاري

ص.ب: ٣٤٣٧ الرياض ١١٤٧١ ـ برقياً: قياسي ـ تلكس : ٤٠١٦١٠ تقييس س ع ـ فاكس: ٤٥٢٠٠٨٦ ـ هاتف: ٤٥٢٠٠٠٠
P.O.Box: 3437 Riyadh 11471 - Cable: (GIASY) - Telex: 401610 SASO SJ - Facs: 4520086 - Tel.: 4520000

With compliments

Dear Mr Kadarah,

apologies for the delay.

International Sales.

British Standards Institution
389 Chiswick High Road
London W4 4AL
United Kingdom
Tel: +44 (0)181 996 9000
Fax: +44 (0)181 996 7400
email: info@bsi.org.uk
Internet: www.bsi.org.uk

British Standards Institution
Incorporated by Royal Charter

APPENDIX F

TABLES RELATED TO DATA ANALYSIS (IN CHAPTERS 8 AND 9)

APPENDIX F

TABLES RELATED TO DATA ANALYSIS (In Chapters 8 and 9)

Table 1 Definitions of the additional qualitative tools used by the Eastern Petrochemical Company

No.	Qualitative Tools	Function of Tools
1	Beliefs Process	Helps teams to discover areas or topics of agreement quickly in a non-threatening way
2	Criteria Rating Form	Compare several options with a common set of factors or issues
3	Interviewing	Helps to collect useful facts and data from individuals and groups
4	Is / Is not Analysis	Separates things that are associated with an issue from things that are not associated with this issue
5	Nine-Block	Helps to evaluate the impact of change implementation against perceived ease of implementation.
6	Story Board	Helps a team to document the outcome of the brainstorming session in a logical way

Source: The Eastern Petrochemical Company (Sharq) (1998) Quality Tips & Tools, Jubail, Saudi Arabia

Table 2 Saudi Arabia's findings vs. other findings in qualitative and SPC techniques

No.	Part 1 Qualitative Tools	Saudi Arabia	Study 1 USA	Study 2 USA
		Combined %*	%	%
1	Task lists (Check lists)	94.0	53.0	58.0
2	Flow charts	92.8	NA	60.0
3	Brainstorming	76.2	NA	75.0
4	Cause-and-effect diagrams	72.3	41.0	43.0
5	Tree diagrams	50.6	NA	NA
6	Multi-voting	47.6	NA	35.0
7	Affinity diagrams	33.7	NA	15.0
	Part 2 SPC Techniques			
1	Sampling inspection	91.5	92.0	68.0
2	Control charts	89.0	NA	58.0
3	Histograms	68.3	69.0	58.0
4	Pareto diagrams	58.7	59.0	63.0
5	Scatter diagrams	56.8	14.0	35.0
6	Taguchi methods	24.4	NA	NA
7	Shingo methods	15.9	NA	NA

Study 1: Modarress and Ansari (1989), Study 2: Scheuermann et al. (1997)

* Saudi figures are combined percentages excluding (Never)

Table 3 Comparison between TQM and Non-TQM firms in top mgmt commitment

No.	Practices	Means			Mann-Whitney U Test	
		TQM	Non-TQM	Dif.	Value	Sig. (2-tailed)
1	Senior managers provide adequate resources to improve quality	4.3793	4.4444	-.0651	776.500	.944
2	Senior managers identify their goals and objectives clearly	4.2414	4.4259	-.1845	696.000	.359
3	Senior managers devote time to quality	4.3793	4.3333	.0460	721.500	.508
4	Senior managers review progress in quality matters	4.3448	4.3519	-.0071	779.500	.970

TQM = 29 firms and Non-TQM = 54 firms. The scale is 5 = always, 4 = often, 3 = sometimes, 2 = rarely, and 1 = never.

Table 4 Comparison between TQM and Non-TQM in Teams & Committees for quality

No.	Teams and Committees	Percentages (%)			Pearson Chi-square	
		TQM	Non-TQM	Dif.	Value	Sig. (2-sided)
		Yes	Yes			
1	Steering committees	93.1	87.0	6.1	.718	.397
2	Problem-solving teams	86.2	79.2	7.0	.608	.436
3	Quality Circles	51.7	33.3	18.4	2.664	.103
4	Cross-functional teams	72.4	57.4	15.0	1.816	.178

TQM = 29 firms and Non-TQM = 54 firms. The scale is 2 = yes, and 1 = no

Table 5 Comparison between TQM and Non-TQM firms in employees' involvement

No.	Practices	Means			Mann-Whitney U Test	
		TQM	Non-TQM	Dif.	Value	Sig. (2-tailed)
1	Line workers are encouraged to inspect the quality of their products and fix any problems	4.3103	4.4815	-.1711	729.000	.560
2	Training and technical assistance are available to line workers to solve quality related problems	4.2414	4.2963	-.0549	777.000	.950
3	Management generally encourages rewards, accepts, evaluates, and implements employee suggestions in quality matters.	4.1034	4.1667	-.0633	749.000	.726
4	Line workers are given the necessary resources to solve any quality problems that may arise	4.0345	4.0185	.016	767.500	.874

TQM = 29 firms and Non-TQM = 54 firms. The scale is 5 = always, 4 = often, 3 = sometimes, 2 = rarely, and 1 = never.

Table 6 Comparison between TQM and Non-TQM in training subjects for quality

No.	Training Subjects	Percentages (%)			Pearson Chi-square	
		TQM Yes	Non-TQM Yes	Dif.	Value	Sig. (2-sided)
1	Process improvement	89.3	75.5	13.8	2.206	.138
2	Leadership training	82.8	71.2	11.6	1.348	.246
3	Team building skills	79.3	60.4	18.9	3.042	.081
4	Problem-solving training	79.3	55.8	23.5	4.489	.034
5	Defect prevention	66.7	61.5	5.2	.201	.654
6	Statistical Process Control	79.3	48.0	31.3	7.467	.006
7	TQM training	96.6	33.3	63.3	30.521	.000
8	Customer care training	44.8	60.4	-15.6	1.830	.176
9	Quality costs training	58.6	52.8	5.8	.254	.614
10	Benchmarking	64.3	39.6	24.7	4.464	.035
11	Process analysis training	57.1	41.5	15.6	1.798	.180
12	Design for manufacturing	42.9	46.3	-3.4	.663	.718

TQM = 29 firms and Non-TQM = 54 firms. The scale is 2 = yes, and 1 = no

Table 7 Comparison between TQM and Non-TQM firms in meeting customer demands

No.	Practices	Means			Mann-Whitney U Test	
		TQM	Non-TQM	Dif.	Value	Sig. (2-tailed)
1	Distribute customer requirements to all parts of the organisation	4.1724	4.1321	.0403	754.500	.883
2	All departments participate in developing products	3.8621	4.0377	-.1756	737.000	.747
3	The use of Quality Function Deployment (QFD)	3.3103	3.4528	-.1425	746.000	.821

TQM = 29 firms and Non-TQM = 54 firms. The scale is 5 = always, 4 = often, 3 = sometimes, 2 = rarely, and 1 = never.

Table 8 Comparison between TQM and Non-TQM firms in measure customer satisfaction

No.	Methods	Means			Mann-Whitney U Test	
		TQM	Non-TQM	Dif.	Value	Sig. (2-tailed)
1	Customer complaints	4.7857	4.8889	-.1032	717.000	.484
2	Customer returns	3.5769	4.1321	-.5552	519.000	.059
3	Feedback from salespersons or sales agents	3.8889	3.7778	.1111	647.000	.388
4	Market share	3.5926	3.8491	-.2565	643.500	.445
5	Financial results	3.6296	3.6923	-.0627	693.000	.922
6	Customer survey results	3.3704	3.1509	.2194	657.500	.542
7	Customer satisfaction index	2.8800	2.9811	-1011	635.500	.767
8	Focus groups	2.8400	2.4423	.3977	551.000	.265
9	Warranty costs as a percentage of sales	2.0769	2.6471	-.5701	518.500	.106

TQM = 29 firms and Non-TQM = 54 firms. The scale is 5 = always, 4 = often, 3 = sometimes, 2 = rarely, and 1 = never.

Table 9 Comparison between TQM and Non-TQM in their relations with suppliers

No.	Attributes	Means			Mann-Whitney U Test	
		TQM	Non-TQM	Dif.	Value	Sig. (2-tailed)
1	Provided suppliers with clear product specification data	2.8276	2.5741	.2535	620.500	.052
2	Established long-term contracts with suppliers	2.1071	1.7255	.2580	634.000	.116
3	Provided technical assistance to suppliers	2.2759	1.7778	.4981	527.000	.009
4	Had joint quality planning with suppliers	2.1071	1.7255	.3817	515.000	.028
5	Relied on relatively few dependable suppliers	1.7143	1.8302	-.1159	680.500	.510

TQM = 29 firms and Non-TQM = 54 firms. The scale is 3 = often, 2 = sometimes, and 1 = never.

Table 10 Comparison between TQM and Non-TQM firms in the use of qualitative tools

No.	Practices	Means			Mann-Whitney U Test	
		TQM	Non-TQM	Dif.	Value	Sig. (2-tailed)
1	Task lists (Check lists)	4.1034	3.7963	.3072	676.000	.283
2	Flow charts	4.3448	3.5185	.8263	454.000	.001
3	Brainstorming	3.7241	2.7547	.9694	466.500	.002
4	Cause-and-effect diagram	3.0000	2.4630	.5370	614.500	.099
5	Tree diagrams	2.3929	1.9057	.4872	601.500	.134
6	Multi-voting	2.2069	1.7170	.4899	599.000	.073
7	Affinity diagrams	1.7241	1.5098	.2143	676.000	.448

TQM = 29 firms and Non-TQM = 54 firms. The scale is 5 = always, 4 = often, 3 = sometimes, 2 = rarely, and 1 = never.

Table 11 Comparison between TQM and Non-TQM firms in the use of SPC

No.	Practices	Means			Mann-Whitney U Test	
		TQM	Non-TQM	Dif.	Value	Sig. (2-tailed)
1	Sampling inspection	4.0000	4.0370	-.0370	747.500	.929
2	Control charts	3.7143	3.7222	-.0079	736.000	.838
3	Histograms	3.5000	2.3519	1.1481	439.500	.001
4	Pareto diagrams	2.8889	2.0755	.8134	484.500	.014
5	Scatter diagrams	2.5185	2.0185	.5000	562.000	.076
6	Taguchi methods	1.8214	1.2593	.5622	541.000	.005
7	Shingo methods	1.3571	1.2222	.1349	692.000	.325

TQM = 29 firms and Non-TQM = 54 firms. The scale is 5 = always, 4 = often, 3 = sometimes, 2 = rarely, and 1 = never.

Table 12 Comparison between TQM and Non-TQM in the use of benchmarking

The use of benchmarking in ISO 9000 registered firms in Saudi Arabia	Percentages (%)			Pearson Chi-square	
	TQM Yes	Non-TQM Yes	Dif.	Value	Sig. (2-sided)
	62.1	44.4	17.7	2.345	.126

TQM = 29 firms and Non-TQM = 54 firms. The scale is 2 = yes, and 1 = no

Table13 Comparison between TQM and Non-TQM firms in quality culture

No.	Practices	Means			Mann-Whitney U Test	
		TQM	Non-TQM	Dif.	Value	Sig. (2-tailed)
1	Develop statements of values and beliefs related to quality and communicate them to employees	4.5862	4.0185	.5677	472.000	.001
2	Train employees to develop skills related to values and beliefs towards quality	4.2414	4.0556	.1858	702.000	.405
3	Measure and report the results of implementing cultural changes associated with quality	3.9310	3.7593	.1718	695.000	.397
4	Offer incentives to encourage employees to implement new values and beliefs	3.4828	3.1852	.2976	666.500	.253

TQM = 29 firms and Non-TQM = 54 firms. The scale is 5 = always, 4 = often, 3 = sometimes, 2 = rarely, and 1 = never.

Table 14 Comparison between TQM and Non-TQM firms in measuring performance

No.	Practices	Means			Mann-Whitney U Test	
		TQM	Non-TQM	Dif.	Value	Sig. (2-tailed)
1	Feedback on customer satisfaction	3.9643	4.2308	-.2665	638.500	.329
2	Audit results	4.0714	3.9815	.0899	721.500	.717
3	Quality failure costs (e.g. reject and scrap rates)	3.5517	4.2037	-.6520	618.500	.092
4	Production rates and adhering to scheduling	3.7931	4.0556	-.2625	718.000	.509
5	Financial accounts (e.g. changes in sales revenue)	3.3214	3.3269	-.0055	717.500	.913
6	Statistical Process Control (SPC)	3.7241	2.9630	.7612	581.500	.048
7	Costs of warranty and product liability	2.1786	2.6538	-.4753	595.500	.164

TQM = 29 firms and Non-TQM = 54 firms. The scale is 5 = always, 4 = often, 3 = sometimes, 2 = rarely, and 1 = never.

Table15 Motives for registration to ISO 9000 in Saudi Arabia (in detail)

Rank	Motives	Valid %					Mean	Std. Dev.
		5	4	3	2	1		
1	To improve the efficiency of the quality system	75.9	16.5	6.3	---	1.3	4.6582	.7141
2	To maintain / increase market share	56.1	25.6	14.6	2.4	1.2	4.3293	.9034
3	To meet customer-supplier demands	59.8	24.4	8.5	2.4	4.9	4.3171	1.0643
4	To meet corporate objectives	50.0	36.6	9.8	1.2	2.4	4.3049	.8846
5	To be a step towards TQM	56.6	26.5	4.8	7.2	4.8	4.2289	1.1404
6	To improve the quality of products	51.9	26.6	12.7	3.8	5.1	4.1646	1.1144
7	To reduce defective rate and wastes	45.7	29.6	16.0	4.9	3.7	4.0864	1.0747
8	To market products in the international arena	45.1	22.0	17.1	8.5	7.3	3.8902	1.2766
9	To use ISO as a promotional tool	32.9	41.5	14.6	1.2	9.8	3.8659	1.1839
10	To improve communications	40.0	25.0	18.8	8.8	7.5	3.8125	1.2638
11	To improve the design of the products or the processes	37.5	23.8	21.3	7.5	10.1	3.7000	1.3445
12	To achieve costs reductions	32.9	28.0	18.3	12.2	8.5	3.6463	1.2898
13	To be eligible for tenders	28.0	31.7	24.4	4.9	11.0	3.6098	1.2547
14	To improve employee relations	26.3	22.5	25.0	18.8	7.5	3.4125	1.2698
15	To have better relations with sub-contractors	20.7	20.7	31.7	12.2	14.6	3.2073	1.3122
16	To avoid being excluded from the European markets	20.7	22.0	8.5	25.6	23.2	2.9146	1.5006
17	To meet government demands, requirements or pressure	17.3	16.0	27.2	18.5	21.0	2.9012	1.3748
18	To imitate competitors	8.6	19.8	17.3	19.8	34.6	2.4815	1.3703
19	To meet the requirement of the foreign partner	16.5	16.5	11.4	12.7	43.0	2.4684	1.6159

The scale is 5 = very important, 4 = fairly important, 3 = of average importance, 2 = of minor importance, 1 = not important.

Table 16 Comparison between ISO motives in Saudi Arabia and other countries*

Rank	Saudi Arabia	Belgium (1)	UK (2)	W. Australia (3)
1	To improve the efficiency of the quality system	To improve efficiency and control	Anticipated demands from future customers for ISO 9000	To maintain/increase market share
2	To maintain / increase market share	Demand or pressure from customers	Increase consistency of operations	To improve efficiency
3	To meet customer-supplier demands	Improve quality image	Maintain/improve market share	To be considered for tenders
4	To meet corporate objectives	Corporate-level decision	Improve service quality	To improve customer service
5	To be a step towards TQM	Perfect Start to TQM	Customer pressure	To gain marketing benefits
6	To improve the quality of products	To improve product or service quality	Use ISO as a promotional tool	As a base for quality improvements

* The 6 most important motives, (1) Vloeberghs and Bellens (1996), (2) Buttle (1997), (3) Brown and Van Der Wiele (1995)

Table 17 Kruskal-Wallis (One Way Anova)
International marketing motives for registration to ISO by degrees of exports

No.	Motives	Extent of Exports (%)	Mean Rank	Chi-square	df	Sig.
1	To market products in the international arena	No Exports	20.78	13.904	4	.008
		1-9	36.30			
		10-30	44.05			
		31-50	51.50			
		51+	51.17			
2	To avoid being excluded from the European markets	No Exports	31.56	13.353	4	.010
		1-9	34.50			
		10-30	39.21			
		31-50	43.14			
		51+	60.42			

Table 18 Spearman's Correlation Coefficient for the relationship between degrees of export and international marketing motives

No.	International Marketing' s Motives	Degrees of Involvement in Exports (%)	
		Correlation Coefficient	Sig. (2-tailed)*
1	To market products in the international arena	.407	.000
2	To avoid being excluded from the European markets	.360	.001

* Correlation is significant at the .01 level or less (2-tailed)

Table 19 Pearson Chi-square test for the difference between size of firms in performing measures for planning prior to ISO implementation

No.	Planning Measures	Value	df	Sig. (2-sided)
1	Measured internal aspects such as waste, rework, or cost of paperwork	.001	2	.999
2	Measured external aspects such as sales increases, credit notes, and refused items	.015	2	.992
3	Performed cost-effective analysis (quantify the financial impact of ISO implementation	2.470	2	.291
4	Used Gap analysis to assess the firm's quality system capabilities against ISO and discover any gaps	1.303	2	.521

Table 20 Private providers of ISO 9000 training in Saudi Arabia

No.	Name of Provider	Nationality	Freq.	%
1	Bywater, PLC	British	9	23.1
2	Al-Khorayef Management Services	Saudi	4	10.3
3	Institute of Quality Assurance (IQA)	British	4	10.3
4	D.C.S Consultant International	British	3	7.6
5	Neville-Clarke Ltd.	British	2	5.1
6	Strategic Consultancy Services	British	2	5.1
7	FAHS, Inspection Agency	Saudi	1	2.6
8	Resource (Science & Technology Expertise) Ltd.	British	1	2.6
9	Steve Hill Associates	British	1	2.6
10	The Blackwell Partnership	British	1	2.6
11	Other providers (no names were given)	NA	11	28.1
Total			**39**	**100.00**
Percentages of known nationalities (no. of known = 28 frequencies): British (23 freq. 82.1%), Saudi (5 freq. 17.9%)				

Table 21 Kruskal-Wallis Test (One Way Anova):
Factors influencing the choice of registration agency by size of firms

No.	Factors	Sizes of Firms*	Mean Rank	Chi-square	df	Sig.
1	Their reputation and image	1-100	37.83	.631	2	.729
		101-300	42.08			
		301 +	41.73			
2	Their knowledge of the industry	1-100	39.28	4.659	2	.097
		101-300	36.09			
		301 +	48.16			
3	Their previous experience in Saudi Arabia	1-100	39.50	.173	2	.917
		101-300	41.94			
		301 +	42.19			
4	Their costs	1-100	42.42	2.049	2	.359
		101-300	37.16			
		301 +	45.33			
5	The relative simplicity of their audit procedures	1-100	50.64	5.129	2	.077
		101-300	42.56			
		301 +	35.30			
6	Demand / advice by parent company or partner	1-100	50.31	5.739	2	.057
		101-300	34.56			
		301 +	43.48			
7	Personal relationship	1-100	51.65	5.944	2	.051
		101-300	35.11			
		301 +	41.23			
8	Their closeness to firm	1-100	48.31	2.924	2	.232
		101-300	36.84			
		301 +	41.05			
9	Advice by another company or person	1-100	51.00	17.202	2	.000
		101-300	28.47			
		301 +	49.19			

* Sizes of firms are determined by number of employees.

Table 22 The number of years that the registration agencies have operated in Saudi Arabia

Group	Registration Agencies	Years Operating
1	British Standards Institution, QA (BSI)	5 Years or more
	Det Norske Veritas (DNV)	
	Lloyds Register Quality Assurance (LRQA)	
2	ABS, Integrated Services Inc. (ABS)	3 - Less than 5 years
	Germanischer Lloyds (GL)	
	SGS, Inspection Services Saudi Arabia Ltd. (SGS)	
	TUV, Cert (TUV)	
	American Petroleum Institute (API)	
3	AOQC: Moody International (AOQC)	2 – less than 3 years
4	Bureau Veritas, BVQI Middle East (BVQI)	1 – less than 2 years
5	Saudi Arabian Standards Organisation (SASO)*	Less than 1 year

*As working independently from BSI or SGS

Table 23 Profiles of the registration agencies operating in Saudi Arabia

No.	Registration Agencies	Nationality	Operating From
1	British Standards Institution, QA	UK	UK
2	Det Norske Veritas	UK	Dubai, UAE
3	SGS, Inspection Services, SA Ltd.	UK	Al-Khobar, Saudi Arabia
4	Saudi Arabian Standards Org.	Saudi	Riyadh, Saudi Arabia
5	Lloyds Register Quality Assurance	UK	Dammam, Saudi Arabia
6	ABS, Integrated Services Inc.	UK	Dammam, Saudi Arabia
7	AOQC: Moody International	UK	Jeddah, Saudi Arabia
8	TUV, Cert	Germany	Germany
9	Germanischer Lloyds	Germany	Alexandria, Egypt
10	American Petroleum Institute	USA	USA
11	Bureau Veritas, BVQI Middle East	UK	Dubai & Dammam
Percentages of registered firms by nationality of registration agencies:* Germany (6.5%), Saudi Arabia (12.0%), UK (80.4%), USA (1.1%) Total (100.00)			

* Those figures are obtained by accumulating the percentages of each country's agencies, percentages were included in Table 9.15.

Table 24 Ranking registration agencies based on the level of satisfaction of their clients using both means and Kruskal-Wallis test (One Way Anova)*

Rank	Registration Agencies	N	Mean	Kruskal-Wallis (one way Anova)			
				Mean Rank	Chi-square	df	sig
1	Lloyds Register	9	4.7778	51.17	9.089	10	.524
2	AOQC: Moody Int'l.	5	4.6000	45.30			
3	Germanischer Lloyds	2	4.5000	42.00			
3	SASO**	2	4.5000	42.00			
5	ABS, Integrated	6	4.3333	36.50			
6	BSI, QA**	19	4.2632	35.39			
7	TUV Cert	4	4.2500	33.75			
8	Det Norske Veritas	13	4.2308	34.00			
9	SGS, Inspection**	11	4.0000	29.68			

*Bureau Veritas and API were removed from the evaluation since each of them registered only one firm.
** SASO, BSI, and SGS were evaluated by the firms that have been registered by their own efforts without co-operation between SASO on one side and either BSI or SGS on the other side.

Table 25 Examples of quality records that have been used in ISO 9000 registered firms

No.	Elements in the Quality Records
1	BSI specifications in "Mild Steel"
2	Calibration methods
3	Department quality manuals
4	Design manufacturing specifications
5	Goods specifications
6	ISO 9000 standards
7	Job description
8	Manufacturing plans
9	Operating instructions
10	Process engineering specifications
11	Quality assurance documents
12	Quality forms
13	Quality mission
14	Quality plans
15	Quality policy
16	Raw materials specifications
17	Recommendations on the transportation of dangerous goods
18	Record forms
19	Safety procedures
20	Sampling plans documents
21	Test methods
22	TQM manual
23	Various specific manuals

Table 26 Comparison between Saudi Arabia and the USA in the costs of implementing ISO 9000

No.	Types of Costs	Saudi Arabia		USA (1996)*	
		Average Costs (SR)	%	Average Costs** (SR)	%
1	Internal costs	208,212.12	66.80	517,000	66.70
2	Consultancy fees	65,595.5	21.10	183,750	23.70
3	Registrar's fees	37,688.62	12.10	74,250	9.60

* Irwin and Dun & Bradstreet Information Services (1996) *ISO 9000 Survey, Comprehensive Data and Analysis of U.S. Registered Companies, 1996,* USA. **Costs basically in $ US are converted into Saudi Riyals (SR) ($ US = 3.75 SR)

Table 27 Factors helping in the implementation ISO 9000 (in detail)

Rank	Factors	Valid %						Mean
		5	4	3	2	1	0	
1	Top management commitment	78.3	15.7	6.0	---	---	---	4.7229
2	A well structured system of procedures	68.7	26.5	2.4	---	2.4	---	4.5904
3	The firm's internal auditor (s)	59.8	28.0	6.1	1.2	1.2	3.7	4.3293
4	The ISO 9000 training programmes	50.6	32.5	12.0	3.6	1.2	---	4.2651
5	Employee motivation and commitment	43.8	40.0	12.5	2.5	1.3	---	4.2250
6	Communication between management and employees	39.8	41.0	16.9	1.2	1.2	---	4.1687
7	Experience with the existing quality system	38.6	31.3	19.3	7.2	3.6	---	3.9398
8	General written publications on ISO 9000	15.9	23.2	32.9	17.1	1.2	9.8	3.0610
9	Assistance from the external consultant (s)	24.1	20.5	7.2	4.8	3.6	39.8	2.3735
10	Assistance from the parent company or partner	20.5	16.9	6.0	9.6	10.8	36.1	2.1807
11	The contribution of the human resources department	6.2	19.8	16.0	14.8	17.3	25.9	2.0494
12	SASO written publications on ISO 9000	4.9	7.3	4.9	12.2	17.1	53.7	1.0976
13	The software (computer programmes) on ISO 9000	7.2	6.0	9.6	6.0	8.4	62.7	1.0964
14	Assistance from the Saudi government	---	9.6	6.0	12.0	19.3	53.0	1.0000
15	The existing TQM programme	6.0	8.4	6.0	2.4	12.0	65.1	.9880

The scale is 5 = very helpful, 4 = fairly helpful, 3 = of average help, 2 = of minor help, 1 = no help at all, 0 = not applicable.

Table 28 Comparison between the problems of ISO in Saudi Arabia and other countries

Rank	Saudi Arabia	Sweden (1)	Turkey (2)
1	The need to change the regular system to fit ISO	Time and resources-consuming	Lack of understanding of its importance by all departments
2	A resistance to the introduction of ISO	Difficulties in interpreting the standards	Unwillingness to change from the existing system
3	Lack of understanding of the importance of ISO by all departments	Cumbersome and bureaucratic documentation	Difficulty in understanding the ISO requirements
4	ISO implementation is time consuming	Initial difficulties in making the quality system understood and accepted	Documentation control
5	ISO implementation involves high costs	Difficulties in choosing the suitable level of documentation	Time and cost

(1) Carlsson and Carlsson (1996) and (2) Erel and Ghosh (1997)

Table 29 Benefits of ISO 9000 implementation in Saudi Arabia (in detail)

Rank	Benefits	Valid %					Mean	Std. Dev.
		5	4	3	2	1		
1	Increase quality awareness in the firms	38.3	49.4	12.3	---	---	4.2593	.6667
2	Improved the efficiency of the quality system	34.6	49.4	14.8	---	1.2	4.1605	.7658
3	Improved customer service	16.3	46.3	28.8	6.3	2.5	3.6750	.9109
4	Improved the quality of products	21.3	37.5	26.3	7.5	7.5	3.5750	1.1338
5	Improved inspection methods and time to produce finished goods	24.4	29.3	29.3	9.8	7.3	3.5366	1.1779
6	Reduced customer complaints	13.9	39.2	31.6	10.1	5.1	3.4684	1.023
7	Improved inspection methods and time to receive incoming materials	17.5	36.3	27.5	8.8	10.0	3.4250	1.1776
8	Improved the quality of incoming materials	14.6	29.3	41.5	7.3	7.3	3.3659	1.0601
9	Reduced defective rate and wastes	7.8	33.8	45.5	9.1	3.9	3.3247	.8950
10	Improved staff motivation	9.9	34.6	38.3	11.1	6.2	3.3086	1.0080
11	Improved employees relations	8.5	32.9	32.9	15.9	9.8	3.1463	1.1013
12	Improved the speed of goods delivery	8.8	27.5	40.0	16.3	7.5	3.1375	1.0403
13	Improved productivity	6.3	35.0	27.5	21.3	10.0	3.0625	1.1063
14	Improved suppliers' relations	7.5	28.8	33.8	18.8	11.3	3.0250	1.1063
15	Maintained / gained market share	7.6	30.4	30.4	16.5	15.2	2.9873	1.1821
16	Improved process design	14.1	25.6	23.1	15.4	21.8	2.9487	1.3666
17	Reduced costs	2.5	20.3	50.6	15.2	11.4	2.8734	.9523
18	Improved profitability	5.1	17.9	42.3	16.7	17.9	2.7564	1.1071
19	Improved product design	8.9	21.5	19.0	16.5	34.2	2.5443	1.3849
20	Increased exports	8.8	12.5	22.5	21.3	35.0	2.3875	1.3168

The scale is 5 = crucial effect, 4 = great effect, 3 = some effect, 2 = little effect, 1 = no effect.

Table 30 Comparison between ISO benefits in Saudi Arabia and other countries

Rank	Saudi Arabia	Turkey (1)	UK (2)	W. Australia (3)
1	Increase quality awareness	Increased quality awareness	Improving efficiency	Improved quality awareness
2	Improved the efficiency of the quality system	Standardisation of the company's quality system	Improving awareness of problems	Improved awareness of problems
3	Improved customer service	Increased sales/ exports	Better management control	Improved management control
4	Improved the quality of products	NA	Use ISO as promotional tool	Improve customer service
5	Improved inspection methods and time to produce finished goods	NA	Increasing customer satisfaction	Improved product and service quality

(1)Erel and Ghosh (1997), (2) Buttle (1997) and (3) Brown and Van der Wiele (1995)

Table 7.31 Satisfaction with ISO 9000 by size of firms (using Kruskal-Wallis test (One Way Anova)

No	Sizes of Firms No. of Employees	N	Mean	Kruskal-Wallis (one way Anova)			
				Mean Rank	Chi-square	df	Sig
1	1-100	17	4.2353	36.44	1.818	2	.403
2	101-300	33	4.3636	39.98			
3	301 or more	31	4.4196	44.58			

The scale is 5= very satisfied, 4= satisfied, 3= indifferent, 2= dissatisfied, and 1= very dissatisfied