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# **An Investigation of ISO 9000 Implementation Issues In Saudi Arabia Manufacturing Industry**

Abdullah Q. Albadran

2015

# **An Investigation of ISO 9000 Implementation Issues In Saudi Arabia Manufacturing Industry**

Abdullah Q. Albadran

A thesis submitted in partial fulfilment  
of the requirements of the University  
of Northumbria at Newcastle for the  
degree of Professional Doctorate

Research undertaken in the Faculty  
of Mechanical and Construction  
Engineering

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## **Abstract**

Since the introduction of ISO 9000 in 1987 there has been a tremendous growth in the number of companies seeking registration and certification, both in developed and developing countries. Although there is a wealth of literature on ISO 9000 implementation in developed countries and in some developing countries, it was found that there is relatively little materials related to recent study on the factors that influence ISO 9000 implementation in Saudi manufacturing industry. This topic has not received enough attention and certainly there is lack of these studies in the Middle East countries. Therefore, the aim of this research is to investigate, identify and analyse the factors that influence implementation of ISO 9000 in Saudi manufacturing industries.

Both questionnaires and pairwise comparison interviews were employed to achieve the study objectives. The questionnaire aimed to investigate the ISO 9000 implementation factors in Saudi manufacturing industry, while, pairwise comparison interviews aimed to rank the priorities of the most important factors. In terms of data analysis, a variety of analytical tools used to deal with qualitative/quantitative and objective/subjective nature of the study. The tools used includes multiple regression analysis, hypothesis testing and Analytical hierarchy process (AHP), Data analysis is contribution of this research to enhance a body of knowledge concerning ISO 9000 in relation to manufacturing organizations in Saudi Arabia. The findings revealed that top management support; work system and quality guidelines are the most important factors influencing the successful implementation of ISO 9000 in the manufacturing industry. Additionally, AHP result shows that Saudi manufacturing organisations should be aware of three main factors in order to successfully implement ISO 9000. These factors are; top management commitment, customer satisfaction and training and education. This research will fill the gaps in that the existing literature. Moreover, the result of the findings from this industrial survey is also applicable to some extend to ISO implementation in the other Arab countries.

**Keywords:** ISO 9000, Manufacturing, Saudi Arabia, Influences factors.

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## Declaration

I declare that the work contained in this thesis has not been submitted for any other award and that it is all my own work. I also confirm that this work fully acknowledges opinions, ideas and contributions from the work of others. The work was done in collaboration with the Farmer's Union Ltd, Wessex.

Any ethical clearance for the research presented in this thesis has been approved. Approval has been sought and granted by the University Ethics Committee on **March 2012**

**I declare that the Word Count of this Thesis is 34,094 words**

Name: Abdullah Qais Albadran

Signature:

Date:01-12-2015

## CHAPTER 1 : INTRODUCTION

---

### 1.1 Introduction

The globalisation of world markets together with the expansion of international trade and the rapid improvement in high quality products and services has brought high levels of market pressure across the world. In order to become efficient and competitive in today's business environment, the majority of organisations are being encouraged not only to change their old operational habits, but also to develop better ways to ensure that customers are satisfied with the quality of products and services. Many organisations have discovered that the key to customer satisfaction and competitive success lies in emphasizing and achieving product and service quality as a strategic weapon in performing business (Pulat, 1994; Krasachol and Guh, 2000; Lai et al., 2002; Reed et al., 1999). It is clear that quality has emerged as a strategic competitive tool for organisational success (Yong and Wilkinson, 2002). In today's business environment, organisations cannot afford to ignore the strategic implications of quality for a competitive position.

In the light of globalisation, various standardised methods such as Total Quality Management (TQM) principles and criteria for formation of quality policy, creation of international quality accreditation, notification and quality certification systems have been implemented in organisations to achieve quality products and services. In today's business environment the conformation to and application of standardised quality management system models such as International Organisation of Standards (ISO) 9000 and TQM are considered to be vitally important phenomena in total quality management development and globalisation (Dale et al., 2001; Ruzevicius et al., 2004).

ISO 9000 is one of the most influential initiatives that grew from the quality movement of the 1980s (Poksinska et al., 2002). It is one of the most frequently implemented

strategies concerning quality across the world (ISO, 2006). Moreover, ISO 9000 has become a subject of focus in many developing countries, including Saudi Arabia. Although this literature review offers many diverse opinions on ISO 9000 in different countries, little research has been carried out in Saudi Arabia concerning ISO implementation issues, such as the factors affecting ISO 9000 implementation and the problems associated with its implementation. As many aspects of implementation have been debated, this study attempts to highlight the factors that affect the implementation of ISO 9000 in Saudi manufacturing organisations.

The research is divided into six chapters. The first is an introduction to the research topic, the second is literature review, the third is the methodology used to gather information, the fourth is the research tools, the fifth is a discussion of the findings, and the final chapter is the conclusion and recommendation. The research starts from a literature review of the research topic, through which cited authors have been able to delineate the most important factors affecting ISO 9000 implementation. The methodology then progressed with a survey extended to 366 companies. The factors affecting the implementation of ISO 9000 in Saudi manufacturing industries are then analysed. This analysis provides an understanding of the factors having most influence on the ISO 9000 implementation progress.

## **1.2 Background of Study**

In the 1950s, manufacturers were able to sell nearly anything they produced, but the reliability of product quality and service became a significant matter once markets started to become more competitive. In an inflating number of industries, higher management acknowledged that quality was a major factor and a strong influence on business, affecting costs and customer satisfaction. During the 1980s and 1990s, there was a progressive move towards globalisation, and conventional ways of management and the scale of manufacturing were rapidly transformed through technological upgrades, specifically in the distribution of information, communications, deregulation

of markets, and competition. The world was transformed into an open global market, and senior management of organisations in many countries began striving to utilise various methods to maintain competitiveness. Attaining and sustaining a competitive edge is difficult but essential in such a dynamic market (Dory and Schier, 2002).

Organisations need continuous improvement in processes, products, and services through innovation of their business procedures, reduction in costs, and increase in productivity. To maintain competitiveness and in accordance with stakeholders' strategies, organisations evolved to require a management structure that aids continuous improvement in their procedures (Huarng, 1999). Numerous organisations began modifying their conventional business procedures from a production-oriented approach to a more competitive customer-oriented strategy. Customer satisfaction has become the core of business procedures. Quality management is one method that can be applied to connect the organisation's mission, vision, quality values, and operating principles to customer satisfaction. Oakland (2003) states that when senior management acknowledges quality management as a significant strategic matter it becomes apparent as an essential focus at all levels of the firm.

Various organisations have developed a philosophy to achieve customer satisfaction in order to reach the desired level of quality on the international platform. Management and quality control have emerged as strong and progressive aspects within industries and organisations (Magd et al., 2003). With the help of an effectively implemented quality management system (QMS) it is possible for organisations to ensure the required levels of quality throughout their development activities (Gotzamani and Tsiotras, 2001). A number of approaches have been presented to judge if organisations are implementing their quality programmes effectively and efficiently. The first approach takes into account the ISO 9000 series standards. The second concentrates on total quality management (TQM) aspects. Formal systems and standards are present in the ISO 9000 series of standards, which helps organisations to design, produce, and deliver quality products and services (Fuentes et al., 2000).

The International Organisation for Standardisation (ISO) sets the ISO 9000 standards. In order to do so, the ISO-satisfied regulatory and statutory requirements are measured by national standards bodies (Tsim et al., 2002). The standards relate to quality management developed to help organisations ensure customer and stakeholder satisfaction (Poksinska et al., 2002). Since its introduction in 1987, the particular ISO 9000 standards have obtained extensive approval and the number of organisations authorized for ISO 9001 continues to grow (Sabah, 2011). Developed countries have been using quality management for many years, but this idea has only recently become popular in developing countries (Al-Zamany et al., 2002).

Developing countries lack a real understanding of quality management procedures, which is why most fail when they are implemented (Wong, 1998). Therefore, it is essential to present a research report that could help more industries in developing countries, such as Saudi Arabia, to understand the concept of quality and overcome obstacles for implementing ISO 9000. In many countries, the manufacturing industry is a dynamic and significant productive sector. This manufacturing sector has been studied in many developing and developed countries, apart from Arab countries where there is a lack of research (Ramanathan, 2004). There are studies of the implementation experience of ISO 9000 standards in different countries, as each country has a different environment and thus different problems in implementation. It is therefore essential to study the implementation of ISO 9000 in Saudi manufacturing industries.

Saudi Arabia is one of the world's leading oil exporters and a member of the Organisation of the Petroleum Exporting Countries (OPEC). However, one of the main goals of the Saudi government is to diversify from oil and gas by developing its human capital. Therefore, manufacturing is their strategic choice to diversify the economy (NIS, 2011). Saudi manufacturing organisations are faced with competition in domestic



and international markets. Saudi Arabia's open door free-market policy has allowed giant multinational manufacturers from around the world to enter their market to satisfy the demand of Saudi consumers who have disposable income to spend. Thus, manufacturing industries in Saudi Arabia have had to become very competitive and complex. Saudi manufacturing organisations found themselves in competition with the high-quality output from countries like America and Japan. These competitive forces have encouraged Saudi organisations to implement ISO 9000 (Magd et al., 2003).

### **1.3 Significance of Study**

Saudi Arabia is a forward looking country, with investments in massive communication systems and is moving towards competition in international markets. Saudi Arabia is developing its manufacturing and service-oriented industries (Kadasah, 2000). Among these, industries include textiles, pharmaceuticals, construction, food, and chemicals. To compete in the open market economy, they need more than just state-of-the-art technology, so when attempting to make their businesses competitive companies need to consider implementation of quality management. Considering these factors, the importance of this study can be identified:

(1) There is a lack of research on the practice of quality management in Saudi Arabia.

This research is an attempt to fill some of the gaps in the literature and reduce doubts concerning the practices of quality management in organisations in Saudi Arabia by investigating the experience of ISO 9000 certified manufacturing corporations.

(2) There needs to be a basis for future ISO 9000 implementation research in Saudi Arabia and the Middle East since there is currently a lack of research in the field of quality management.

(3) Manufacturing organisations in Saudi Arabia play a progressive role in the economy, so research in this industry is significant.

(4) Many researchers mentioned that there is a lack of quality management research in

developing countries and Saudi Arabia (Ali, 1997; Al-Kahlifa and Aspinwall, 2000; Baidoun, 2004; Salaheldin, 2003; Zairi, 1996).

- (5) Findings in the literature on the subject of quality management implementation and its likely impact on manufacturers in Saudi Arabia are limited. The findings will attempt to recognise the factors that lead to the possible prevention of the implementation of quality management for manufacturers and decision-makers.

#### **1.4 Research Aim and Objectives**

The aim of this research is to investigate, identify, and analyse the motivation factors and barriers that influence implementation of ISO 9000 and to develop a framework to help in successfully implementing ISO 9000 standards in the Saudi manufacturing industries.

The objectives of the study are to:

1. Conduct a critical and comprehensive literature review on ISO 9000 implementation.
2. Identify factors that influence the adoption of ISO 9000 in Saudi manufacturing industries from the literature and the survey.
3. Determine the significance of these factors through a series of hypotheses using statistical test analysis.
4. Test the significance of the factors affecting the successful implementation of ISO 9000 standards (preparation, effort and auditing) using regression analysis.
5. Determine the subjective ranking of the factors based on Multi Criteria Decision Making (MCDM) by using Analytical Hierarchy Process (AHP).
6. Use evidence from primary and secondary data, interviews and questionnaires to establish a theoretical framework in order to analyse the influence of these factors in Saudi Arabia.
7. Make recommendations to improve the implementation of ISO 9000 in Saudi manufacturing industries.

## 1.5 Research Questions

The key research question is ***“What are the factors influencing the application of ISO 9000 standards in Saudi manufacturing industries?”***

This question leads to the following questions:

- (1) Is the decision-maker in the firm aware and informed about ISO 9000?
- (2) Is there any important statistical dissimilarity in the opinions of participants in the Saudi manufacturing companies about the aspects hindering their organisations from adopting the ISO 9000 standard?
- (3) How to eliminate or reduce the difficulties in Saudi manufacturing industries so they can successfully apply ISO 9000?

## 1.6 Methodology

This research was chosen in order to investigate the implementation issues of ISO 9000 in Saudi manufacturing industries. With the use of survey questionnaires, pairwise comparison interviews and published literature, this study used the combined quantitative and qualitative approach. This combined approach helped to achieve a three-stage approach. The three-stage survey was carried out using samples to investigate the answers to the research question, “What are the factors influencing the application of ISO 9000 standards in Saudi manufacturing industries”. The three-stage approach comprised:

1. An initial questionnaire was sent to participants to confirm **whether the common factors affecting the implementation of ISO 9000 which were selected from the literature are applicable to the Saudi manufacturing industries.**
2. A second questionnaire focused on finding the main hypotheses such as factors that may affect the implementation of the ISO standards and techniques to analyse the data.
3. The last stage used face-to-face pairwise comparison interviews.

## 1.7 Original contribution to knowledge

Conducting this study is significant in order to investigate and discuss factors that influence the implementation of ISO 9000 in Saudi manufacturing industries. The following points are contributions attained by this research study:

- Contribution to the field of ISO 9000: The study fills an existing gap in the research relating to the problems of ISO 9000 implementation in Saudi.
- Framework of ISO 9000 implementation: The study develops a framework to assist the Saudi manufacturing organisations in ISO 9000 implementation.

## 1.8 Layout of Study

As demonstrated in Figure 1.1 this research has been divided into six chapters:

**Chapter one** is the study's introduction. It includes an introduction to the research, comprising the aim and significance of the study, the research goals and objectives, research questions, and the overall layout of the report.

**Chapter two** is the literature review. It includes literature associated with quality management in general, specifically ISO 9000, as well as the formation of the conceptual structure of the study.

**Chapter three** is contains the methodology. It includes a review of the research philosophy, approach, and strategy, and the development and planning of the research questionnaire, the measures used in it and the data collection techniques. Moreover, there is an in-depth description of the research methodology used to achieve the research goals and objectives. This chapter also discusses the translation of the questionnaire, its format, and the pilot study. Finally, it includes a review of the validity and consistency of the research instruments, the method employed for managing the questionnaires, and the data analysis methods.

**Chapter four** is the data analysis and findings: It focuses on data analysis and the

research outcomes.

**Chapter five** is a discussion of the study's research findings. It reviews and analyses the research findings.

**Chapter six** is the conclusion and recommendations. It includes the conclusion and recommendations for further research, and additions to the existing body of knowledge.



**Figure 1.1** Thesis Layout

## CHAPTER 2 LITERATURE REVIEW

---

### 2.1 Chapter Introduction

As the worldwide quality revolution enters its fifth decade, demand by customers for products of progressively higher quality continues to accelerate (Desatnick, 1989). There has been a continuous increase in the number of countries which have implemented ISO 9000 as their national quality standard during the last two decades, as well as a continual rise in the number of companies within these countries who identified the ISO 9000 standard as a strategic management tool essential for effective control and best business practice (Farooqui and Ahmed 2009; Prajogo, 2009). Since its advent, ISO 9000 standards have become a common research topic within management journals. The literature review offers many diverse opinions on ISO 9000 in different countries but little research has been carried out in developing countries, such as the Kingdom of Saudi Arabia. Many researchers mentioned that there is a lack of quality management research in developing countries (Ali, 1997; Al-Kahlifa and Aspinwall, 2000; Baidoun, 2004; Salaheldin, 2003; Zairi, 1996).

This research aims to understand the salient features and issues of the subject. This chapter focuses on the issues related to ISO 9000 implementation. Moreover, the ISO 9000 world registration information presented in this section outlines the theoretical framework that guides the implementation. The objective of this chapter is to carry out a comprehensive and critical literature review of the implementation of ISO 9000. It aims to include necessary and relevant variables in the literature review and subject matter not previously considered by other researchers. Manufacturing organisations may be able to use this information to improve their operations and functions.

### 2.2 Introduction to Quality Management

In the contemporary world, businesses face challenges due to rapid changes in

economic and market environments. The business environment is subject to high levels of globalisation, competition, technological deregulation of markets and many other challenges and must survive in these competitive environments by catering to the needs and requirements of their customers (Baidoun, 2004). The 20<sup>th</sup> century has been called the century of productivity and it is expected that the 21<sup>st</sup> century will be the century of quality (Stewart and Waddell, 2003). The strategic competitive tool for organisational success is said to be quality (Yong and Wilkinson, 2002). Many organisations have developed a philosophy to achieve customer satisfaction in order to reach the desired level of quality on the international platform. Management and quality control have emerged as strong and progressing aspects within industries and organisations (Magd et al., 2003). With the help of effectively implemented quality management system (QMS) it is possible for organisations to ensure the required levels of quality throughout their development activities (Gotzamani and Tsiotras, 2001). Two programmes have been introduced to judge if organisations are implementing their quality programmes effectively and efficiently. The first programme takes account of the ISO 9000 series standards and the second concentrates on the TQM aspects. Formal systems and standards are present for the ISO 9000 series of standards, which helps organisations to design, produce, and deliver quality products and services (Fuentes et al., 2000). The concept of TQM has gained prominence since organisations and industries are striving to maintain their quality levels and be competitive in the constantly changing world markets (Eom and Stough, 1995; Sureshchandar et al., 2001). They believe that TQM activities will help them to gain a competitive advantage in world markets (Chan and Quazi, 2002; Nilsson et al., 2001). Developed nations have been using TQM for many years, but this idea has only recently become popular in developing nations (Al-Zamany et al., 2002). Developing nations lack a real understanding of quality management procedures, which is why most fail when they are implemented (Wong, 1998). Therefore, it is essential to present a research report that could help countries such as Saudi Arabia (classified as developing country) to understand the concept of quality and overcome obstacles for

implementing the ISO 9000.

### **2.3 Quality Concepts and Definitions**

Various interpretations of the concept of quality are present in literature, and although a commonly used term, it is difficult to state its exact meaning. In relation to business, it is about satisfying the expectations of the customer. It is difficult to state one specific definition that covers all contexts as each customer has their own opinion or interpretation of product or service quality. Quality is easy to visualise but difficult to define say Galloway and Ho, (1996). Several scholars have presented the concept of quality in literature, Juran (1974) believes it is focused on the perspective of the customer and is about fitness for use. The customer is the one who decides which goods or service to purchase so it is up to them to state the level of quality they find acceptable. The product or service needs to satisfy the needs and requirements of each customer, and only then do they purchase. When these requirements and needs are met, the desired level of quality is achieved (Juran, 1993). Crosby believes that quality is the conformance to specifications where the focus is on the service provider. His definition requires that customer requirements and specifications are correctly represented (Crosby, 1996). The quality of the product is based on its ability to achieve those characteristics that conform to the requirements of the potential user. An organisation promises a level of quality to its customers and is obliged to deliver this quality (Crosby, 1996). They must state an Acceptable Quality Level (AQL) to manage quality and provide an objective quality measure with a standard of zero defects. If they do not meet this standard, the quality is not up to the mark. However, this method does not take into account the preferences of customers. Juran believes that Crosby's definition is unfit since a product may conform to all standards but might still be unfit for customer requirements. Feigenbaum (1991) suggests that quality must emphasise the requirements of the customer. He believes that achieving a complete product that meets service characteristics through engineering manufacture, marketing, and



maintenance, based on the requirements and expectations of the customer. Many departments in an organisation are responsible for implementing quality standards, including finance, marketing, research and development, purchasing, and several others (Feigenbaum, 1991). Therefore, it is essential for integrating all activities carried out by these departments to ensure they manage the process efficiently. The objective of any organisation is to achieve customer satisfaction therefore, they develop and design products and services in an economical manner with quality control that satisfies customers, and targets present and potential customers (Deming, 1986).

Deming, like Juran, believes that quality must be based on the requirements of the customer, must be relative and change according to their requirements and needs. Deming presents eight dimensions of quality that include the viewpoints of consumers, these are, reliability, conformance, serviceability, perceived quality, aesthetics, durability features and performance. Organisations are required to understand which one of these dimensions is important for customer satisfaction and then fulfil this dimension within their product or service. Scholars of the modern world present similar ideas as previous scholars regarding the concept of quality and believe that the concept must integrate the needs of consumers. Bregman and Klesfsjo (1994) are modern scholars who state that the actual quality of the product must meet the expectations and needs of customers. Several ambiguities are present in the definitions but the definition by Oakland (2003) overcomes these uncertainties. He states that meeting customer requirements such as reliability, availability, delivery, cost efficiency, maintainability and many others, should be the focus of organisations. Juran and Oakland both believe that quality must focus on the requirements and perceptions of customers. Harry (2000) defines quality as a state where the value is embedded within each aspect of the product or business relationship for customer satisfaction. BS EN ISO 8402 (1995) states quality as the totality of the characteristics or features, which are present within a product or service having the ability to fulfil all implied needs and satisfaction levels. These definitions are similar to those presented by previous

scholars in that they agree organisations should focus on the customer, and that the features or characteristics of the services or products should fulfil the needs and requirements of customers. Presented are definitions in order to explain the concept of quality as described in the literature. The concept is multidimensional but has customer satisfaction at its core. It is only Crosby who believes that the focus should be on the manufacturing of the product, and if a customer were presented with a quality product or service that meets requirements, they would be satisfied.

## **2.4 Quality Philosophy**

The trading of commodities is complex in the modern world, mainly due to differences in culture, the greater distances, and obstacles to implementing the standards present in each individual nation making the exchange of goods and services a difficult and tedious task. Competition in global markets is high and increasing, so producers need to guarantee the quality of their product or service. Successful implementation of the quality management system is only possible if organisations understand the quality philosophy. There are several concepts and processes that organisations must understand and implement as part of a successful quality management programme; these include the quality management systems, quality assurance, total quality management, continuous improvement, and quality improvement (Kruger, 2001). Juran (1989) notes that strong quality performance infrastructure provides quality improvement. According to Juran and Gryna (1988), in the initial stages of the process, organisations are required to present a quality policy to guide managerial activities. Senior management are responsible for presenting this quality policy. They form committees to present quality management agendas and must communicate and coordinate with the workforce during the implementation phase (Juran, 1989). Feigenbaum (1991) presents a fundamental philosophy for quality achievement that states that processes must be thoroughly analysed and managed during the production

phase or when service delivery takes place, and should be avoided at the time of the inspection. He describes three activities to take into account:

1. **New Design Control:** During this activity, all production processes or services are carried out to meet the specific requirements of customers.
2. **Purchasing Control:** If the quality control process of the suppliers is carried out, the specific requirements may be met efficiently.
3. **Product Control:** The production and services documents must conform to specific requirements (Feigenbaum, 1991).

From the initial stages of the design process until the manufacturing stages, the functions and activities associated with the products must satisfy customer needs and requirements (Feigenbaum, 1991). Each department in the organisation, including customer service, marketing, manufacturing, and research and development is affected by this philosophy (Mills, Dye and Mills, 2009). Customers are certain about their requirements and if the philosophy is applied at each stage of the process, it is possible to meet them.

Senior management must take into account the needs of customers, employees and suppliers, and when their requirements are met, organisations should be able to provide solutions to their problems (Sun et al., 2000).

## **2.5 ISO 9000 Standards**

International competition has increased in the world, which is why the application of quality systems and standards such as the ISO 9000 series is important (Najmi and Kehoe, 2000). ISO 9000 offers the first international standards developed from the British (BS 5750) and Military standards. The ISO was established in Geneva in 1947 (West et al., 2000). The acronym is a short form of a Greek word "isos" that means equal (Levitt, 2005). ISO 9000 is normally used to refer to an ISO 9000 registration programme that is actually a collection of general standards in the management

systems. These standards are beneficial in dealing with a company's quality systems (Briscoe et al., 2005). The ISO 9000, as a management system standard, provides entities with the working mechanism that helps them to develop and follow their own quality systems.

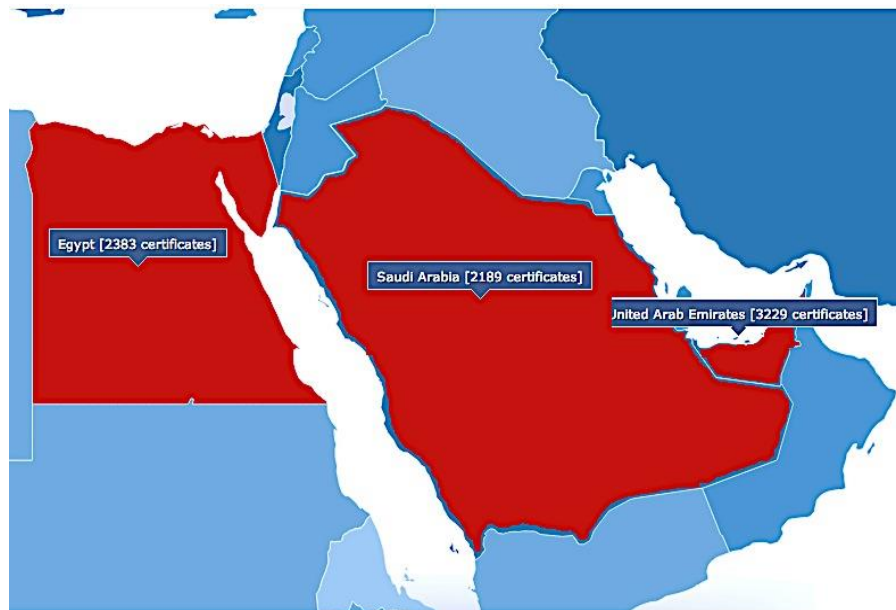
The very first family of standards were issued in 1987 and these standards were not applicable to products but to the management systems. The Quality Management System (QMS) to which these standards were applicable included entities for profit, not for profit, academia, government, etc. (Sousa Poza et al., 2009). The set of ISO 9000 standards which was proposed in 1987 consisted of five standards, namely ISO 9000, 9001, 9002, 9003 and 9004. Of these five standards, ISO 9000 and 9004 served as plans for the development of quality systems in organisations, whereas the other three standards, namely ISO 9001, 9002 and 9003, served as the conformance standards for quality assertion systems that deal with the supplier-customer relationship. These standards were termed as contractual standards and dealt only with the verification of the extent to which quality standards met the set standards of the entity instead of the standards of the overall management. Moreover, the selection of the standards was also based on the different requirements of the entity. The major drawback of the ISO 1987 was that it was not good enough for bringing about improvements in the business and lacked customer focus approaches at some points (Mead, 2011).

In a further development, a new series of ISO 9000 standards was introduced in 1994 which were termed ISO 9000:1994. This series also had ISO 9000, 9001, 9002, 9003 and 9004, but this series was concerned with preventive actions rather than keeping a check on the quality of the final product. However, they still had the feature of checking the conformance of procedures with the set standards. In 2000, an ISO 9000 revision was issued which contained ISO 9000 and 9004 standards and had ISO 9001, 9002 and 9003 in a combined version that was termed ISO 9001:2000. This series performed differently as compared to the earlier versions of ISO 9000 standards. It focused on the development of quality management systems instead of keeping a

check on the system to conform to the set standards. Moreover, it focused on customer satisfaction and the element of continuous improvement in the adopted quality assurance systems. When quality management standards became popular internationally, there was an outstanding rise in the number of certifications to ISO 9000 standards after the initial 9000 series was published in 1987 (Mead, 2011). The next section will discuss the world registration of ISO 9000.

## **2.6 ISO 9000 World Registration**

According to a survey that was published by ISO of Geneva (2013), there were 1,129,446 ISO 9001: 2000 certificates issued in 187 countries up to the end of December 2013. This was an increase of 32,459 (+3%) over 2012. The survey reported China as the leader of ISO 9001:2000 certificates at the close of 2013, followed by Italy, the UK, Japan, Spain, the USA, Germany, Australia, France, and the Republic of Korea. Since ISO 9000 is a globally accepted quality standard, it is gaining popularity in Saudi Arabia. The fact remains that, as in other developing countries, there were considerably less registrations to ISO 9000 in Saudi Arabia, compared to other industrial countries. In 1993, when ISO 9000 was initially implemented in Saudi Arabia, there were just ten registered organisations. The number of organisations rose to 30 in the subsequent year. As in other countries, this figure rose swiftly after that. According to the international survey of ISO 9000 (ISO, 2012), it can be seen that the number of certified organisations in Saudi Arabia increased to 2189. This can be compared to the UAE and Egypt, where there are 3229 and 2383 certifications, respectively as shown in figure 2.1. This data could indicate either a lack of interest in the implementation of ISO 9000 or could indicate other obstacles.



**Figure 2.1** Number of ISO certifications in Saudi Arabia, UAE and Egypt.

The following section will address the issues of ISO 9000 implementation factors in Saudi Arabia and other developing countries.

### **2.7 ISO 9000 in the developing countries**

Most existing research has been carried out in developed countries. The developing countries have been trying to apply ISO 9000 for a long time so that they can participate in local and foreign markets. The past two decades have seen a consistent rise in the number of developing countries which use ISO 9000 as a national quality standard. Within these countries, the number of organisations using the ISO 9000 standard for effective regulation and implementation of best business practice has also increased. The extent of ISO 9000 registration in developing countries is an indicator of their industrial and technological standing. When a developing country's industrial and technological standards are high, its industries are more interested in the effectiveness of their operations and the quality mechanisms of their factories. The Developing Country Committee (DEVCO), formed by ISO in 1961, is a committee within ISO created to assist developing countries in standardising products and associated tasks, such as quality management and the adoption of ISO 9000. The objective of DEVCO is

to assist developing countries by offering them help with the most important measures they need to overcome standardisation issues. However, developing countries still face the burden of development and growth, though they do not have the infrastructure for standardisation, as well as for other industrial domains.

In developing countries, few companies are certified to ISO 9000 by comparison to developed countries. Efforts are being made by developing countries to apply ISO 9000 on a wider basis, in order to gain entry into significant markets in Europe and North America, however, these countries still require reliable infrastructure for ISO 9000 registration (Lal, 1996). With respect to registration bodies, there are national bodies in these countries that are not recognised at the international level, and in several instances they are not certified to ISO standards. Hence, companies in these countries depend on foreign agencies, which are more credible and reliable at the international level. Kadasah (2000) claimed that it is likely that this mechanism will not be effective, as it has restricted use; it is not being employed in any Arab countries, including Saudi Arabia. Furthermore, developing countries still depend on the developed countries for obtaining training and certification for their assessors. This is what happened at the Saudi Arabian Standards Organization (SASO), which obtains certification for its auditors through the Institute of Quality Assurance (IQA) in the UK. The ISO 9000 training agencies in developing countries also depend on developed countries for access to personnel and materials. Based on the dependence for access to personnel and materials, and because of inadequate research in this field, there is a need to carry out this study so that implementation problems and misunderstandings regarding ISO 9000 can be understood and explained.

The information obtained from studies carried out in developing countries forms the basis of the author's future vision. Ramanathan (2004) stated that in several countries the manufacturing sector holds a significant and dynamic position, and anything that endangers the manufacturing sector may have a disproportionate impact on the entire economy. This is why several studies have examined the industrial sector in several

countries, both developed and developing; however, Arab countries have not been studied extensively. Earlier studies received the support of Al-Mijrab (2010), who stated that even though there is substantial literature on ISO 9000, very few studies have concentrated on the issues and challenges of ISO 9000, especially with respect to Arab countries. There has been progress in implementing ISO 9000 standards in the Middle East, with several companies in Kuwait, the United Arab Emirates, Qatar, Lebanon, Oman and the Kingdom of Saudi Arabia incorporating these standards and obtaining certification.

According to Mezher and Ramadan (1998), there has been a dramatic alteration in the competitive environment and the way information and processes occur due to globalisation. Many companies, particularly those from developing countries, are becoming aware of the fact that they need to concentrate on the quality of their products and services if they wish to secure a competitive edge. An empirical examination was conducted by Amar and Zain (2002) to determine the obstructions faced by manufacturing corporations in applying quality systems. Eleven relevant barriers to the execution of quality mechanisms in Indonesia were found. These were identified in terms of the most problematic fields to local companies: management, human resources, the approach towards quality, culture, interdepartmental associations, materials, machines and equipment, quality related information, methods, finance, and training. The authors found that most of these aspects created obstructions for quality systems in other places; therefore, similar ways of dealing with these obstructions could be determined.

According to Ho (2002), companies have established that they can use quality products as a strategic tool for carrying out business across the globe. It is increasingly becoming essential to have standardised business procedures, so that competitive advantages can be obtained. The international standardisation organisation has introduced the quality management standard, which offers models to companies so that they can standardise their processes and easily transfer goods and services at the



international level. Aslanertik and Tabak (2006) claimed that companies are not just looking to become quality leaders by implementing quality management systems alone; rather, they are aware of the fact that for sustainable development, it is imperative to have leadership, efficient human resource management, and productive business integration with suppliers.

An empirical investigation on a sample of industrial organisations carried out in Egypt by Hesham and Magd (2007), aimed to investigate the application of ISO 9000 in Egypt by determining the critical factors for the successful application of the standards. The authors presented problems pertinent to the application of ISO standards and the important role that the management committee played in the successful application of ISO 9000. They also found the need to modify the organisation system to conform to ISO 9000. However, employees' resistance to applying standards was the most significant issue encountered. In addition, Hesham (2010) conducted a study based on the manufacturing sector in Egypt and suggested eleven possible factors that affect the implementation of ISO 9000. He asked members to rank the level to which each aspect had affected them. The rankings ranged from "very helpful" to "not helpful at all". By examining the results, it was clear that the most beneficial factors in successful implementation of ISO 9001:2000 are commitment from senior management, the dedication of the firm's internal auditor, a well-structured system of procedures, and assistance from the parent company or partner. In the Egyptian organisations that were analysed, it was found that they were motivated for certification to maintain their market share, reduce pressure from foreign competitors, make quality systems efficient, comply with customers, and meet government demands and requirements (Magd and Curry, 2003).

One of the greatest impediments faced in applying quality management successfully was inadequate higher management commitment. If there was a lack of participation by higher management in quality management activities, it was improbable that a company would successfully apply quality management. Companies that were seeking

to implement quality management should have a clear long-term vision, and an extensive plan for attaining effective quality management application. If the vision and plan statement are ineffective, quality management may not be adequately implemented. Government support was also recognised by several researchers as the most vital obstacle to successfully applying quality management. Shokshok (2011) offered similar results, finding that there was insufficient encouragement from the government for quality reforms, which had an adverse impact on the implementation of quality management in Libyan manufacturing organisations.

Arshida and Agil (2013) examined the critical success factors for application of quality management in the Libyan Iron and Steel Company in order to enhance performance and determine the main obstacles faced in applying quality management. To achieve the objectives of their study, questionnaire surveys and semi-structured interviews were carried out. The following critical success factors were determined: training and education, supplier quality management, empowerment of employees, vision and plan statement, recognition and reward, and customer focus. Three further obstacles to quality management implementation were identified: insufficient higher management commitment, lack of vision and plan statement, and insufficient government support. Furthermore, some impediments to the adoption of ISO 9000 in Libyan service and manufacturing industries were identified by Al-Mijrab (2010). In his study, semi-structured interviews were used for data collection. For the main study, 17 professional quality managers were chosen, belonging to 13 candidate organisations functioning in Libya. The author identified the following obstacles: awareness and training of ISO 9000, organisational culture, internal resistance, expertise, and cost of ISO certification and quality manuals.

A study in Yemen was conducted by Al-Zamany et al. (2002). The objective of their study was to determine the challenges and obstacles to quality management in Yemeni culture. Three key areas were found. The first involved problems with government, including the choice and evaluation of managers in public companies, and inadequate

governmental programmes for endorsing quality activities such as exist in other countries (India: Sterman et al., 1997; Singapore: Lee, 2000; Thailand: Krasachol et al., 1998; China: Chen, 1997; and Malaysia: Hamzah and Ho, 1994). Examples of these kinds of programmes included offering productive information and statistical data to bring about improvement, offering essential strategic evaluations for the companies so that they can review their own strategies, conducting research activities to carry out the tasks of public companies, and linking initiatives between companies and ministries to aid in improvement activities. The next area involved technical knowledge, which is insufficient in Yemeni companies. The study established that there was inadequate knowledge of new methods within organisations, and few skilled workers who can execute new strategies. This led to the establishment of training institutes for developing the workforce in skills like self-evaluation, process management, data collection and analysis, problem-solving, carrying out surveys and so on. The final area was highly significant and pertained to prevailing organisational practices associated with the attitudes of the personnel, identified by certain respondents as improper managerial practices. These three problem areas suggested that the key factors for successfully applying quality management in any company were government support, training and education, and organisational culture.

On the one hand, Twaissi (2008) discussed the adoption of quality management elements in Jordan. The key factors and barriers to successful implementation identified in his study included 11 factors and seven obstructions. The factors were: top management commitment, employee training, customer satisfaction and focus, quality communication and structure, policy and strategic planning, supplier relationship, quality measurement and benchmarking, organisational culture, social responsibility and continuous improvement. On the other hand, Sabah (2011) conducted a study in Iraq in order to discover the obstacles to and prevailing misunderstandings of ISO 9001 implementation by studying a sample of 50 companies in Baghdad. Nine key obstacles were identified as follows: commitment of higher management, resistance shown by

employees, challenges of carrying out internal audits, lack of consulting boards, impractical ISO 9001 requirements, lack of financial resources, insufficient human resources, inadequate employee training, and lack of knowledge of quality initiatives.

Furthermore, an effort was made by Magd and Nabulsi (2007) to examine the problems linked to the certification of ISO in the Middle East in general and in the United Arab Emirates (UAE) in particular. The underlying theme of this research was the feedback gained from 51 certified companies in the UAE, corresponding to 5% of all certified corporations. There were 2422 certified companies in the UAE at that time. The authors took the view that it was difficult to apply ISO 9000 because the standards described typical requirements for quality management systems that led to further issues in recognising the benefits and drawbacks of the standards. They also asserted that, for certified companies in the UAE, the internal advantages of ISO were greater than the external advantages. Furthermore, according to Zaramdini (2007), UAE organisations were motivated to seek ISO 9000 certification for several reasons including: to reduce rejections, incidents or complaints, improve procedures and processes, improve efficiency and productivity, improve relationships with stakeholders, implement total quality management, reduce customer pressure, enter new markets, maintain or increase market share, and to be used as a marketing or promotional tool. Hence, it was found that organisations attained ISO 9000 certification to achieve the maximum benefits that helped achieve quality standards, increase awareness, improve documentation, meet customer satisfaction, increase market share and give them a strong competitive advantage.

Another study completed in the Arab countries was carried out in Kuwait by Aldowaisan and Youssef (2006). They indicated that training, availability of resources, improved documentation systems, sufficient time, and the implementation framework were common factors affecting ISO 9000 implementation. Moreover, Al-Khalifa and Aspinwall (2000) identified some of the factors affecting the implementation of quality systems within Qatari industry. These factors were: resistance to culture change,

limited resources to implement change, insufficient expertise, lack of knowledge and skills among leading management, staff in unsuitable positions and promotions based on nationality rather than on qualifications, and difficulties associated with empowerment at lower employee levels, as well as lack of time, and lack of information, education and training. Furthermore, Ashrafi (2008) conducted a study based in Oman, finding several difficulties with implementation of the ISO standard: the time required to write the manuals, the time to complete the whole process, lack of guidance within the organisation, the difficulties of changing company culture, the stress created by ISO implementation, the vagueness of the standard, the high cost of certification, and the narrow focus of the standard.

In addition, studies conducted among Arab countries showed that they do share similar circumstances. Hence, those studies might reflect some of the obstacles that effect Saudi manufacturing industries. The ISO certification achieved by many of the Saudi organisations helps them gain markets, improve product and service quality, improve quality systems, reduce operational waste, meet customer requirements, meet contractual requirements and to use the quality management tool as a development programme (Magd, Kadash and Curry, 2003). Likewise, Mezher and Ramadan (1999) stated that the main reasons for the adoption of ISO 9000 in Saudi Arabian manufacturing organisations are quality improvement, efficiency, and competitiveness. Furthermore, Magd (2005) carried out a study on ISO-certified corporations in Saudi Arabia in which the three most significant advantages obtained from the implementation of ISO standards were ascertained: greater quality process efficiency, improved reporting of procedures, and greater recognition of the importance of quality within the organisation. Moreover, Hesham and Magd (2006) suggested three major advantages of applying ISO 9000 in Saudi Arabia: more efficient quality systems, improved reporting systems, and greater awareness of the importance of quality within organisations. On the other hand, both authors also found that the major issue encountered by manufacturing companies with respect to registration in Saudi Arabia

was the high cost of registration and auditing procedures. Accordingly, ISO 9000 can assist as a means to attain efficiency and assist as the basis for quality administration, rather than develop the quality of products. In Saudi Arabia, a registration agency was essentially chosen on the basis of reputation and impression, relevant experience, and the ease of carrying out audit processes (Kadasah, 2000). There was generally a high degree of satisfaction with registration agencies in Saudi Arabia, and a minimal degree of disappointment.

## **2.8 ISO 9000 implementation in Saudi Arabia**

Mezher and Ramadan (1999) conducted a study on manufacturing companies in Saudi Arabia that hold ISO 9000 certification in which they identified the challenges encountered during the process of certification. Eight key issues were identified: high costs, the length of time required to complete the process, time required to document manuals, altering company processes to comply with ISO 9000 standards, not getting any free advice, problems with understanding the standard, ambiguous standards, and the restricted focus of the standard. In another study, Kadash (2000) found the following important factors that aid in ISO 9000 application in Saudi Arabia: commitment of higher management to the goal, a well-organised process system, and the useful feedback from internal auditors. In addition, the key issues linked to the application of standards were the need to alter existing systems, hesitation shown by employees with respect to bringing about change, and lack of comprehension with respect to ISO standards shown by all departments. With respect to the manual, the major problem reported was the presence of an administrative burden which was particularly noticeable, causing lower flexibility.

Through this literature review, various perspectives on the advantages, misunderstandings, drawbacks and obstacles regarding the adoption and implementation of ISO 9000 standards have been obtained. There have been three studies in Saudi Arabia and those studies seemed to be the most relevant studies to

this research. The first study, by Kadash (2000), investigated some of the issues regarding the implementation of the quality system elements in Saudi manufacturing industries. Kadash's study covered the motivation for registration, the cost of ISO registration, training programmes adopted, ISO documentation, quality manuals, registration agencies, ISO benefits, and formal auditing.

The second study by Magd, Kadash and Curry (2003) empirically evaluated ISO 9000 implementation in the Saudi manufacturing organisations. Their study covered the benefits of ISO 9000 in the Saudi manufacturing organisations, the cost of the registration compared to the profit gained, and the level of satisfaction with the ISO certificate. The third study by Hesham and Magd (2006) evaluated the implementation of ISO 9000 in the Saudi manufacturing organisation. Hesham and Magd's study covered the benefits accomplished from ISO 9000 implementation, factors affecting the selection of the registration agency and the issues relating to the registration agencies in Saudi Arabia.

Having shown the need for further studies, the current study attempts to fill an important gap in the literature by further investigation. At present, there is pressure on the manufacturing and service industries from the Saudi government and the Ministry of Industry to achieve higher quality and to implement ISO 9000, so that domestic products and services can successfully compete with international products. Hence, a study of the factors that influence the adoption of ISO 9000 will aid in successful implementation of the standards.

## **2.9 ISO 9000 Implementation Factors**

This section deals with the factors that affect the outcomes of the implementation of ISO 9000 from a global perspective. These factors are termed as the enablers (Baidoun, 2004). These factors determine the success rate of the implementation of the management system by fulfilling the corporate objectives and are termed "variables" that are the means to attainment of the final goal of the quality management system

(Najeh et al., 2004). This section will also present the factors that organisations identify as crucial before and while implementing ISO 9000. To understand these factors completely, the researcher refers to the literature available on this subject and will examine the work-studies to understand the issues faced during implementation. The idea of the literature studied is summarized and has been presented in Table.2.1 Companies faced common factors which have impacted the performance of their ISO 9000 implementations. Table.2.1 clearly illustrates these factors along with the effects they have on the organisation. This information could be helpful for researchers in conducting further studies in this regard and also helpful for other organisations that are implementing ISO 9000 standards. However, the following table shows the common factors in different organisations.



**Table 2.1 ISO 9000 Implementation Factors**

	Absence of quality guidelines	Unwillingness to change organizational culture	Inflating the size of documents	Unwillingness to change work systems	Weak interdepartmental relations	Ignorance of ISO importance	Insufficient knowledge in quality	Insufficient employee training	Insufficient human resources	Shortage of financial resources	ISO requirements are unrealistic	Absence of consulting boards	Difficulty of internal audits	Employee resistance	Top management commitment
Gader et al. (2009)					x			x	x	x	x			x	
Psomas et al. (2010)													x		
Wahid and Corner (2009)								x						x	
Han and Chen (2007)															
Ashrafi (2008)							x	x		x					
Sabah (2011)	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
Sampaio, Saraiva and Rodrigues (2009)	x						x								
Magd (2008)															
Hayat (2003)					x										
Hesham and Magd (2007)	x														
Al-Zamany, et al. (2002)							x		x						
Fuentes et al. (2000)							x	x							
AlKahlifa and Aspinwall (2000)							x	x	x						
Amar and Zain. (2002)	x							x							x
Lipovatz, et al. (1999)								x	x						
Sousa-Poza et al. (2009)												x			
Maersha (2007)										x					x

As evidenced by the chart, the ideas of quality built into ISO standards demand that employees and managers within a company work mutually to recognise and find out the quality issues, as identified by Dory and Schier (2002). Moreover, implementation of ISO 9000 can be affected by many factors both inside and outside an organisation. Thus, the factors affecting the implementation of ISO 9000 will be discussed in the following sections.

### **2.9.1 Ignorance of ISO Importance**

To guarantee their employees fully comprehend and undertake the ISO 9000 standards together with its obligations is the most difficult challenge to surface after implementation of QMS (Tang and Kam, 1999). Since senior management were unable to comprehend the requirements of the ISO standards and its implementation procedure, some companies were unable to acquire the certificate. In addition, Al-Zamany, Hoddell and Savage (2002) and Ashrafi (2008) stated that due to inadequate knowledge of QMS in developing countries, the implementation of quality programmes has been futile. Withers and Ebrahimpur (2001) stated "11 diverse European countries encountered hurdles because they were unable to understand ISO 9000 standards and senior management were not fully involved". According to Zairi (1996), Arab governments and managers strongly believed that ISO 9000 brings overnight success and higher levels of competition, and that it was a single pillar of the quality management notion and a licence to practise. It was a significant element, but inadequate by itself, hence the need for all Arab countries to deal with their inadequate knowledge.

Research carried out by Ashrafi (2008); Curry and Kadasah (2002); Gaderet al. (2009) and Mersha (2007), confirmed that European countries, together with Arabic and Asian companies, all fail to correctly interpret ISO standards (Al-Khalifa and Aspinwall, 2000; Beskese and Cebeci, 2001; Carlsson and Carlsson, 1996; Chu and Wang, 2001; Dale, 1999; Erdal and Ghosh, 1997; Lee et al., 1999; Mo and Chan, 1997; Quazi and Padibjo, 1998; Yahya and Goh, 2001). It is evident, therefore, that senior management should possess adequate knowledge of the purpose of the standards, and the way they exercise its requirements, the means to measure its business impact and the fields that may be beneficial. Inadequate knowledge of the standards in all departments was the third major obstacle in implementing ISO 9001:2000 in the manufacturing division in Egypt, as suggested in research by Magd (2008). The ranking of hurdles varies among researchers, but the most common hurdle in Egypt was in accordance with that found

in prior research, for instance, that of Bayraktar and Beskese (2001); Calisiret al. (2001); Dahlgard and Antoni (2002); Fuentes et al. (2000); Yahya and Goh (2001).

### **2.9.2 Top Management Commitment**

Top management commitment influences successful quality management. They have to take responsibility for the goods and services offered and initiate the implementation and stimulation of the quality management strategy. In the application of quality management research carried out by Ahire et al. (1996), Antony et al. (2002), Bayazit (2003), Conca et al. (2004), Saraph et al. (1989), Tamimi (1998), Tsang and Antony (2001), and Yousef and Aspinwall (1999), the most significant factors were identified as senior management's responsibility for offering dedication, leadership, and suitable cooperation in the technical and human processes. All employees should own quality; it should be built into the manufacturing process through protocols and procedures. Quality should begin at senior levels and trickle down to lower levels of management, but it is also possible for it to emerge from the bottom in the form of talks, and then advance to the top. Where senior management are dedicated to the implementation of periodic quality management procedures together with commitment to application and maintenance, efficient quality management implementation exists.

In order that management and leadership emerges at all stages it is necessary that leaders modify the company theoretically as well as structurally and are not merely occupied in everyday management. Amar and Zain (2002) assessed an Indonesian manufacturing company and found that the most important hurdle to implementation of ISO 9000 is ineffective senior management dedication to the standard. In Australia, New Zealand, and New Jersey companies, the prominent reason for unsuccessful implementation of the QMS is ineffective dedication from senior management, and the most detrimental obstacle to achieving certification is ineffective leader support, as emphasised by Samson (1997) and Srinidhi (1998) and as cited in Olsen (1994) and by Dzus and Sykes (1993); Kwai-Sang, Poon and Kit-Fai (2000); Stebbing (1993); and

Quazi, Hong and Meng (2002). Therefore, it can be concluded that top management commitment is one of the most important factors influencing ISO 9000 implementation.

### **2.9.3 Insufficient Knowledge of the Quality Programme**

Crosby (1996) explains the term quality awareness as a condition in which people are aware of what is happening in their surroundings. According to Kwai-Sang, Poon and Kit-Fai (2000) awareness is termed as the employee's realisation of a company's strategy related to quality and quality maintenance and the ISO standards. Thus, the objective of awareness is to ensure everyone is working for a firm whose goal is to maintain quality. In Yemeni organisations, the insufficient knowledge factors observed were: a lack of knowledge, education, learning, and training workshops related to the problems of quality. This lack of knowledge impedes quality implementation. These organisations are also unaware of the significance of quality work required to compete in the global market (Al-Zamany, Hoddell and Savage, 2002). As Crosby notes, it is because of inaccurate management that quality issues are raised; otherwise, quality issues do not have any separate existence. Balzarova, Bamber and McCambridge (2002), Hayat (2003), Sharp et al. (2003) and Taylor (1995) all describe the procedure of certification being obstructed by the dearth of awareness. In conclusion, the condition of awareness could be a result of making quality knowledge sufficient.

### **2.9.4 Employee Resistance**

In a survey of organisations in Singapore, Calingo et al. (1995) and Quazi and Padibjo (1998) recognised that resistance to change was the most difficult barrier in the application of the ISO 9000 standards. According to Fuentes et al. (2000), middle management resists change when they observe that their power over employees and decision-making is in danger while assigning new tasks and duties. According to Al-Zamany, Hoddell and Savage (2002), in order to sustain improvement, organisations have to change their perspectives and practices by engaging senior management. The adoption of western models of quality management systems in Yemeni organisations

may cause resistance by employees. These models are based on the values of European culture, which is why they cause cultural problems in these companies.

According to the research of Tsim, Yeung and Leung (2002) and Moser and Bailey (1997), application of the standards of ISO 9000 usually results in employee resistance as its application increases their workload, specifically documentation. The system requires a written record of all actions taken at all steps of operations. Many employees who have been working to old patterns for a long time do not like to accept new working patterns, because they are less interested in learning the new skills required to accomplish new tasks, so they resist the changes. Employees' resistance to change is one of the most difficult hurdles to overcome, more often, the changes in organisations result in misunderstanding and resistance from employees, which makes the advancement in a company hard and sometimes unsuccessful (Folger and Skarlicki, 1999). Lipovatz, Stenos and Vakas (1999) identify the reasons for resistance by employees as their ignorant attitudes to new tasks and duties, different perceptions and doubtfulness, which is a barrier in Greek companies. The research of Liang Tan (1997) shares the views of Maital and Maltz (1980) and Salazer (1994) that employee resistance results in low productivity, less concern about the challenges and ethics, poor relationships and habits among managers and employees. Thus, employees' resistance is one of the cultural hindrances that prevent the application of the QMS.

### **2.9.5 Shortage Of Financial Resources**

White et al.(2009) and Ashrafi (2008) declare in their research that one of the important hurdles in the certification of the ISO 9000 is its cost, which increases expenses due to system maintenance. Customers have contrasting principles in respect of their behaviour on price versus certification. The major hurdles small-scale organisations face in implementing the ISO 9000 are related to technical costs or cultural conditions. Technical problems are associated with a dearth of resources, high application cost and unsatisfactory external guidance. The status of the organisation does not matter in cultural problems; it is often identical in all scales of organisations. Therefore,

organisations working on a small scale need to have more tactical and cost-effective plans for the application procedure (Mo and Chan, 1997).

According to Bell (1994), the application of the ISO 9000 system in small companies has not proved to be a good decision because its heavy costs and maintenance could ruin the business. This is a problem in both the non-US and US organisations too, according to Carlsson and Carlsson (1996) and Vloeberghs and Bellens (1996), who say that all the organisations are adversely affected by the cost of ISO 9000 documentation. This finding is hardly surprising, as ISO 9000 requires detailed documentation with regular updates regarding changes at every level of operations. Hence, the cost of documentation has adverse effects on the system, and presents a hurdle in the certification of the ISO 9000 system. Fuentes et al.(2000) say that in Spanish companies, one of the obstacles restricting the application of the standards of the ISO 9000 is the lack of financial resources required to pay for implementation and maintenance of the QMS. Research by Stevenson and Barnes (2001) declares that while introducing the QMS, many companies are confronted with the high cost of implementation in terms of time, training, and consultancy fees.

#### **2.9.6 Insufficient Human Resources**

Vloeberghs and Bellensn (1996) note that human resource management theorists and experts now focus on the new concept of quality management, and it is observed that many companies have started working on this concept as companies have been facing the issue of quality demonstration and application for a long time. According to the research of Vouzas (2007), issues faced by human resource management have their roots in quality ideology, and effective application and maintenance of the QMS requires the engagement and assurance of all employees. Wieleet al. (2001) say that human resource management is all about organising training programmes, developing the integration and coordination between heads and employees and providing information and recognition to employees related to the QMS.

Amar and Zain (2002) describe various studies that find human resource obstacles in the manufacturing companies of Indonesia, as demonstrated in the clauses of the standards of ISO 9001:2000. These clauses result in increased turnover at the level of management (clause 5.1), poor workers' skills, poor workers' education and increased turnover of employees (clause 6.2.1) and deficiency of training programmes and failure to accomplish training goals (clause 6.2.2.5). The studies of Al-Khalifa and Aspinwall (2000), Al-Zamany, Hoddell and Savage (2002), Amar and Zain (2002), Ashrafi (2008), Fuentes et al. (2000), Gaderet al. (2009), Lipovatz, Stenos and Vaka (1999), Quazi and Padibjo (1998), Sampaio, Saraiva and Rodrigues (2009), Wahid and Corner (2009), and Wieleet al. (2001) determine that scarce human resources, deficient knowledge of the system of ISO 9000, inappropriate engagement of and guidance from senior management, less awareness of quality systems and culture, deficient education and training, employees resistance towards change, lack of success in changing employees' viewpoints, and system documentation upgrades are obstacles that cause many problems in the application of ISO 9000.

### **2.9.7 Customer Satisfaction**

The researchers have agreed upon the realisation of the ISO 9000 certification for satisfying customers effectively. This theory is given by numerous researchers including Brown et al. (1998), Dale (1994), Magd and Curry (2003), Jones et al. (1997), Gotzamanis and Tsiotras (2002), and Padibjo and Quazi (1998). The fundamental concept of the new standard is to motivate organisations for effective utilisation and execution of their quality management system comprising of continual improvement, partnership relationships, customer satisfaction, and open communication with customers (Yeung, Leung and Tsim, 2002). The coherent and unswerving communication of mission objectives and statements refers to quality values, focus and expectations. This refers to the main criterion of the top management.

In accordance with the opinions of Oakland (2000), Zairi (1999) and Feigenbaum (2002), this type of high standard management concentrates on customer satisfaction,

needs and expectations along with the arrangement of procedures in order to fulfil these needs. As per the observations and analysis of Karapetrovic and Casadesus (2003), around 400 Spanish organisations are certified with the ISO 9001:2001, stressing the intricacy of evaluating customer satisfaction data which has become a tremendous matter faced by organisations. Lack of customers' responsiveness and feedback and the lack of alternatives for the customer are huge barriers in the implementation of ISO 9000 in product acceptance in the Syrian and Yemeni companies.

### **2.9.8 Absence of Consulting Agency**

One of the major restrictions to the effective application of the ISO 9001 is the lack of consulting boards (Sabah, 2011). A small-scale firm is required to appoint external consultants in the development of the implementation procedure after the formation of teams and management representatives for the execution of the ISO. While other organisations may be dependent on their own qualified employees for the accomplishment of this objective, smaller organisations must realise that hiring professional consultants will increase their productivity and guide them in the preparation and execution of the ISO 9000 standards, in accordance with the opinion of Yahya (2003). Moreover, the researcher Anwar (2010) observed the conditions of Libyan service and manufacturing industries, saying that the industry made the employment of external consultants with the objective of helping with the preparatory measures costly, while there were certain other alternatives accessible to them due to the lack of experienced local consultants. Moreover, the most significant factor, that of trust, is actually lacking in the Libyan consultants and so the organisations have to contact foreign agencies which are very expensive.

As per the opinion of Barnes and Stevenson (2001), consultants are helpful in only a particular sector of the certification process, or they can be appointed to take an organisation from the initial stages of the process to the final point. As per Arora (1996), a firm is required to evaluate the cost, experience and qualifications of the



consultant before hiring them. The organisations need to be fully aware of those consultants who structured a quality system for the satisfaction of their clients, but were actually making the problems more complex (Fox, 1994). The consultants hired should structure such a system that is appropriate for the normal routine of the organisation and this is dependent on the harmonisation and co-ordination between the consultants and the firm.

### **2.9.9 ISO 9000 Requirements Are Unrealistic**

The respondents of the research conducted in the service and manufacturing sectors of Iraq thought that the ISO 9001 requirements are unrealistic (Sabah, 2011). Sabah's findings were that this was due to certain reasons such as the sub-optimization of performance due to standards, quality investigated through inspection, the creation of bureaucracy by the standards which previously the organisation had worked effectively without, and that standards were reliant on people's interpretation of quality (Seddon, 1998).

### **2.9.10 Difficulty of Performing Internal Audits**

An internal audit is basically aimed to analyse and ensure that the company's quality systems meet the requirements of the quality standard which is being employed. Those carrying it out must have no direct relation with or responsibility for the audited activity. The reports must be presented to those concerned who have due authority to implement counteractive actions. The efficacy of these measures would also need to be verified through another audit. Bubshait and Al-Atiq (1999) declared that many companies rarely accept the ISO 9000 system and face real problems during implementation and after implementation. Researchers found almost seventy obstacles that prevent the application of the system. Some relate to the high cost of ISO 9000, specifically during the initial stages, as there are insufficient funds for quality experts and managers. In addition, there is ignorance about accepting new techniques, communication problems related to language barriers, irrelevant job locations, hardship

during implementation at irrelevant locations, management intervention, differences in culture among employees, and a decrease in productivity due to the increased workload while acquiring new skills in addition to routine work. Al-Zamany, Hoddell and Savage (2002) state that in Yemini organisations, there is a lack of trained employees to examine the organisation's procedures, to gather and analyse data, to come up with solutions and to apply the ISO 9000 system. In organisations in China, India and Mexico, Zhoa, Maheshwari and Zhang (1995) identify untrained employees causing problems in the application of the system and in research carried out by Sampaio, Saraiva and Rodrigues (2009), Ashrafi, (2008) and Dale (1994) it was found that the deficiency of quality experts is an obstacle to the application of ISO 9000.

### **2.9.11 Unwillingness to Change Work Systems**

The working environment changes and competition is at its peak, the market has every type of product to satisfy customer requirements, but the wide availability of a variety of products increases the expectations and demands of customers and they place more emphasis on quality. Therefore, companies that already offer customers a quality product become prominent in the market and beat off competitors (Gotzamani and Tsiotras, 2001). The system of motivation can be categorised into intangible and tangible approaches. Intangible approaches are referred to as techniques adopted by senior management in order to control the mental state of people for the purpose of encouraging and motivating them. Employees' fears, expectations, self-esteem, self-respect and pride are influenced by the techniques of intangible motivation. The tangible approach is the giving of feedback on employees' work and is associated with the response of a company to an employees' progress, accomplishments and attitudes, which they reward (Ellecker, 1998).

Low and Ling Pan (2004) say that in Singaporean companies lack of respect, appreciation and rewards in return for quality performance from employees are obstacles in the way of implementing the QMS system. Lee and Leung (1999) conducted a survey where they determined that improper and inappropriate

communication, complicated management techniques, improper relationships and a lack of motivation are major problems and obstacles in various companies. These hurdles can be categorised as people-oriented and related to human resource management and human relationships in the working environment. A lack of recognition and incompatible reward systems result in opposition to new quality systems and new management techniques, which are barriers to the application of the ISO 9000 (Macedo-Soares and Lucas, 1996; Ngai and Cheng, 1997).

### **2.9.12 Insufficient Employee Training**

Gaderet al. (2009) say there are many studies of human resource management and its training function that show these two elements as essential for the improvement in a company's performance and the effective application of the QMS, therefore, companies should consider these elements for adopting change. Newall and Dale (1990) and Zaramdini (2007), note employees' resistance is often generated because of deficient knowledge and inappropriate training, and ignorance of training and education is a significant barrier in the adoption and application of ISO 9000. Oakland (1996) says that organisations should arrange training programmes for their employees and examine the outcomes, because training is an essential element that improves quality. Lipovatz, Stenos and Vaka (1999) demonstrate that appropriate communication and training are two elements that have the capability to overcome people-oriented hindrances in the implementation process. They also say that providing management and employees with proper training is motivational, and saves time, whereas, inappropriate training and education causes deficient employees to dis-engage and acts as an obstacle in the application of the ISO 9000 system in Greek organisations.

Education and training are two factors that help companies in the change process and there should be informal and formal training and education programmes. Training and education should be considered as a continuous process that supports organisations to improve quality. Many western organisations arrange training programmes without considering the effect on quality, and instead of getting positive results they are not

successful in the application of the QMS. Brazilian companies also face problems due to lack of training, according to the research by Al-Khalifa and Aspinwall, (2000), Dickenson, Campbell and Azarov, (2000), Fuentes et al. (2000), Sharp et al. (2003) and Yahya and Goh (2001) who identify a dearth of proper training and education as the main reason for problems faced by companies in South America, Europe, North Africa, Arabia, Asia, Australia and New Zealand (Macedo-Soares and Lucas, 1996; Ngai and Cheng, 1997; Samson, 1997; Tang and Kam, 1999; Tayara, Nasser and Ghadban, 2000).

### **2.9.13 Weak Inter-Departmental Relations**

Another barrier identified by Wahid and Corner (2009) and Amar and Zain (2002) is that many organisations face problems because of lack of information about quality. The research of Najmi and Kehoe (2000) states the views of Brown et al. (1995), Dale and Cooper (1994), Goodman et al. (1994), Katz and Laza (1993), Tatikonda and Tatikonda (1996), Wheaton (1990) and Zangwill (1994). They determine that the major obstacle found in the application of ISO 9000 is the deficiency in the assimilation between current information systems and new quality information systems. Low and Ling Pan (2004) find inadequate transmission of information in Singaporean companies is a barrier to the application and perpetuation of the ISO 9001:2000. Additionally, the barrier of improper exchange of information was found in Spanish companies. Mersha (2007) identifies a dearth of knowledge, improper specification, improper tools, improper materials and a lack of motivation as a drawback, which prevents the maintenance of quality work.

In public companies in Yemeni, there is inadequate communication from top to bottom and vice versa, as observed by Al-Zamany, Hoddell and Savage (2002). This may be caused by the lack of trust between people, together with the obstacles that staff encounter when they have to talk or argue with their managers regarding quality. With reference to Swedish companies, Carlsson and Carlsson (1996) are of the opinion that although communication is significant in the implementation of a new QMS, it is not

managed well most of the time. Balzarova, Bamber and McCambridge (2002) cite Thiagrayanet et al. (2001) who suggest that useful communication comprises of maintaining interest, employees maximum participation, perceiving roles and duties in procedures and increasing individual's potential.

#### **2.9.14 Inflating Size of Documents**

The efficient application of a quality management system is often prevented by the element of time (Balzarova et al., 2004, p. 392). The research of Withers and Ebrahimpour (2001) discusses the studies of Atwater and Discenza (1993), Carlsson and Carlsson (1996), and Vloeberghs and Bellens (1996) and notes that the time required in the process of certification is not recorded by approximately 70% of US companies. Chu and Wang (2001) say that when managers have insufficient experience and there are no estimates of time then obstacles will occur. Therefore, time is a significant barrier to be overcome. There is little exact proof in the literature of the difficulties encountered in the implementation of ISO 9000, as offered by Mathews and Ueno (2001).

It is a slow process to understand how to overcome the organisational hurdles including the limited time available for preparations to initiate the ISO 9000. This is due to problems that get in the way of understanding system change. An outcome of this might be significant modifications that would enhance internal procedures (Lipovatz, Stenos and Vaka, 1999). Participants report insufficient time as the most important hurdle, which is the primary problem faced in Finland and is a valid reason in companies that self-assess (Mathews and Ueno, 2001). In the north west of England, Sharp et al. (2003) observed that the barrier to efficient implementation of ISO 9001:2000 was insufficient time allowed for the progress of ISO 9001:2000. To modify an entire organisation's systems in a limited time is not feasible, as it takes considerable time to spread innovative ways and to change duties and jobs (Bamber, 1998 cite in Balzarova, Bamber and McCambridge, 2002). It can take up to two years to acquire the certificate depending on the size of the company, the amount of

documentation, the conversion of production processes, and management dedication (Stevenson and Barnes, 2001).

### **2.9.15 Absence of Quality Guidelines**

The quality manual is the best way to present the QMS documentation. These manuals determine the quality goals and programmes and include the details of QMS processes with task-related commands, descriptions of interdependent procedures and the different written records. The cooperation and skills of employees have an influence on the preparation of documents in the quality management system (ISO/TC176/SC2, 2002). Research by Beskese and Cebeci (2001) discusses Turkish organisations that had difficulty handling the documentation process and recognising the need for standardisation in order to change the present system and culture. Organisations in Hong Kong and Brazil also faced these difficulties (Lee et al., 1999; Macedo-Soares and Lucas, 1996). According to Withers and Ebrahimpour (2001), improper and inaccurate documentation is an enormous hurdle in the application of quality management systems.

### **2.9.16 Unwillingness to Change Organisational Culture**

Oakland (2000) explains organisational culture as the philosophy that encompasses the organisation regarding the way they perform business, the way staff behave and the manner in which the company deals with them. It may be that the organisational culture includes behaviour derived from personal relations, customs ensuing from staff groups, leading morals assumed by the organisation, regulations, and the environment inside the organisation (Oakland, 2000). Research stresses the significance of culture explained in diverse ways and linked with communication. Culture acts as an umbrella that encompasses every element of social activities, and it can significantly affect behaviour, communication, associations, and other social boundaries. Culture cements an organisation together. The knowledge, belief, art, morals, laws, customs, habits and capabilities gained by staff in an organisation comprises its culture, as recognised by

Mauil, Brown and Cliffe (2001). Citing Vanisina (1990), they declare that the nature and culture of an organisation should be examined if it is going to implement an efficient quality management system, and if modification is required, it should be fixed within present structures, as to improve the required behaviours, culture change is essential.

Certain authors suggest that the organisational culture should be in accordance with the quality method or vice versa if the company is going to implement quality programmes. It is essential that this takes place in the early stages of implementation as the culture affects future reactions to quality proposals. This means that organisational culture affects quality from the idea of quality within the organisation (McNabb and Sepic, 1995 and Sinclair and Arthur, 1994 quoted in Corbett and Rastrick, 2000, p.17). According to Mallak, Bringelson, and Lyth (1997), for quality programmes like ISO 9000 it is important to modify old behaviours, attitudes and morals according to the organisation's required behaviour, but in the process many challenges have to be overcome. The deterring elements with respect to ISO 9000 quality management thinking are the shortage of quality awareness, bureaucracy, opposition to modification, and centralised decision-making.

## **2.10 Methodology Used to Uncover the Factors**

It has been noticed that many methods have been used in order to uncover the factors/barriers affecting the implementation of quality management standards. The comparison of the literature presented in Table 2.2 helped to select the appropriate methodology for this research, informing the research questions and pairwise comparison interviews questions.

Table 2.2 Some research methodologies used to uncover the factors			
Author	Country	Aim	Methodology and Data analysis
Al-Mijrab (2010)	Libya	Identify and analyse the difficulties that affect the implementation of ISO 9000	Interviews/Qualitative Template Analysis
Al-Madi (2005)	Jordan	To develop a framework to help in the identification of the impediments to the transition from ISO 9000 standard towards TQM	Questionnaire/ t-Test, ANOVA, Chi-square Factor Analysis, Multiple Regression
Calisir (2007)	Turkey	To determine the level of difficulties/obstacles associated with the implementation of ISO 9000	Questionnaire/Simple t- tests and multiple regression analysis
Sabah (2011)	Iraq	To examine the various barriers and misconceptions that impede ISO 9001 implementation	Questionnaire/Frequency test using the mean to find out the most important factor
Khanna and Sharma (2011)	India	To review critical success factors (CSFs) of total quality management (TQM), and to rank these	Questionnaire/Technique for Order Preference by Similarity to Ideal Solution (TOPSIS)
Abdullah et al. (2012)	Malaysia	To explore the main barriers of ISO 9000 implementation	Questionnaire/Frequency test using the mean to find out the most important factor

Various methods of collecting and analysing the data can be used in order to identify the factors affecting the implementation of ISO 9000 in Saudi manufacturing industries. Secondary and primary data collection methods can be used together and produce data. Secondary data collection will gather information from the public domain such as books, journals and reports while the primary data collection method uses questionnaires and interviews (Saunders et al., 2007). A mixture of both quantitative and qualitative data research methods was useful in this research, “the use of two or more data collection methods or independent sources of data within one study in order to ensure the synchronization among data and your thoughts” (Saunders et al., 2003). However, in order to determine the most appropriate methods of analysing the data there must be a critical review of the literature.

A statistical test (t-test) was performed by Calisir (2007) in order to find out which of his selected factors are significant. Moreover, t-tests were employed by Al-Madi (2005) to discover if any variation existed among the responses and to reveal the statistically significant differences. The t-test is a statistical method of testing hypotheses about the mean of a small sample drawn from a normally distributed population. Hypothesis



testing is a statistical methodology used to validate the accuracy of a statement, as per the empirical data (Fisher, 1925).

In addition, regression analyses were used by Calisir (2007) to test the hypotheses of his study, and to examine the relationships between the factors. Likewise, Al-Madi (2005) employed regression analysis in his study to predict the values of dependent variables (quality management progress) from the independent variables (top management commitment and support, organisational culture/climate, reward and recognition, training and education, employee empowerment and involvement, and infrastructure factors). However, regression analysis was proposed by Hair et al. (1998) who stated that regression analysis is a statistical method which could be utilized to analyse the relationship between a dependent and several independent variables, the core objective of regression analysis is to predict the single dependent value selected by the researcher by using the independent variables.

Furthermore, in order to rank the critical success factors of total quality management, Khanna and Sharma (2011) conducted research in India that used the Technique for Order Preference by Similarity to Ideal Solution (TOPSIS), which is one of the multi-criteria decision-making (MCDM) methods. The MCDM has proposed various methods, some of which are: Inner product of vectors, Analytic hierarchy process, Multi-attribute value theory, Multi-attribute utility theory, Multi-attribute global inference of quality, Goal programming, Data envelopment analysis, Dominance-based rough set approach, Aggregated indices randomization method, Non-structural fuzzy decision support system, Grey relational analysis, Evidential reasoning approach, and Superiority and inferiority ranking method (Chan and Tong, 2007, p.1539-1546). Picking the model that provides the best solution not only depends on the comfort and preference of the person who chooses it, but also on the conflict or problem presented. However, according to Taha and Daim (2013) Analytical Hierarchy Process (AHP) is easy to use and apply. Therefore, to clarify its features, the characteristics of TOPSIS and AHP are compared in Table 2.3.

Table 2.3 Comparison of characteristics between AHP and TOPSIS		
Characteristics	AHP	TOPSIS
1 Category	Cardinal information, information on attribute	Cardinal information, information on attribute
2 Core process	Pairwise comparison	The distances from PIS and NIS (cardinal absolute measurement)
3 Attribute	Given	Given
4 Weight elicitation	Pairwise comparison	Given
5 Consistency check	Provided	None
6 No. of attributes Accommodated	$7 \pm 2$ or hierarchical decomposition	Many more
7 No. of alternatives accommodated	$7 \pm 2$	Many more
8 Other	Compensatory operation	Compensatory operation

It can be seen that the major weaknesses of TOPSIS are in not providing for weight elicitation and consistency checking for judgments. However, AHPs provide the weight elicitation and consistency which help the decision-making to check if the data is consistent. From this viewpoint, AHP alleviates the requirement for paired comparisons. The AHP is an organised strategy for working with complicated choices. Rather than recommending a “correct” choice, the AHP helps the decision-makers find the one that best matches their needs. The AHP provides an extensive and logical structure for constructing a choice issue, for comprising and quantifying its components, for relating those components to overall objectives, and for analysing alternative solutions. It is used around the world in a wide range of choice circumstances, in areas such as education, business, and government (Saaty, 2008). Therefore, the conclusion of this section is that no one has ever used AHP methods in order to rank the priorities of the factors affecting the implementation of ISO 9000. Besides; no one has ever used a combination of t-test, regression analysis and AHP in their research investigating ISO 9000 implementation factors.

## **2.11 Chapter Summary**

In summary, this chapter has provided the reader with an overview of the factors affecting implementation of ISO 9000 from a range of different countries. A detailed analysis of the literature was carried out to acquire information about the factors/barriers in the application of the system of ISO 9000. Many obstacles that restrict the implementation of ISO 9000 in developing countries were discovered; these obstacles may also have an influence in Saudi manufacturing industries. The literature mentioned in this chapter fulfils the three purposes of this research. It also helped us with the information required to formulate the questionnaire, interview and research questions and supported us in the selection of a relevant research methodology. The researcher arguments relate to the selection of a qualitative/quantitative methodology, adoption of data gathering approaches and pairwise comparison interview techniques along with the data gathering and analysis is presented in the following chapter.

## **CHAPTER 3 : METHODOLOGY**

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### **3.1 Chapter Introduction**

The purpose of this chapter is to describe the comprehensive research design and how an approach was developed to investigate the research questions. The main aim of this section is to describe the research methodologies and review their policies. The motive behind this process is to improve and escalate the diverse suppositions, patterns and methods through which research is likely to be triggered. The research scholar gains significant knowledge regarding the strengths and flaws of the many views that exist, and he or she also develops the necessary learning to offset these flaws against the likely strengths in the research study. The section begins with an outline of the research methodology, along with the theoretical framework, together with a summary of the research design. A methodology of the research, including techniques of data acquisition and analysis, is presented. Finally, the researcher presents a methodology suitable for the research questions.

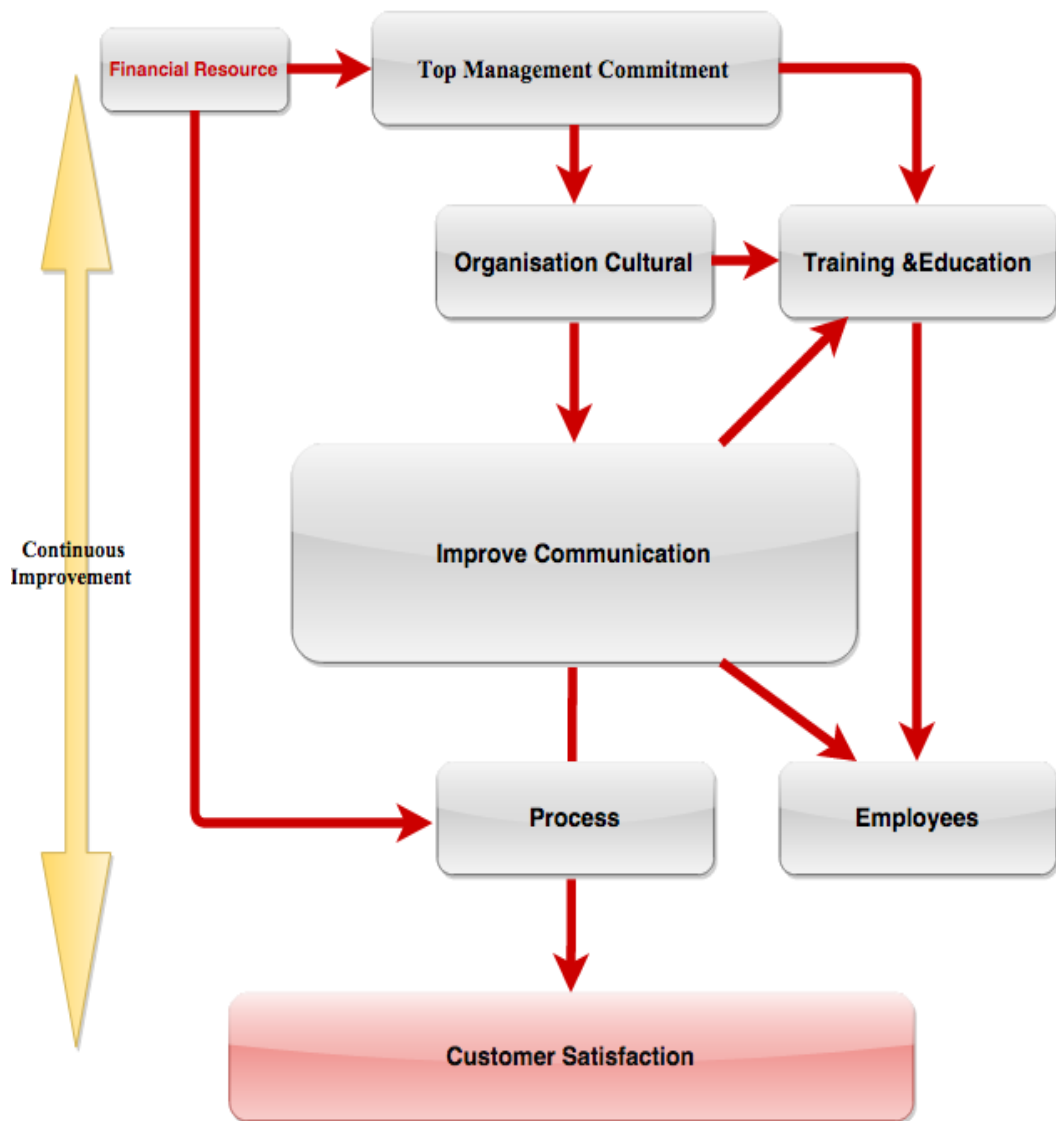
### **3.2 Methodology Outline**

The objective of this research was to determine a theoretical framework to assist in the recognition of factors that affect the implementation of ISO 9000 in the Saudi manufacturing sector. Certain characteristics associated with this aim have been derived from the literature reviews to attain the targets of our research. Sekaran (2003) describes a framework as an intangible representation of the way one conceives or makes sound associations between the many factors recognised as significant to the problem. This theory runs logically from the records of former studies in this area. Sekaran further emphasises that incorporating sound philosophies with available studies without overlooking the limitations and restrictions prevailing the situation is crucial in developing a systematic base for examining the research issue. The

framework of the factors affecting the implementation of ISO 9000 in the Saudi manufacturing industry will be discussed in the following section.

### **3.3 Theoretical Framework**

Yin (2003) offers the idea that the research question and targets should be devised and speculative schemes used that will assist in the formulation of an outline to coordinate and guide the data analysis. In order to form a speculative or descriptive structure the primary variables, components, ideas and problems in the research project should be recognised, together with the calculated or deduced associations amongst them (Miles and Huberman, 1994; Robson, 2002; Yin, 2003). The function of this is to outline the factors and/or obstacles that arose from the literature review, and to form them into a speculative framework, which paves the way to move forward in an appropriate direction. The aim of this framework is to recognise the important factors that affect the implementation of ISO 9000 in the Saudi manufacturing industry. The structure of the framework is put together because of the evaluation of related literature in the previous sections. The theoretical framework for this research is illustrated in Figure 3.1.



**Figure 3.1** Framework of the factors affecting the implementation of ISO 9000 in the Saudi manufacturing industry.

The proposed framework takes into account sixteen criteria. Education and training are essential components in the model which is coordinated towards organisation and administration. Administration drives the whole organisation's strategy by spreading awareness and changing the organisation's culture to understand the ISO 9000 standard. Moreover, financial resource is an important element in the model as this funds all the necessary training and consultation for the ISO 9000 implementation.

The communication criteria will link both employees and the top management together in order to improve the process of ISO 9000 implementation. Furthermore, the process is coordinated towards extreme consumer satisfaction. The customer feedback

empowers the drive towards continuous improvement, which is a fundamental and essential component of ISO 9000.

### **3.4 Research Design**

The research methodology is the processes and procedures followed in developing the research. Choosing the methodology entails identifying the need for the research, reviewing the related literature, developing the objectives and the research questions, and then identifying the appropriate strategies to answer these questions to satisfy the first objective of the study. The research methodology also includes the tools used for collecting, analysing and presenting the data. It depends on the overall aim and scope of the research, the scope of data, the research questions and the proposal, as well as the constraints of the research (Yin, 1994). This research was chosen in order to investigate the implementation issues of ISO 9000 in Saudi manufacturing industry. With the use of the survey questionnaires, pairwise comparison interviews and published literature, this study used the combined quantitative and qualitative approach of research. The reasons for this combination were the strengths and weaknesses of each viewpoint.

By using a combination of methodologies, strengths can be enhanced and weaknesses reduced. Diverse methods were used in the provision of data validation or the value of analysis in the “triangulation method”. Primary and secondary methods containing pairwise comparison interviews and questionnaires, along with expert judgments and literature reviews, were used to accomplish triangulation in this research study. Bryman (2004) recommended triangulation as a mixture of different techniques that are used to defeat shortcomings in particular methodologies. Therefore, the efficiency of research methodologies can be strengthened with the help of triangulation.

The quantitative and qualitative combined approach helped to achieve a three-stage approach. The first stage was triangulating the implementation factors that influenced the adoption of ISO 9000 from materials published in the literature; this is to satisfy the

second objective of this study, which was to identify factors that influence the adoption of ISO 9000 in the Saudi manufacturing industry. In order to achieve this, a questionnaire was conducted in Saudi manufacturing companies.

The questionnaire identified the common factors that affect ISO 9000 in Saudi Arabia and other countries and highlighted some of the special factors that only **applied** to the Saudi environment. After achieving the second objective a theoretical framework was established to analyse the factors that influence the adoption of ISO 9000 in Saudi Arabia. The second stage of this study was to develop a questionnaire that focused on the hypothesis and regression questions to find out the effect of these factors. This achieved the third and fourth objectives of this study: to determine the significance of these factors through a series of hypotheses using statistical test analysis and to test the significance of the factors on the successful implementation of the ISO 9000 standard (preparation, effort and auditing) using regression and t-test analysis.

The questionnaire took the shape of structured questions (closed-ended questions) for the most part, since they have several advantages over unstructured questions (open questions). Alreck and Settle (1995) mentioned that many researchers prefer structured questions in a survey design 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) agreed with Alreck and Settle (1995) in preferring the use of a structured questionnaire rather than an unstructured one. He claimed that structured questionnaires require little time, incur low costs, involve no extended writing, are easy to process, are easy for a comparison among variables, are easy when testing specific hypotheses and involve less training for interviewers.

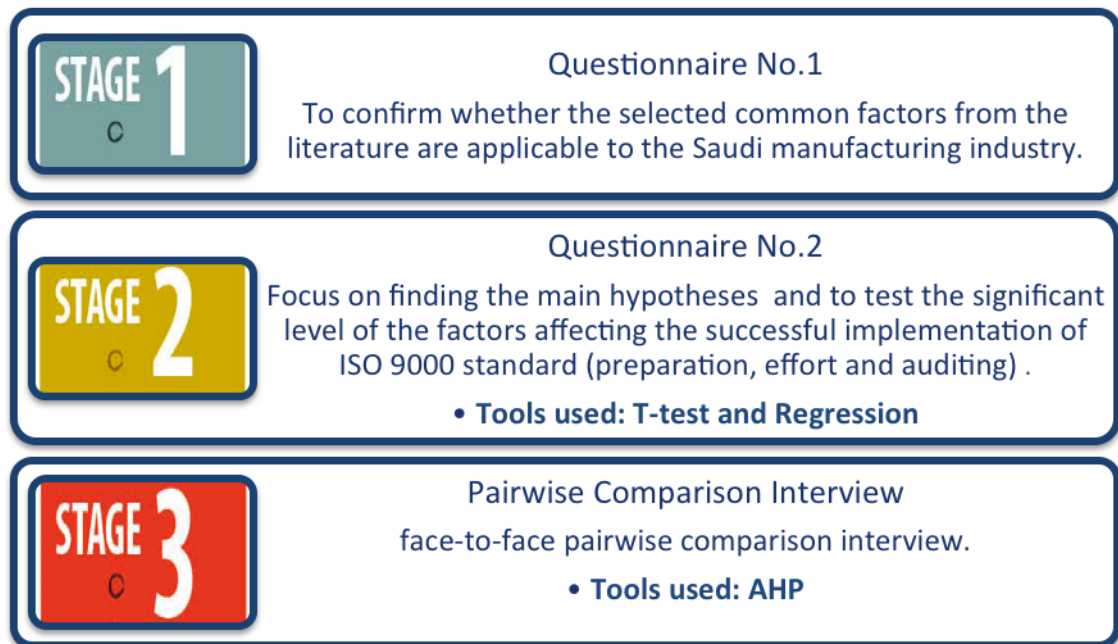
Designing the questionnaire was based on previous research performed in other countries along with the ISO 9000 series of standards and publications. Piloting and adjusting the questionnaire was one of the essential steps completed before



distribution. The questionnaire was distributed in person or by email to cover most of the manufacturing organisations in Saudi Arabia. After gathering the data from the questionnaire, the data was analysed. In this research, there were three stages of survey to locate potential factors that may affect the ISO 9000 implementation in the Saudi manufacturing industries. The first two stages were questionnaires, which are the quantitative approach and the third stage was pairwise comparison interviews, which is the qualitative approach. The next section will describe in detail the data collection methods.

### **3.5 Data Collection Methods**

The means to gather and produce data are known as the research methods (Oppenheim, 1992). Business-oriented research uses two types of data collection: secondary and primary. The sources available to access information for a research study are included in the methods of secondary data collection. According to the classification declared by Saunders et al. (2007) secondary data can be categorized as documentary versus survey. Written materials (books, journals and reports) and non-written material (CD ROMs and television programmes) are included in the documentary data sources. The two main methods of primary data collection are questionnaires and interviews. These methods must be recognized in both qualitative and quantitative aspects according to Silverman (2001). Saunders et al. (2000), Easterby-Smith et al. (2002) and Creswell (2003) state that business-oriented studies rarely fall under one particular research idea, phenomenology (qualitative) or positivism (quantitative). A mixture of both is used by many business and managerial researchers. The justification to select a multi-method approach for this study was based on this discussion. Therefore, a three-stage survey as shown in Figure 3.2 was carried out using appropriate samples to investigate the factors affecting the implementation of ISO 9000 in the manufacturing industry in Saudi Arabia.



**Figure 3.2** Three-stage survey

The population for this study were licensed and registered companies within industrial sectors across Saudi Arabia. The researcher identified 100 companies and two were selected for personal visits to test the questionnaire. The researcher identified general managers, quality managers and quality employees as a source of data. The rationale behind this is explained as:

1. The sample contains the opinions of expert leaders in the organisation. A rich data source can be established by views, knowledge and enlightened opinions (Sekaran, 2003).
2. General managers at head offices are considered the most experienced and knowledgeable people in terms of processes, procedures, quality management practice, implementation, strategic planning, assessment, training aspects, and all factors that could affect the ISO 9000 programme.
3. Many researchers in the area of ISO consider quality managers to be the most important employees in a company. Success of ISO 9000 functions across a company can be achieved by their maintenance, commitment, attitudes and valuable opinions.

4. The role of quality employees is to ensure high quality among functions. They were included due to the comprehensive nature of the questionnaire, which entails many questions regarding ISO and other issues, and to assure quality in this process.

More details of the three-stage survey will be discussed in the following sub-sections.

### **3.5.1 First Questionnaire**

A questionnaire can be identified as “a reformulated set of questions to which respondents usually provide their answers, within somewhat closely defined options” (Sekaran, 2003, p.236). The first questionnaire is an “agree or disagree” type. This type of questionnaire is appropriate for investigating whether the list of the most common factors gathered from the literature effecting the ISO 9000 implementation applies in the Saudi industry or not.

### **3.5.2 Second Questionnaire**

The questionnaire approach is believed to be the most suitable form of data collection from staff and managers (Bryman, 2004). Delivery and collection of the questionnaire along with emails were selected as the principal methods of data collection for this study. The second questionnaire contained hypothesis and regression questions. The regression analysis was employed in this study to predict the values of the dependent variable [ISO 9000 implementation progress (preparation, auditing and effort)] by using the independent variables (ISO requirements, training and education, customer satisfaction, size of documents, quality guidelines, top management, work system, employees' resistance, internal audit, understanding of quality programme, financial resources, human resources, consulting boards, inter-departmental relations, ignorance of ISO's importance, and organisation culture).

The wording of a questionnaire is very important in questionnaire design. Oppenheim (2000), Aaker et al. (2001), Churchill (2001), Easterby-Smith et al. (2002), Malhotra and Birks (2003), and Sekaran (2003), all suggest that important guidelines and clear

questions must be considered when questions are developed. It is important to decide whether to use open or closed-ended questions. Dillman (2000) specified two types of questions that can be helpful in shaping a questionnaire: closed-ended (structured) and open-ended (unstructured) questions. The pros and cons of open-ended and closed-ended questions are illustrated in Table 3.1.

Table 3.1 Advantages and disadvantages of open-ended and closed-ended questions  
Source: Outlined from Oppenheim (2000) and Sounders et al. (2007)

Advantages	Disadvantages
<b>Open-ended questions</b>	
Option to answer freely and opportunity to probe responses	Time-consuming and demand more effort from respondents
<b>Close-ended questions</b>	
Require little time, responses are easier to compare as responses have been predetermined	Do not allow probing responses

Open-ended questions allow respondents to document their thoughts and give answers according to their choice, but it is a rigorous and time-consuming task. In contrast, the benefits of closed-ended questions include saving time and easy comparison of responses, but interviewees cannot express their thoughts in this kind of **questions**. After analysing the pros and cons of both open and close-ended questions, the researcher chose closed-ended questions for this research. Some open-ended questions in the shape of *'others (please specify)'* were used.

The selection of the most appropriate scale depends on the type of information required. The researcher can select the most suitable scale for the study from diverse scaling methods (Sekaran, 2003). A five-point Likert scale is often used in many studies of quality management (Chapman and Al-Khawaldeh, 2002; Temtime and Solomon, 2002; Solis et al., 1998). Therefore, throughout the questionnaire a five-point Likert ordinal scale was used to specify the degree of agreement or disagreement with each question. The Likert scale gave the options: 1- strongly disagree, 2- disagree, 3- not sure, 4- agree, and 5- strongly agree.

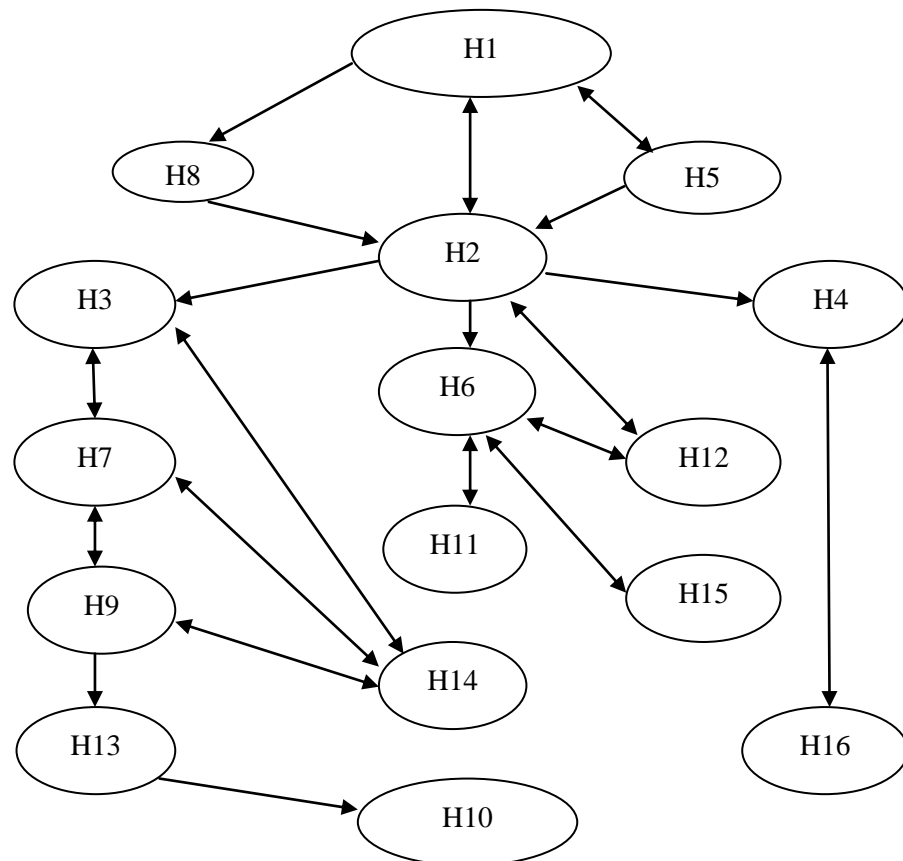
Four questionnaires, in both Arabic and English, were delivered to two firms for piloting by general managers, quality managers and quality employees. The purpose was to discover any non-interpretable or vague questions. The researcher received two completed questionnaires. The questionnaire was easy to complete and none of the respondents suggested any modification. Consequently, no further pilot test was needed; therefore, the study was carried out with the final two-language version of the research questionnaire (Oppenheim, 2000).

### **3.5.3 Pairwise comparison interview**

The last stage of the research survey was the qualitative approach or the pairwise comparison interview. The interview was to rank the relative importance of these factors to satisfy the fifth objective of the study, which was achieved by using an Analytical Hierarchy Process (AHP) method, which is considered to be a multi-criteria decision-making approach (as there is a subjective element and people attribute differently to the factors). According to Sekaran (2003), one method of collecting data is to interview respondents in order to obtain information on the issue of interest. Hussey and Hussey (1997) defined an interview as a method of collecting data in which participants are asked questions in order to find out what they do, think or feel. The use of questionnaires as a research technique might be seen as a **quantitative strategy where the data will be expressed in numerical terms**, whereas pairwise comparison interviews are considered as qualitative techniques. The findings from the quantitative and qualitative research were tested and analysed in order to satisfy the sixth objective of the study. This is to use evidence from primary and secondary data, interviews and questionnaires to establish a theoretical framework and to come up with the final list of factors that affects the implementation of ISO 9000 in Saudi manufacturing organisations and then make recommendations to improve the implementation of ISO 9000 in the Saudi manufacturing industry. The following section discusses the hypotheses raised from the literature review.

### 3.6 Research Hypothesis

Based on the literature review a number of hypotheses were suggested to be used in this research. The research sought the validity or otherwise of the following hypotheses;



**Figure 3.3 Hypothesis Model**

#### Hypothesis 1:

- H0: The level of commitment and support to quality from the senior management has no effect on the implementation scale of ISO 9000.
- H1: The level of commitment and support to quality from the senior management has a positive effect on the implementation scale of ISO 9000.

#### Hypothesis 2:

- H0: Training and education has no effect on the implementation scale of ISO 9000.

- H1: Training and education has a positive effect on the implementation scale of ISO 9000.

**Hypothesis 3:**

- H0: Effective inter-departmental relations have no effect on the implementation scale of ISO 9000.
- H1: Effective inter-departmental relations have a positive effect on the implementation scale of ISO 9000.

**Hypothesis 4:**

- H0: Understanding of the quality programme has no effect on the implementation scale of ISO 9000.
- H1: Understanding of the quality programme has a positive effect on the implementation scale of ISO 9000.

**Hypothesis 5:**

- H0: The financial resources of the firm has no effect on the implementation scale of ISO 9000.
- H1: The financial resources of the firm has a positive effect on the implementation scale of ISO 9000.

**Hypothesis 6:**

- H0: ISO 9000 requirements have no effect on the implementation scale of ISO 9000.
- H1: ISO 9000 requirements have a positive effect on the implementation scale of ISO 9000.

**Hypothesis 7:**

- H0: Human resource activities have no effect on the implementation scale of ISO 9000.

- H1: Human resource activities have a positive effect on the implementation scale of ISO 9000.

**Hypothesis 8:**

- H0: Consulting bodies have no effect on the implementation scale of ISO 9000.
- H1: Consulting bodies have a positive effect on the implementation scale of ISO 9000.

**Hypothesis 9:**

- H0: Employees' resistance has no effect on the implementation scale of ISO 9000.
- H1: Employees' resistance has a positive effect on the implementation scale of ISO 9000.

**Hypothesis 10:**

- H0: Customer satisfaction has no effect on the implementation scale of ISO 9000.
- H1: Customer satisfaction has a positive effect on the implementation scale of ISO 9000.

**Hypothesis 11:**

- H0: Inflating size of documents has no effect on the implementation scale of ISO 9000.
- H1: Inflating size of documents has a positive effect on the implementation scale of ISO 9000.

**Hypothesis12:**

- H0: Quality guidelines have no effect on the implementation scale of ISO 9000.
- H1: Quality guidelines have a positive effect on the implementation scale of ISO 9000.



**Hypothesis13:**

- H0: Changes to the work system have no effect on the implementation scale of ISO 9000.
- H1: Changes to the work system have a positive effect on the implementation scale of ISO 9000.

**Hypothesis14:**

- H0: Organisation culture has no effect on the implementation scale of ISO 9000.
- H1: Organisation culture has a positive effect on the implementation scale of ISO 9000.

**Hypothesis15:**

- H0: Performing internal audits has no effect on the implementation scale of ISO 9000.
- H1: Performing internal audits has a positive effect on the implementation scale of ISO 9000.

**Hypothesis16:**

- H0: ISO importance has no effect on the implementation scale of ISO 9000.
- H1: ISO importance has a positive effect on the implementation scale of ISO 9000.

This study developed a framework for implementation of ISO 9000 in manufacturing organisations in Saudi Arabia. In this way, it utilized and used the satisfactory data collection and analysis methods which support the workability of the proposed model. The quantitative method has the ability to describe the current status of the manufacturing organisation in Saudi Arabia and highlight the discriminating issues. Additionally, the qualitative methods can emphasis the critical issues that were found from the quantitative method; likewise it has the capacity to concentrate data that does not appear from the quantitative methodology. The following section will describe the

data analysis methods in detail.

### **3.7 Data Analysis**

Both qualitative and quantitative methods were used in the current study. The main method of data collection was the distribution of questionnaires. Pairwise comparison interviews were also conducted with both general managers and quality managers, so that themes developed from the questionnaire could be explained to them. Discussion of the methodologies and tests used to evaluate the collected data is offered in the following paragraphs.

#### **3.7.1 Quantitative data analysis**

Choosing the correct numerical methods depends upon the research objectives, nature of the data and the link between the methods. Thus, a design appropriate to the research question and framework was used. A statistical test (t-test) is one of the quantitative methods used in this research. The purpose of the t-test is to test the hypothesis of this research.

Another statistical method used in the current research is regression analysis. The purpose of the regression analysis is to use the independent variables to calculate the single dependent value selected by the researcher. Hair et al. (1998) recommended that regression analysis is a numerical method by which the relationship between many independent variables and a single dependent variable can be analysed. A discussion of the analysis methods used in this **research** is presented in next section.

##### **3.7.1.1 The t-test**

Such a statistical problem is usually tested by employing the '*Student's t-test*', formulated by Gosset in 1908. The test statistic is:

$$t = \frac{M - \mu}{\sqrt{\frac{\sum X^2 - ((\sum X)^2/N)}{(N-1)(N)}}} \quad \text{Equation 1}$$

The one sample t-test (or single sample t-test) is used to compare the mean of a single sample of scores to a known or hypothetical population mean. The Null Hypothesis (H0) =  $M - \mu = 0$ , where M is the sample mean and  $\mu$  is the hypothesized of population mean. The (H0) is that there is no difference between the sample mean and the population mean. Therefore, from the above discussion it can be concluded that one sample t-test was suitable for this research

### 3.7.1.2 Regression

Regression refers to a statistical method used to determine a linear association between two or more variables. It is usually used to make predictions and causal inference. In its most basic form (i.e. bivariate form), regression relates the independent variable (X) and the dependent variable (Y), as in the following formula:

$$Y = B_0 - B_1 - u \quad \text{Equation 2}$$

In this relation:

- The slope parameter ( $B_1$ ) refers to the magnitude and direction;
- The intercept parameter ( $B_0$ ) denotes the status of the dependent variable in the absence of an independent variable;
- The term ( $u$ ) is an error term that keeps a check over the variability not mentioned by slope and intercept terms;
- The regression coefficient ( $Y$ ) describes the relativity of data and resultant values.

Regression analysis is a statistical approach used to analyse the relationship between a single dependent variable and several independent variables. The core objective of regression analysis is to predict the single dependent value selected by the researcher by using the independent variables (Hair et al., 1998). This is the reason for which regression analysis was employed in this research to predict the values of the dependent variable [ISO 9000 implementation progress (preparation, auditing and effort)] by using the independent variables (ISO requirements, training and education, customer satisfaction, size of documents, quality guidelines, top management, work system, employees' resistance, internal audit, understanding of quality programme, financial resources, human resources, consulting boards, inter-departmental relation, ignorance of ISO importance, and organisation culture). The pairwise comparison interview was assessed through AHP as discussed earlier in literature review, as it has MCDM questions.

### **3.7.2 Multiple-Criteria Decision-Making**

The concept of decision-making in various fields requires a computational method for detecting the predictions in ranking order. According to Alonso et al. (2010), Bozóoki (2011), Saaty and Vargas (2012) and Deng and Chan (2011) the methods of finding various ways to prefigure these predictions is a topic much attended to in science; for instance, for information systems, control systems, and social choices. "Pairwise Comparisons" concerns the process of comparing two entities, one of which is more preferred in a quantitative property.

The MCDM has proposed various methods, a few of which are: inner product of vectors, analytic hierarchy process, multi-attribute value theory, multi-attribute utility theory, data envelopment analysis, dominance-based rough set approach, the evidential reasoning approach, and superiority and inferiority ranking method (Chan and Tong, 2007, p.1539-1546). Picking the model that provides the best solution not only depends on the comfort and preference of the one who chooses it, but also on the

conflict or problem presented. This study used the Analytic Hierarchy Process (AHP) as the MCDM method in order to rank the priority factors for ISO 9000 implementation in Saudi manufacturing organisations. Saaty (2008) stated that AHP is one of the important applications of pairwise comparisons widely used as a structured technique for helping people deal with complex decisions. It uses pairwise comparisons of tangible and intangible factors to construct ratio scales that are useful in making important decisions. The pairwise comparison will be discussed in the following section.

### **3.7.2.1 Pairwise Comparison Interviews Sample**

A ranking or preference is usually defined as a weakly ordered relationship between a set of items such that, for any two items, the first is either “less preferred”, “more preferred”, or “indifferent” to the second one (French, 1986). The Pairwise Comparisons method is based on the observation that while ranking the importance of several objects is often problematic, it is much easier to do when restricted to two objects (David, 1988). The problem is then reduced to constructing a global ranking from the set of partially ordered pairs. The method can be traced to the 1785 Marquis de Condorcet paper (Condorcet, 1785). It was explicitly mentioned and analysed by Fechner (1860), made popular by Thurstone (1927), and was transformed into a kind of semi-formal methodology by Saaty (1977) called the AHP, Analytic Hierarchy Process (Dyer, 1990; French, 1986; Saaty, 1977).

In this research, four large companies were chosen for the pairwise comparison interviews. The quality departments are sections within the four organisations, and indicate that detailed information can be obtained from managers regarding ISO 9000 implementation factors within their firms. Top-level, middle-level and quality managers in each company participated in the interviews. The respondents generated a complete list of factors that have a significant effect on the implementation of ISO 9000 in the Saudi industrial sector. Pairwise comparison interviews allowed the researcher to

obtain perfect and concise information regarding these factors. Therefore, the relative importance of these factors was ranked using AHP. The Analytic Hierarchy Process will be discussed in the next chapter.

### **3.8 The Analytic Hierarchy Process**

The AHP is an organised strategy for working with complicated choices. Rather than recommending a “correct” choice, the AHP helps the decision-makers find the one that best matches their needs. The AHP provides an extensive and logical structure for constructing a choice issue, for comprising and quantifying its components, for relating those components to overall objectives, and for analysing alternative solutions. It is used around the world in a wide range of choice circumstances, in areas such as education, business, and government.

The AHP users start by breaking down the choice issue into a hierarchy of more easily understood sub-problems, each of which can be examined individually. The components of the hierarchy can connect with any element of the choice problem, tangible or intangible, properly or approximately calculated, well or poorly understood and anything at all that relates to the choice at hand. Once the hierarchy is designed, the choice creators consistently assess its various components by evaluating them to one another two at a time. To make the evaluations, the choice creators can use tangible data about the components, or they can use their conclusions about the elements’ comparative importance and meaning. It is the substance of the AHP that human decisions, in addition to this actual information, can be employed with undertaking this evaluation (Saaty, 2008).

The AHP formulates these assessments into mathematical principles that can be used in comparisons across the entire range of the issues. A mathematical weight or concern is produced for each factor of the hierarchy, enabling different and often incommensurable components to be compared to one another in a logical and reliable way. This capability differentiates the AHP from other selection techniques. In the

ultimate step of the procedure, the main concerns are calculated for each of the choice alternatives. These figures signify the alternatives' comparative capability to get the choice objective, so that they allow a straightforward consideration with the various actions (Can and Ozmutaf, 2009).

### **3.9 AHP Based Study**

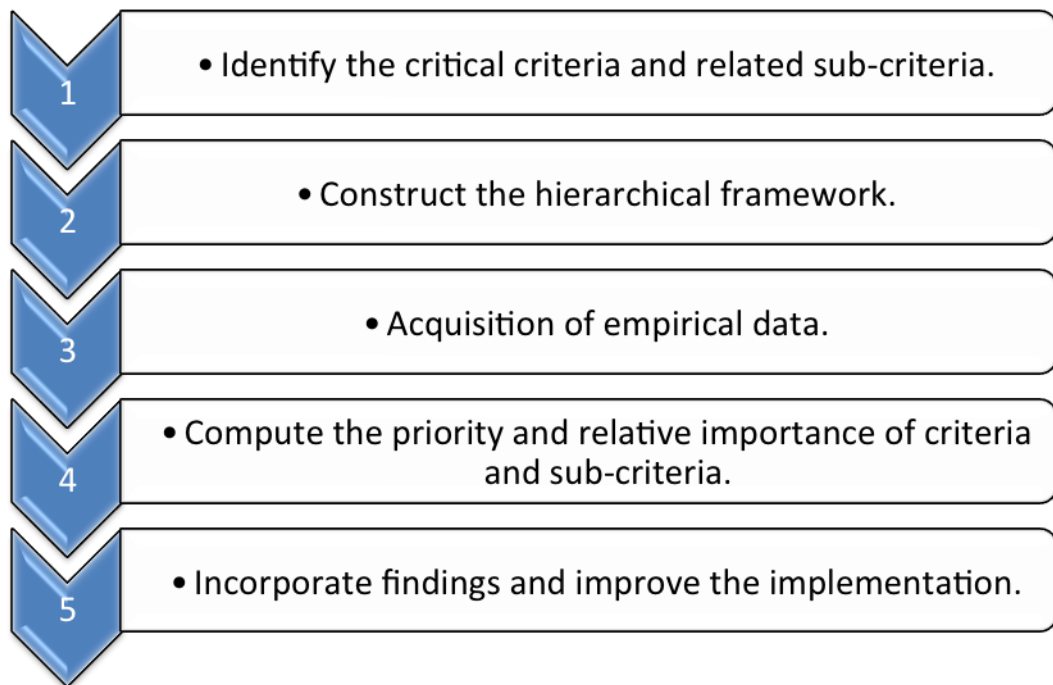
To analyse the process and the factors governing the application of the ISO 9000 standard, an in-depth literature review was compiled. The calibration and assessment of all the critical factors gave rise to conflict in the decision-making process because:

- There was considerable difficulty in compiling and placing various elements in a comprehensible, analytical structure to illustrate the analytical problem for ease of comprehension.
- The critical factors varied and were not uniform, some were purely quantitative while others qualitative.
- The factors responsible for the proper application of ISO 9000 did not necessarily fall in line with one another, they often contradicted each other. All such factors could not be put forth in purely quantitative terms, as some aspects were psychological, and thus qualitative. Thus conflict arose at various occasions.

The problems encountered above were taken into consideration for the development of a framework by employing AHP. Over the past few years, the AHP method developed by Saaty (1980) has been used extensively by management officials for major decisions, and is an example of the MCDM. The method's simple application, adaptability, intuitive appeal, and its characteristic of incorporating both qualitative and quantitative factors in its structure, along with the feature of bringing intricate and poorly formulated problems into a concise structure along with its simplicity have made it popular for taking decisions (Vargas, 1990; Wedley, 1990). The difference between AHP and various other decision-making methods lies in these three characteristics (Vargas, 1990; Wedley, 1990; Roper-Lowe and Sharp, 1990):

- Its competence in managing both the tangible and intangible aspects of a problem
- The organisation of all problems and their prioritisation in a hierarchal format to help analyse the problem
- Its supervision of the pattern of decision-making of the decision-maker.

The AHP is beneficial as it provides a comprehensive structure based on the aggregation principle. Figure 3.3 shows the process flowchart of the AHP.



**Figure 3.4** Flowchart of the AHP study

The following section presents a proposed framework with each step.

### **A. Stages of AHP Study**

The author studied the effects of the ISO 9000 implementation upon various manufacturing organisations in Saudi Arabia. The study's objective was to collect empirical data to project verified and authentic opinions regarding the requirements for the ISO 9000 implementation and its degree of success in Saudi Arabia's manufacturing sector. The method applied to calibrate the effect of criteria and sub-



criteria of the ISO 9000 implementation on Saudi manufacturing units was AHP. The intricate and multifaceted problem was deconstructed into its components and arranged in a hierarchal manner in accordance with criteria and nature. A description of AHP methodology is as follows. The research and literature helped in collecting and organising the criteria and sub-criteria in accordance with importance and relevance after formulating the aim of the study (Step 1). The broader criteria and sub-criteria classification was further narrowed down to a hierarchal categorisation of issues and goals starting from the aim and successively downward (Step 2). The data was collected in empirical forms from credible sources, which in this case were twelve evaluators from four different Saudi manufacturing units which had implemented ISO 9000. The chosen companies were the four largest manufacturing firms in Saudi Arabia and the evaluators were determined on the basis of an interview which was based on the number of people they had hired (Step 3). Due to the specific selection procedure, the interviews reflected the opinions and assessments of the experts in the Saudi manufacturing industry, which were mandatory for the study's proper analysis. A pairwise comparison interview approach was adopted whereby questions were designed based on Saaty's 9-point scale (Table 3.2).

<b>Table 3.2 Preference Scale for Pairwise Comparisons</b>		
<b>Value</b>	<b>Definition</b>	<b>Explanation</b>
1	Equally Preferred (Equally Important)	Two factors contribute equally to the objective
3	Moderately Preferred (Moderately more Important)	Experience and judgment slightly favour one factor over the other
5	Strongly Preferred (Strongly more Important)	Experience and judgment strongly favour one factor over another
7	Very Strongly Preferred (Very Strongly more Important)	A factor is strongly favoured and its dominance is demonstrated in practice
9	Extremely Preferred (Extremely more Important)	Reserved for situations where the difference between the items being compared is so great that they are on the verge of not being directly comparable
2,4,6,8	Intermediate Values	To reflect compromise between two adjacent judgments

Each one of the levels in the hierarchy was assessed by the evaluators through determining relative scales in a paired manner while keeping the main objective or aim

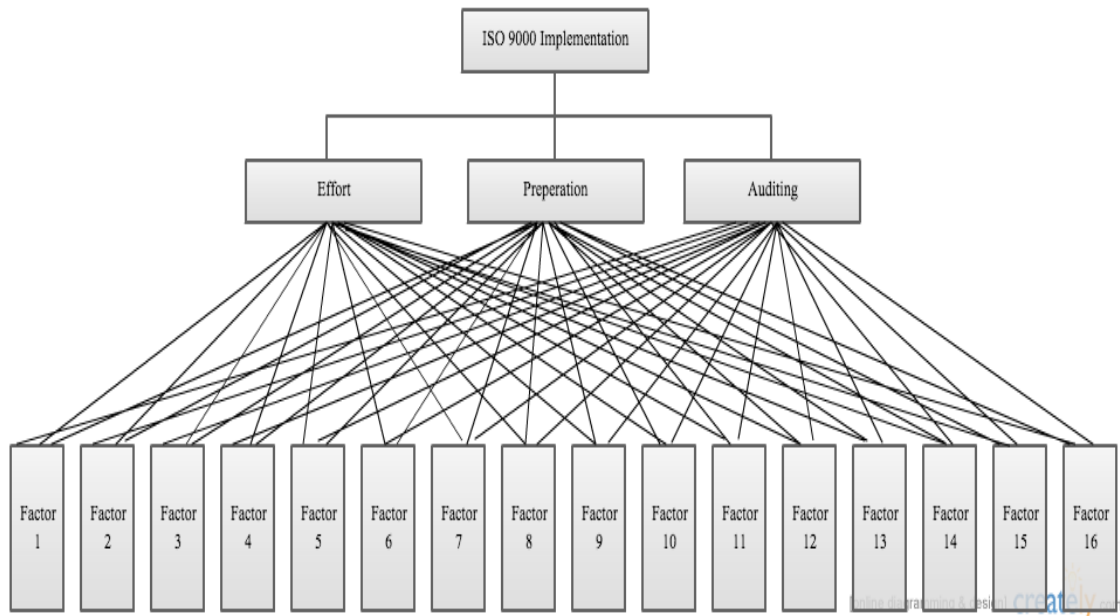
in mind (Saaty, 1980). The collection of views and opinions was followed by its allocation in different hierarchal units according to the AHP criteria following priorities. The software employed for this purpose was Expert Choice (Decision Software Support, 2000). The factors or elements were weighed against each other to establish their importance and a correspondence between quantitative and verbal judgments. For varying data, the method proposed for organisation was the normalized Eigen values method (Saaty, 1980; Crowe et al., 1998). A composite value of normalized weights for all levels was obtained as the different levels of the hierarchy were interrelated. There was a generation of priorities in two major divisions i.e. the local priorities (related to the parent factors) and global priorities (related to the main goal). There were total and sub-total priority scores to grade them. The method was carried out to evaluate comparison matrices for all judgments. The results obtained from the research were taken into consideration regarding the ISO 9000 standard's implementation and the elements determining the adoption of ISO by manufacturing units across Saudi Arabia.

## **B. An Analytical Framework for AHP Analysis**

The AHP methodology requires the establishment of a hierarchy of all factors influencing the decision in Step 2. The determination of criteria and sub-criteria in a hierarchy helps in two ways:

1. The deconstruction of the major problem into its constituents helps in identifying the complex interrelations within.
2. The evaluators are certain that problems located in one level are equal in degree and thus homogeneity is created for easy comparison (Yang and Shi, 2002).

The basic framework for formulating various hierarchal levels and the hierarchy as a whole has been presented by Saaty (2000). The guidelines presented by Saaty (2000) were employed for formulating the AHP structure for this study (figure 3.4).



**Figure 3.5** The Structure of the Decision Problem Using AHP

Based on the above approach to this study, some boundaries appeared, thus the nature of this study is as follows.

1. The decision hierarchy accommodates all the pair-wise comparisons to formulate a comprehensive judgment matrix (Millet and Harker, 1990; Weiss and Rao, 1987).
2. A personal interview, study and discussion have to be conducted to obtain proper results in the AHP method. A postal questionnaire may address the issue, but it will not be nearly as effective (Yahya and Kingsman, 1999). A face-to-face interaction is imperative to ensure that the interviewees understand the functions and questions asked, and that the comparisons are made efficiently, these include all information on definitions, questions, and procedures.

### **3.10 Qualitative Data Analysis**

The AHP will rank the priorities of the factors according to the expert perspective. As priorities bode well if obtained from reliable or close predictable grids, a consistency

check must be used. Saaty (1977) has proposed a consistency index (CI), which is identified with the eigenvalue technique:

$$CI = \frac{\lambda_{\max} - n}{n - 1} \quad \text{Equation 3}$$

Where  $\lambda_{\max} - n$  = maximal eigenvalue

The consistency ratio, the ratio of CI and RI, is given by:

$$CR = \frac{CI}{RI} \quad \text{Equation 4}$$

Where CI is the consistency index and RI is the random index (the normal CI of 500 randomly filled grids). In the event that CR is short of that 10%, then the framework can be considered as having a worthy consistency.

### 3.11 Validity and Reliability Evaluation

The correctness and precision of the research findings can be assessed by reliability and validity. Two approaches were used in this study: pairwise comparison interviews and personally administered questionnaires. The researcher ensured the reliability and validity of these findings, and a number of procedures were used at the stages of pre and post data collection.

#### 3.11.1 Validity

Oppenheim (1992) described validity as the extent to which the research can provide a good measure. Hussey and Hussey (1997) expressed that validity is the extent to which the happening of situation is accurately reflected by the research findings. A

detailed literature review is likely to define and clarify the different scales and how they are measured. The proposed questionnaire adapted many questions from related studies where there was considerable focus on fulfilling the requirements of reliability and validity. The researcher personally distributed and collected the questionnaire. In this way the researcher had the opportunity to clarify uncertainty about the questions and how to answer them. The researcher also reviewed each questionnaire to check if they were fully completed. The researcher made good preparations for the pairwise comparison interviews, and several procedures were adopted to encourage the respondents to provide the desired information. Also, the questions were clearly and precisely introduced to obtain good responses, and the researcher explained that all collected data would remain highly confidential.

### 3.11.2 Reliability

Reliability of a measure indicates the development of reasonable and error free results without any bias. Therefore, reliable measurement across time and several items in the instrument is ensured (Sekaran, 2003). To calculate complete reliability of the measurement scale, Cronbach's alpha measurement of internal consistency was used in this study, where the amount of the total difference is given by alpha that is not due to error, by which the reliability of the scale is represented (Oppenheim, 1992). The minimum acceptable level of reliability "alpha" is 0.60 by the standard of Hair et al. (1998) and greater than .50 by Nunnally's standard (1978). The dependent and independent variables, together with Cronbach's alpha results, are shown in table 3.3.

<b>Table 3.3</b> Dependent and Independent variables Cronbach's alpha results.			
No.	Factors	No. Questions	Reliability
1	Top Management Commitment and Support	4 questions	.959
2	Training and Education	4 questions	.896
3	Interdepartmental relations	5 questions	.907
4	Understanding of quality programme	5 questions	.945
5	Unwilling to change organisational Culture	3 questions	.960
6	Unwilling to change work system	3 questions	.930
7	Human Resources	4 questions	.923
8	Absence of consulting Boards	3 questions	.913

9	Employees' resistance	4 questions	.931
10	Absence of quality guidelines	3 questions	.944
11	Shortage of financial resources	3 questions	.909
12	ISO requirements are unrealistic	3 questions	.891
13	Inflating size of documents	3 questions	.909
14	Difficulty in performing internal audit	3 questions	.955
15	Ignorance of ISO importance	5 questions	.942

### 3.12 Chapter Summary

The aims of the research were accomplished using a methodology that included the multi-methods approach (qualitative and quantitative) of a questionnaire and pairwise comparison interviews. This chapter has explained why these methods were chosen. The main method of data of collection was the questionnaire, which produced results supported by pairwise comparison interviews. Before a final version of the questionnaire was distributed a pilot study was conducted. After the researcher received feedback from the experts in quality control, various drafts were prepared and modified. This chapter described the types of questions and their format, the design and layout of the questionnaire, the population and sample, how the questionnaire was administered and the final version. In addition, ambiguities of validity and reliability were clarified. The chapter concluded with a discussion of the statistical methods used and an analytical description of the research. An analysis of the outcomes and the conclusion is given in the following chapters.

## **CHAPTER 4 : RESULT OF ANALYSIS**

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### **4.1 Chapter Introduction**

This chapter provides details and analysis of the research findings obtained from both questionnaires and pairwise comparison interviews. Therefore, this chapter is divided into three main sections. The first section presents the findings from the first questionnaire, which aimed to identify the main factors affecting the ISO 9000 implementation in the Saudi manufacturing sector. The second section presents the findings of the second questionnaire which dealt with exploring and examining the impact of ISO 9000 factors as independent variables to improve the implementation process of ISO 9000 (the organisation's effort towards the implementation, the auditing times and the period of preparation for the implementation) as dependent variables. The third section deals with the findings gathered from the interviews and aims to rank the priority of the factors affecting the implementation of ISO 9000 in the Saudi manufacturing sector using pairwise comparisons.

### **4.2 Results of the First Questionnaire**

This first section presents the findings collected from the first questionnaire, which was issued to 100 manufacturing companies in Saudi Arabia by e-mail. 37% of the questionnaires were returned, as shown in Table4.1. The first questionnaire aimed to gather the 15 factors most affecting the implementation of ISO 9000 which were identified in the literature review. Those 15 factors were presented to the manufacturing industry in Saudi Arabia in an attempt to triangulate the extracted data with data obtained from the field.

Table 4.1 Company Details

Question	Result
What is the sector of your company?	 <ul style="list-style-type: none"> <li>■ Chemical</li> <li>■ Engineer</li> <li>■ extract</li> <li>■ Food</li> <li>■ other</li> <li>■ Pharmace</li> <li>■ Textile</li> </ul>
What is the average number of employees in your organisation?	 <ul style="list-style-type: none"> <li>■ 50-100</li> <li>■ 100-200</li> <li>■ 200-300</li> <li>■ 300-500</li> </ul>
What is the type of ownership is your business?	 <ul style="list-style-type: none"> <li>■ Mixed</li> <li>■ Saudi private</li> <li>■ Joint venture</li> </ul>
How long have you operated in Saudi Arabia?	 <ul style="list-style-type: none"> <li>■ 3-10 years</li> <li>■ 10-20 years</li> <li>■ above 20 years</li> </ul>
How long has your company been registered for ISO 9000 standards?	 <ul style="list-style-type: none"> <li>■ less than a year</li> <li>■ 1-3 years</li> <li>■ 4-10 years</li> <li>■ more than 10 years</li> </ul>

From the responses, it was found that 40% of the organisations were in the engineering sector and more than 46% had more than 500 employees. 46.7% of companies that had been operating for more than 20 years have held the ISO 9000 standard for more than 10 years. Within the survey group, 40% were joint ventures with



foreign companies and 33.3% were mixed government and private sector. Respondents also declared that commitment from senior management had the most impact on the success of the implementation of ISO 9000, describing this as a critical factor, as shown in Table 4.2. The second most important factor was said to be insufficient human resources and the difficulty of performing internal audits, which was ranked third in importance of all factors, followed by insufficient employee training. One factor of less significance in the implementation of ISO 9000 was the shortage of financial resources. Some of the respondents mentioned that customer satisfaction was one of the most important factors, which affects the implementation of ISO 9000 in the Saudi manufacturing industry. Thus, customer satisfaction was included on the list of factors.

**Table 4.2 Factors influencing the implementation of ISO 9000 in the Saudi manufacturing industry**

Rank	Factors	N	Mean	Std. Deviation
1	Top management commitment	37	4.53	.743
2	Insufficient human resources	37	3.9333	1.38701
3	Difficulty in performing internal audits	37	3.87	1.506
4	Insufficient employee training	36	3.7857	1.42389
5	Insufficient knowledge of quality programme	37	3.7333	1.43759
6	Ignorance of ISO importance	37	3.6667	1.34519
7	Absence of quality guidelines	37	3.4000	1.40408
8	Shortage of financial resources	37	3.2667	1.09978
9	Unwillingness to change organisational culture	37	3.2000	1.42428
10	Weak inter-departmental relations	37	3.1333	1.68466
11	Unwillingness to change work system	37	2.8667	1.45733
12	ISO 9000 requirements are unrealistic	37	2.7333	1.33452
13	Employee resistance	37	2.4667	1.12546
14	Inflating size of documents	37	2.4667	1.24595
15	Absence of consulting boards	37	2.4000	1.18322

Notes: The mean score was based on participants' level of agreement from a choice of five. 5 = strongly agree, 4=Agree, 3= Neutral, 2= Disagree and 1= Strongly Disagree.

### **4.3 Results of the Second Questionnaire**

This section deals with the findings collected using a questionnaire that was distributed to 100 respondents; 37 were returned of which only 32 were useable. The aim of the second questionnaire was to analyse and answer a list of sixteen hypotheses relating to the effects of ISO 9000 data using a t-test and to look at the significance of each factor relating to ISO 9000 implementation progress (preparation, auditing and effort). This was obtained using regression analysis. This section begins with descriptive statistics, followed by a hypothesis test (t-test) and regression analysis.

#### **4.3.1 Descriptive Statistics**

The general characteristics of the respondents are detailed below. These include: job title, the sector of the company, the size of the company, the type of ownership, the period of operation, the period of registration, the preparation length of the registration process of ISO 9000 and the auditing times of the organisation.

##### **4.3.1.1 The Job Title of the Respondents**

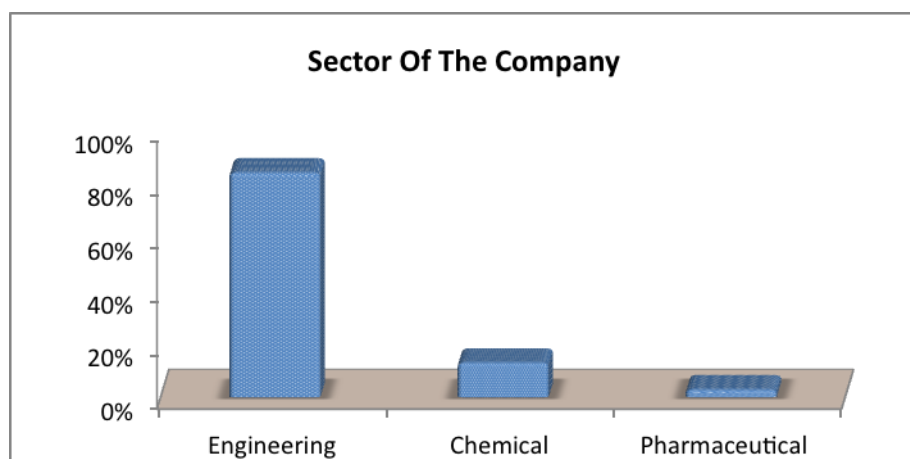
The majority of the respondents were general managers, while the other category consisted of quality managers, however both general and quality managers are familiar with ISO 9000 standard and therefore the answers will be accurate. A total of 22 respondents, 68%, were general managers while the remaining 10 respondents, 32%, were quality managers. The distribution ensured there was no bias while collecting the data or information from the organisations. The data collected was not biased through the over reliance on the quality managers as a source of information. Opinions of the other organisational managers with regard to the implementation of the ISO 9000 were just as relevant and important. This indicated how the whole concept was approached and absorbed in the system.



**Figure 4.1** Job title result diagram

#### 4.3.1.2 The Sector of Operation Of The Company

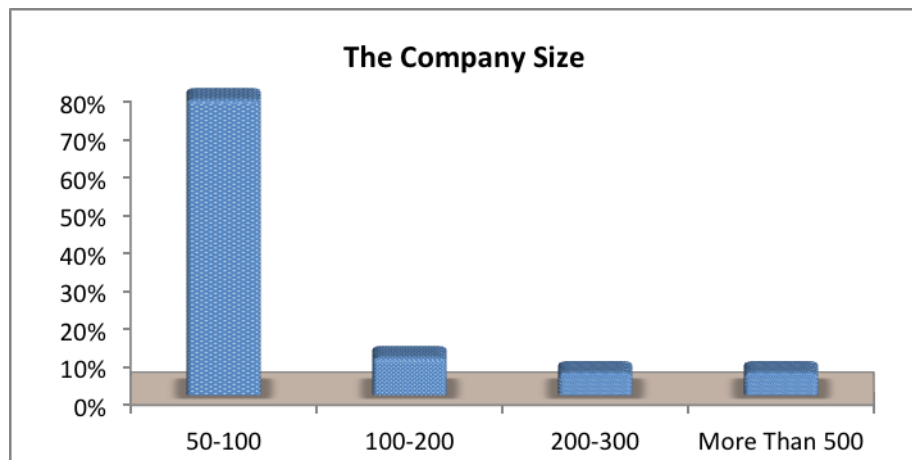
From the results of the data collected, it was evident that the majority of the organisations were in the engineering sector. The number of respondents in this sector was 27, which amounted 84% of the total number of respondents. The other groups consisted of respondents in the chemical sector at 13%, while respondents in the pharmaceutical sector totalled 3%.



**Figure 4.2** Companies sector result diagram

#### 4.3.1.3 The Company Sizes

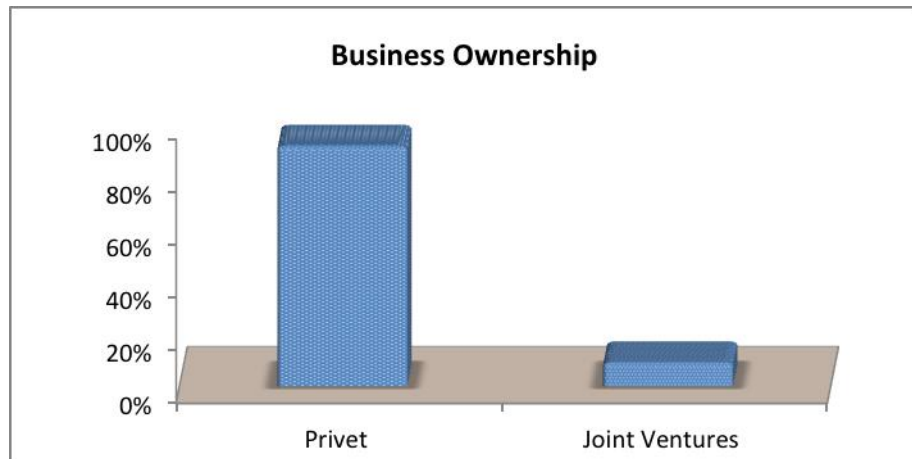
The majority of the organisations (78%) had employee numbers of between 50 and 100. This was followed by 10% that had between 100 and 200 employees in their organisations. The remaining organisations interviewed in the survey had employee numbers of between 200 and 300 and more than 500 employees constituting 6% of the respondents each.



**Figure 4.3** Size of company result diagram

#### 4.3.1.4 The Type of Business Ownership

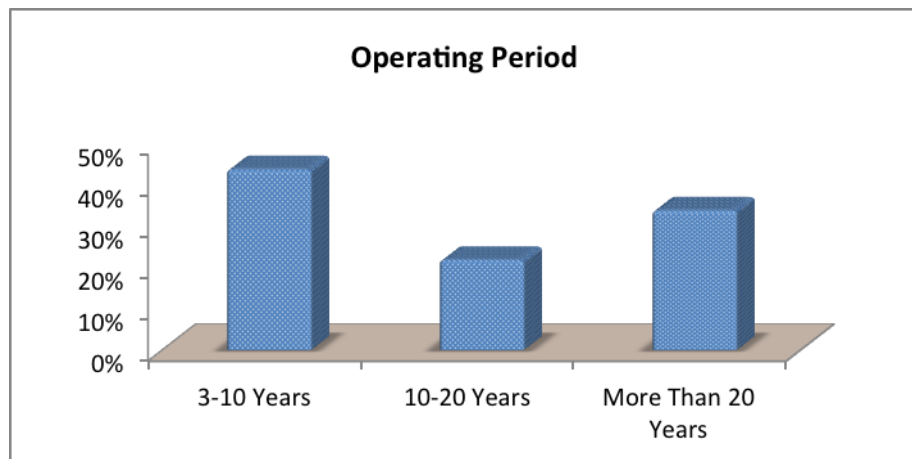
The study revealed that 91% of all the respondents were from privately owned organisations. The other 9% comprised of those organisations which were joint ventures with foreign companies. The results of the survey, therefore, tend to be inclined to the privately owned organisations as there was a 10:1 ratio against the joint ventures with the foreign organisations. The mixed private and government owned organisations were, however, not represented.



**Figure 4.4** Ownership result diagram

#### 4.3.1.5 The Period the Company Has Been Operating

Most of the organisations within the region had been in operation for less than 10 years; 44% of them having been in operation for between 3 and 10 years. Those that had been in operation for between 10 and 20 years represented 22% of the organisations, while those which had been in operation for more than 20 years represented 34% of all the interviewed organisations.

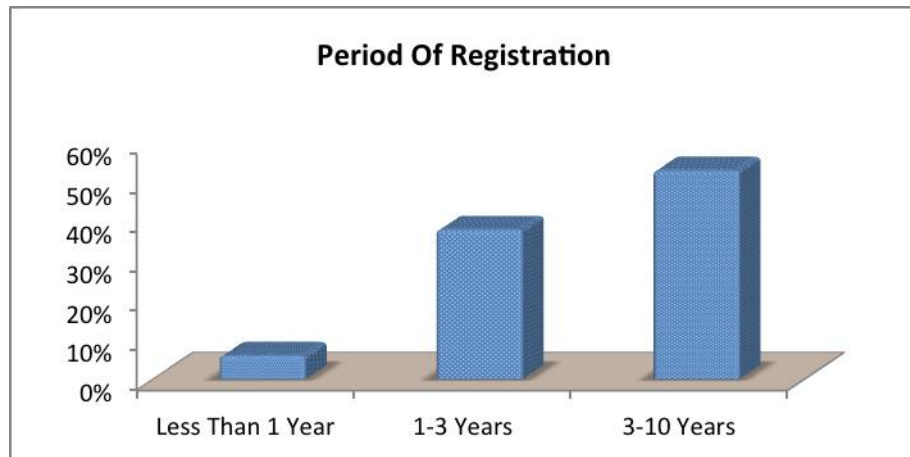


**Figure 4.5** Period of operation result diagram

#### 4.3.1.6 The Period the Company Has Been Registered

Most of the companies had been registered to the ISO 9000 standards for between 3 and 10 years. This accounted for 53% of the respondents. Additionally, 38% of the

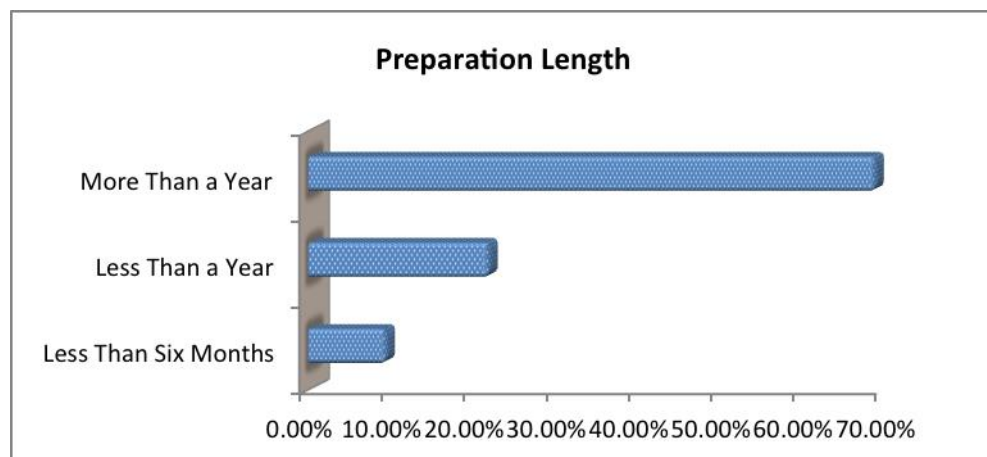
organisations had been registered to the ISO 9000 standards for between 1 and 3 years, while the lowest number, represented by 6%, had been registered for less than 1 year.



**Figure 4.6** Period of registration result diagram

#### 4.3.1.7 The Length of Preparation for the Registration Process of ISO 9000

Most of the companies had prepared themselves for the ISO 9000 registration process for more than a year (68.8%) Additionally, 21.9% of the organisations completed the preparation in less than a year. However, as few as 9.4% of the organisations prepared themselves in less than six months. The registration process requires a great deal of preparation and organisation of the entire system in order to meet all the adjustments required of the organisations.



**Figure 4.7** Length of preparation result diagram

#### 4.3.1.8 The Auditing Times of the Organisations

Only 9.4% of the organisations were granted the ISO certificate at the first attempt, while 34.4% gained certification at the second attempt and 53.1% of the organisations were granted the certificate on the third attempt. Finally, 3.1% were successfully granted the ISO certificate after more than three attempts.

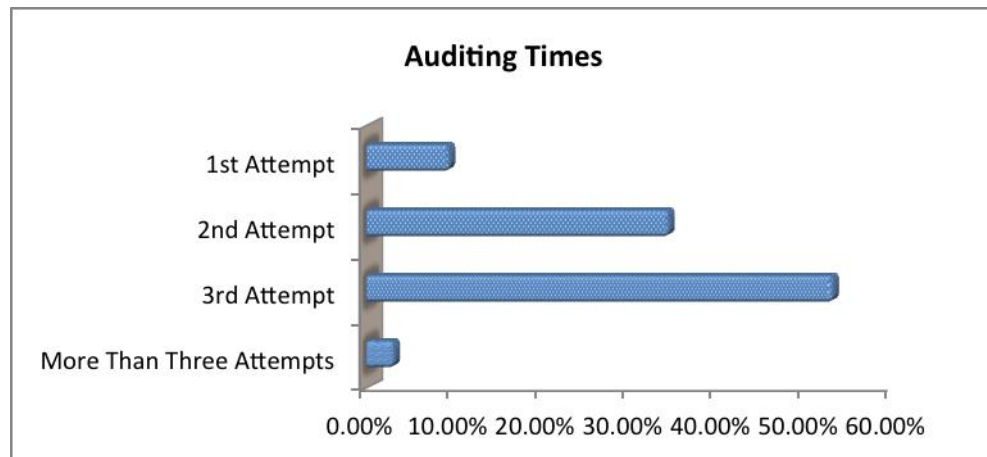
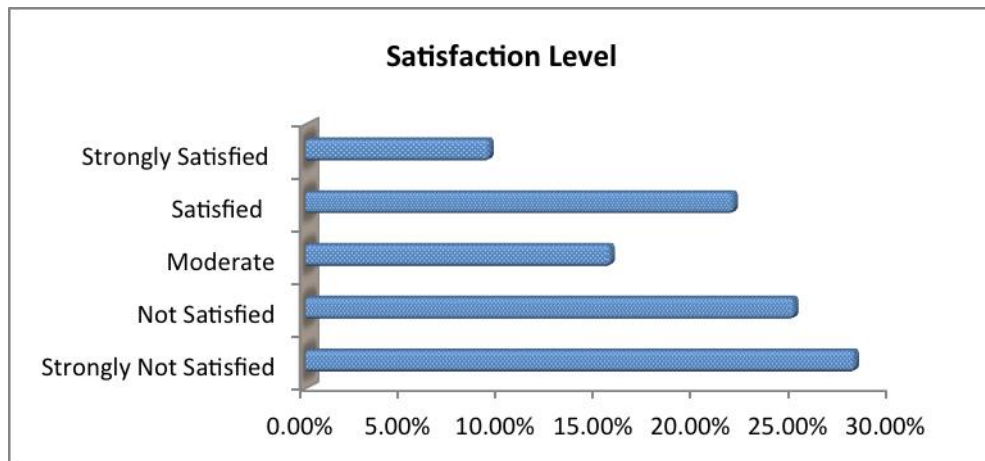


Figure 4.8 Auditing times result diagram

#### 4.3.1.9 The Level of Satisfaction with the Organisation's Effort in ISO 9000

##### Implementation

In order to study the effort that was necessary for the organisations towards the implementation of ISO 9000, the researcher asked the respondents to clarify their level of satisfaction with their organisation's effort towards the implementation process. The results show that 28.1% of the respondents were strongly not satisfied with the effort of their organisations, while 25% were not satisfied, and 15.6% moderately satisfied. Moreover, 21.9% of the survey respondents showed some satisfaction and 9.4% were strongly satisfied.



**Figure 4.9** Satisfaction level result diagram

#### 4.4 ISO 9000 in general

This section examines the hypothesis and explores the frequencies and descriptive statistics of the responses in the statements presented in the t-test section of the ISO 9000 implementation survey. After coding, whereby YES=1 and NO=2, the data was treated as nominal paramedic data since it was a measurement of the responses of a normally distributed population and the hypothesis tested. The normally distributed are parallel with a single central peak at the average (mean or median) of the data.



**Question # 1: Do you agree that the top management's support and commitment is important to your organisation?**

H0: The level of commitment and support to quality from the senior management has no effect on the implementation scale of ISO 9000.

H1: The level of commitment and support to quality from the senior management has a positive effect on the implementation scale of ISO 9000.

Table 4.3 Top Management t-test Result								
N	Valid			32				
	Missing			0				
Mean			1.0625					
Median			1.0000					
Mode			1.00					
Std. Deviation			.24593					
Skewness			3.795					
Std. Error of Skewness			.414					
Kurtosis			13.227					
Std. Error of Kurtosis			.809					
Sum			34.00					
Valid	Yes			30				
	NO			2				
Total			32					
<b>One-Sample Test</b>	Test Value = 0							
	t	df	Sig. (2-tailed)	Mean Difference	95% Confidence Interval of the Difference			
					Lower	Upper		
Top Management Support And Commitment	24.439	31	.000	1.06250	.9738	1.1512		

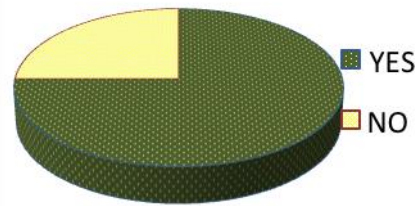
The t-test illustrated that the respondents who believed that top management commitment was a critical factor to the ISO 9000 implementation had a statistically significant acceptance attitude (93.75%) when compared to 6.25% of the respondents who did not consider top management as an important factor to the implementation of ISO 9000,  $t(31) = 24.4$ ,  $p = 0.000$ . The significance was less than 0.05; the null hypothesis is thus rejected.

**Question # 2: Do you agree that quality related training is important to your organisation?**

H0: Training and education has no effect on the implementation scale of ISO 9000.

H1: Training and education has a positive effect on the implementation scale of ISO 9000.

Table 4.4 Training t-test Result						
N	Valid	32				
	Missing	0				
Mean		1.250000				
Median		1.0000				
Mode		1.00				
Std. Deviation		0.439941				
Skewness		1.212283				
Std. Error of Skewness		.414				
Kurtosis		-0.570				
Std. Error of Kurtosis		.809				
Sum		40.00				
Valid	Yes	24				
	NO	8				
Total		32				
One-Sample Test	Test Value = 0					
	t	df	Sig. (2-tailed)	Mean Difference	95% Confidence Interval of the Difference	
					Lower	Upper
Training And Education	16.07	31	.000	1.25000	1.0914	1.408



The t-test illustrated that the respondents who believed that training was critical factor to the ISO 9000 implementation had a statistically significant acceptance attitude (75%) when compared to 25% of the respondents who did not consider training as an important factor to the implementation of ISO 9000,  $t(31) = 16.1$ ,  $p = 0.000$ . The significance was less than 0.05; the null hypothesis is thus rejected.

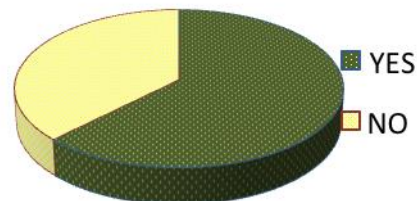
**Question # 3: Do you agree that an effective interdepartmental relations system is important in your organisation?**

H0: Effective interdepartmental relations have no effect on the implementation scale of ISO 9000.

H1: Effective interdepartmental relations have a positive effect on the implementation scale of ISO 9000.

**Table 4.5 Interdepartmental Relations t-test Result**

N	Valid	32
	Missing	0
Mean		1.3750
Median		1.0000
Mode		1.00
Std. Deviation		.49187
Skewness		.542
Std. Error of Skewness		.414
Kurtosis		-1.824
Std. Error of Kurtosis		.809
Sum		44.00
Valid	Yes	20
	NO	12
Total		32



One-Sample Test	Test Value = 0					
	t	df	Sig. (2-tailed)	Mean Difference	95% Confidence Interval of the Difference	
					Lower	Upper
Interdepartmental Relations	15.81	31	.000	1.37500	1.197	1.552

The t-test illustrated that the respondents who believed that interdepartmental relations were a critical factor to the ISO 9000 implementation had a statistically significant acceptance attitude (62.5%) when compared to 37.5% of the respondents who did not consider interdepartmental relations as an important factor to the implementation of ISO 9000,  $t(31) = 15.8$ ,  $p = 0.000$ . The significance was less than 0.05; the null hypothesis is thus rejected.

**Question # 4: Do you agree that understanding the quality programmes is essential to your organisation?**

H0: Understanding of the quality programme has no effect on the implementation scale of ISO 9000.

H1: Understanding of the quality programme has a positive effect on the implementation scale of ISO 9000.

Table 4.6 Understanding the Quality Programmes t-test Result						
N	Valid		32			
	Missing		0			
Mean		1.1875				
Median		1.0000				
Mode		1.00				
Std. Deviation		0.3965				
Skewness		1.6811				
Std. Error of Skewness		.414				
Kurtosis		0.8771				
Std. Error of Kurtosis		.809				
Sum		38.00				
Valid	Yes		26			
	NO		6			
Total			32			
One-Sample Test	Test Value = 0					
	t	df	Sig. (2-tailed)	Mean Difference	95% Confidence Interval of the Difference	
					Lower	Upper
Understanding Of Quality Programmes	16.93	31	.000	1.18750	1.0445	1.3305

The t-test illustrated that the respondents who believed that understanding of the quality programme was critical factor to the ISO 9000 implementation had a statistically significant acceptance attitude (81.2%) when compared to 18.7% of the respondents who did not consider understanding of the quality programme as an important factor to the implementation of ISO 9000,  $t(31) = 16.9, p = 0.000$ . The significance was less than 0.05; the null hypothesis is thus rejected.

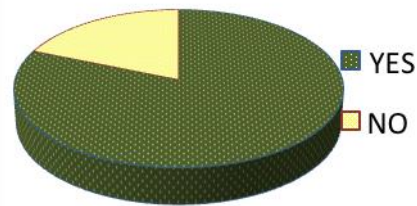
**Question # 5: Do you agree that organisations unwilling to change their culture will have difficulty in ISO 9000 implementation?**

H0: Organisation culture has no effect on the implementation scale of ISO 9000.

H1: Organisation culture has a positive effect on the implementation scale of ISO 9000.

**Table 4.7 Organisation Culture t-test Result**

N	Valid	32
	Missing	0
Mean		1.1875
Median		1.0000
Mode		1.00
Std. Deviation		0.39655
Skewness		1.68113
Std. Error of Skewness		.414
Kurtosis		0.877
Std. Error of Kurtosis		.809
Sum		38.00
Valid	Yes	26
	NO	6
Total		32



One-Sample Test	Test Value = 0					
	t	df	Sig. (2-tailed)	Mean Difference	95% Confidence Interval of the Difference	
					Lower	Upper
Organisation Culture	16.93	31	.000	1.18750	1.0445	1.3305

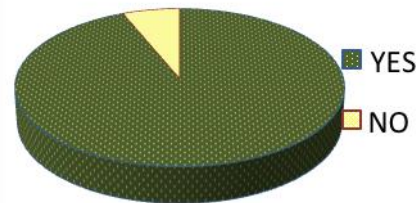
The t-test illustrated that the respondents who believed that organisation culture is a critical factor to the ISO 9000 implementation had a statistically significant acceptance attitude (81.2%) when compared to 18.7% of the respondents who do not consider organisation culture as an important factor to the implementation of ISO 9000,  $t(31) = 16.9$ ,  $p = 0.000$ . The significance was less than 0.05; the null hypothesis is thus rejected.

**Question # 6: Do you agree that organisations unwilling to change the work system will have difficulty in ISO 9000 implementation?**

H0: Changing the work system has no effect on the implementation scale of ISO 9000.

H1: Changing the work system has a positive effect on the implementation scale of ISO 9000.

Table 4.8 Work System t-test Result						
N	Valid			32		
	Missing			0		
Mean			1.0625			
Median			1.0000			
Mode			1.00			
Std. Deviation			0.24593			
Skewness			3.79504			
Std. Error of Skewness			.414			
Kurtosis			13.226			
Std. Error of Kurtosis			.809			
Sum			34.00			
Valid	Yes			30		
	NO			2		
Total			32			
One-Sample Test	Test Value = 0					
	t	df	Sig. (2-tailed)	Mean Difference	95% Confidence Interval of the Difference	
					Lower	Upper
Work System Change	24.43	31	.000	1.0625	0.973	1.151



The t-test illustrated that the respondents who believed that the work system was a critical factor to the ISO 9000 implementation had a statistically significant acceptance attitude (93.7%) when compared to 6.2% of the respondents who did not consider the work system as an important factor to the implementation of ISO 9000,  $t(31) = 24.4$ ,  $p = 0.000$ . The significance was less than 0.05; the null hypothesis is thus rejected.

**Question # 7: The role of Human Resources is important in your organisation?**

H0: Human resource activities have no effect on the implementation scale of ISO 9000.

H1: Human resource activities have a positive effect on the implementation scale of ISO 9000.

Table 4.9 Human Resource t-test Result																											
N	Valid			32																							
	Missing			0																							
Mean			1.0312																								
Median			1.0000																								
Mode			1.00																								
Std. Deviation			0.1767																								
Skewness			5.6568																								
Std. Error of Skewness			.414																								
Kurtosis			32.000																								
Std. Error of Kurtosis			.809																								
Sum			33.00																								
Valid	Yes			31	<table border="1"> <thead> <tr> <th rowspan="3">One-Sample Test</th> <th colspan="5">Test Value = 0</th> </tr> <tr> <th rowspan="2">t</th> <th rowspan="2">df</th> <th rowspan="2">Sig. (2-tailed)</th> <th rowspan="2">Mean Difference</th> <th colspan="2">95% Confidence Interval of the Difference</th> </tr> <tr> <th>Lower</th> <th>Upper</th> </tr> </thead> <tbody> <tr> <td>Human resources</td> <td>33.00</td> <td>31</td> <td>.000</td> <td>1.0312</td> <td>0.967</td> <td>1.0949</td> </tr> </tbody> </table>		One-Sample Test	Test Value = 0					t	df	Sig. (2-tailed)	Mean Difference	95% Confidence Interval of the Difference		Lower	Upper	Human resources	33.00	31	.000	1.0312	0.967	1.0949
	One-Sample Test	Test Value = 0																									
t		df	Sig. (2-tailed)	Mean Difference				95% Confidence Interval of the Difference																			
							Lower	Upper																			
Human resources	33.00	31	.000	1.0312			0.967	1.0949																			
NO			1																								
Total			32																								

The t-test illustrated that the respondents who believed that Human Resources were a critical factor to the ISO 9000 implementation had a statistically significant acceptance attitude (96.9%) when compared to 3.1% of the respondents who did not consider Human Resources as an important factor to the implementation of ISO 9000,  $t(31) = 33, p = 0.000$ . The significance was less than 0.05; the null hypothesis is thus rejected.

**Question # 8: Do you agree that the consulting body is important to your organisation?**

H0: The Consulting body has no effect on the implementation scale of ISO 9000.

H1: The Consulting body has a positive effect on the implementation scale of ISO 9000.

Table 4.10 Consulting Bodies t-test Result		
N	Valid	32
	Missing	0
Mean		1.3750
Median		1.0000
Mode		1.00
Std. Deviation		0.4918
Skewness		0.5421
Std. Error of Skewness		.414
Kurtosis		-1.8243
Std. Error of Kurtosis		.809
Sum		44.00
Valid	Yes	20
	NO	12
Total		32

One-Sample Test	Test Value = 0					
	t	df	Sig. (2-tailed)	Mean Difference	95% Confidence Interval of the Difference	
					Lower	Upper
Consulting Bodies	15.81	31	.000	1.3750	1.197	1.552

The t-test illustrated that the respondents who believed that the consulting body was a critical factor to the ISO 9000 implementation had a statistically significant acceptance attitude (62.5%) when compared to 37.5% of the respondents who did not consider the consulting body as an important factor to the implementation of ISO 9000,  $t(31) = 15.8$ ,  $p = 0.000$ . The significance was less than 0.05; the null hypothesis is thus rejected.



**Question # 9: Do you agree that customer satisfaction is important to your organisation?**

H0: Customer satisfaction has no effect on the implementation scale of ISO 9000.

H1: Customer satisfaction has a positive effect on the implementation scale of ISO 9000.

Table 4.11 Customer Satisfaction t-test Result						
N	Valid		32			
	Missing		0			
Mean			1.0937			
Median			1.0000			
Mode			1.00			
Std. Deviation			0.2961			
Skewness			2.9264			
Std. Error of Skewness			.414			
Kurtosis			6.9986			
Std. Error of Kurtosis			.809			
Sum			35.00			
Valid	Yes		29			
	NO		3			
Total			32			
One-Sample Test	Test Value = 0					
	t	df	Sig. (2-tailed)	Mean Difference	95% Confidence Interval of the Difference	
					Lower	Upper
Customer Satisfaction	20.89	31	.000	1.0937	0.9869	1.2005

The t-test illustrated that the respondents who believed that customer satisfaction was a critical factor to the ISO 9000 implementation had a statistically significant acceptance attitude (90.6%) when compared to 9.3% of the respondents who did not consider customer satisfaction as an important factor to the implementation of ISO 9000,  $t(31) = 20.9, p = 0.000$ . The significance was less than 0.05; the null hypothesis is thus rejected.

**Question # 10: Do you agree that overcoming the employees' resistance to change is very important to your organisation?**

H0: Employees' resistance has no effect on the implementation scale of ISO 9000.

H1: Employees' resistance has a positive effect on the implementation scale of ISO 9000.

Table 4.12 Employees' Resistance t-test Result						
N	Valid		32			
	Missing		0			
Mean		1.2187				
Median		1.0000				
Mode		1.00				
Std. Deviation		0.4200				
Skewness		1.4285				
Std. Error of Skewness		.414				
Kurtosis		0.039				
Std. Error of Kurtosis		.809				
Sum		39.00				
Valid	Yes		25			
	NO		7			
Total			32			
One-Sample Test	Test Value = 0					
	t	df	Sig. (2-tailed)	Mean Difference	95% Confidence Interval of the Difference	
					Lower	Upper
Employees' Resistance	16.41	31	.000	1.2187	1.0673	1.3701

The t-test illustrated that the respondents who believed that employees' resistance was a critical factor to the ISO 9000 implementation had a statistically significant acceptance attitude (78.1%) when compared to 21.9% of the respondents who did not consider employees resistance as an important factor to the implementation of ISO 9000,  $t(31) = 16.4, p = 0.000$ . The significance was less than 0.05; the null hypothesis is thus rejected.

**Question # 11: Do you agree that a quality guideline is important to your organisation?**

H0: Quality guidelines have no effect on the implementation scale of ISO 9000.

H1: Quality guidelines have a positive effect on the implementation scale of ISO 9000.

Table 4.13 Quality Guidelines t-test Result						
N	Valid		32			
	Missing		0			
Mean			1.0937			
Median			1.0000			
Mode			1.00			
Std. Deviation			0.2961			
Skewness			2.9264			
Std. Error of Skewness			.414			
Kurtosis			6.9986			
Std. Error of Kurtosis			.809			
Sum			35.00			
Valid	Yes		29			
	NO		3			
Total			32			
One-Sample Test	Test Value = 0					
	t	df	Sig. (2-tailed)	Mean Difference	95% Confidence Interval of the Difference	
					Lower	Upper
Quality Guideline	20.89	31	.000	1.0937	0.9869	1.2005

The t-test illustrated that the respondents who believed that quality guidelines were a critical factor to the ISO 9000 implementation had a statistically significant acceptance attitude (90.6%) when compared to 9.4% of the respondents who did not consider quality guidelines as an important factor to the implementation of ISO 9000,  $t(31) = 20.9$ ,  $p = 0.000$ . The significance was less than 0.05; the null hypothesis is thus rejected.

**Question # 12: Do you think shortage of financial resources will affect the implementation of ISO 9000?**

H0: The financial resources of the organisation has no effect on the implementation scale of ISO 9000.

H1: The financial resource of the organisation has a positive effect on the implementation scale of ISO 9000.

Table 4.14 Financial Resources t-test Result						
N	Valid		32			
	Missing		0			
Mean		1.0625				
Median		1.0000				
Mode		1.00				
Std. Deviation		0.2459				
Skewness		3.7950				
Std. Error of Skewness		.414				
Kurtosis		13.226				
Std. Error of Kurtosis		.809				
Sum		34.00				
Valid	Yes		30			
	NO		2			
Total			32			
One-Sample Test	Test Value = 0					
	t	df	Sig. (2-tailed)	Mean Difference	95% Confidence Interval of the Difference	
					Lower	Upper
Financial Resources	24.4	31	.000	1.0937	0.9869	1.2005

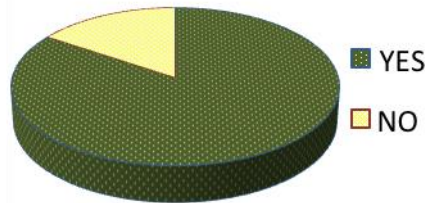
The t-test illustrated that the respondents who believed that financial resources were a critical factor to the ISO 9000 implementation had a statistically significant acceptance attitude (93.7%) when compared to 6.2% of the respondents who did not consider financial resources as an important factor to the implementation of ISO 9000,  $t(31) = 24.4$ ,  $p = 0.000$ . The significance was less than 0.05; the null hypothesis is thus rejected.

**Question # 13: Do you think that the requirements of ISO 9000 are unrealistic?**

H0: ISO 9000 requirements have no effect on the implementation scale of ISO 9000.

H1: ISO 9000 requirements have a positive effect on the implementation scale of ISO 9000.

Table 4.15 ISO Requirements t-test Result						
N	Valid		32			
	Missing		0			
Mean			1.1562			
Median			1.0000			
Mode			1.00			
Std. Deviation			0.3689			
Skewness			1.9878			
Std. Error of Skewness			.414			
Kurtosis			2.0777			
Std. Error of Kurtosis			.809			
Sum			37.00			
Valid	Yes		27			
	NO		5			
Total			32			
One-Sample Test	Test Value = 0					
	t	df	Sig. (2-tailed)	Mean Difference	95% Confidence Interval of the Difference	
					Lower	Upper
Requirements Of ISO 9000	17.73	31	.000	1.1562	1.0232	1.2892



The t-test illustrated that the respondents who believed that requirements of ISO 9000 were a critical factor to the ISO 9000 implementation had a statistically significant acceptance attitude (84.4%) when compared to 15.6% of the respondents who did not consider the requirements of ISO 9000 as an important factor to the implementation of ISO 9000,  $t(31) = 17.7, p = 0.000$ . The significance was less than 0.05; the null hypothesis is thus rejected.

**Question # 14: Does the inflating size of documents affect the implementation of ISO 9000?**

H0: Inflating size of documents has no effect on the implementation scale of ISO 9000.

H1: Inflating size of documents has a positive effect on the implementation scale of ISO 9000.

Table 4.16 Documents Size t-test Result								
N	Valid			32				
	Missing			0				
Mean			1.3125					
Median			1.0000					
Mode			1.00					
Std. Deviation			0.4709					
Skewness			0.8493					
Std. Error of Skewness			.414					
Kurtosis			-1.3682					
Std. Error of Kurtosis			.809					
Sum			42.00					
Valid	Yes			22				
	NO			10				
Total			32					
One-Sample Test	Test Value = 0							
	t	df	Sig. (2-tailed)	Mean Difference	95% Confidence Interval of the Difference			
					Lower	Upper		
Size Of Documents	15.76	31	.000	1.3125	1.1427	1.4822		

The t-test illustrated that the respondents who believed that size of documents was a critical factor to the ISO 9000 implementation had a statistically significant acceptance attitude (68.7%) when compared to 31.2% of the respondents who did not consider the size of documents as an important factor to the implementation of ISO 9000,  $t(31) = 15.7$ ,  $p = 0.000$ . The significance was less than 0.05; the null hypothesis is thus rejected.

**Question # 15: Do you agree that performing the internal audits is important within your organisation?**

H0: Performing internal audits has no effect on the implementation scale of ISO 9000.

H1: Performing internal audits has a positive effect on the implementation scale of ISO 9000.

Table 4.17 Internal Audits t-test Result						
N	Valid		32			
	Missing		0			
Mean		1.2500				
Median		1.0000				
Mode		1.00				
Std. Deviation		0.4399				
Skewness		1.2122				
Std. Error of Skewness		.414				
Kurtosis		-0.5701				
Std. Error of Kurtosis		.809				
Sum		40.00				
Valid	Yes		24			
	No		8			
Total			32			
<b>One-Sample Test</b>	Test Value = 0					
	t	df	Sig. (2-tailed)	Mean Difference	95% Confidence Interval of the Difference	
					Lower	Upper
Internal Audits	16.07	31	.000	1.2500	1.0913	1.4086

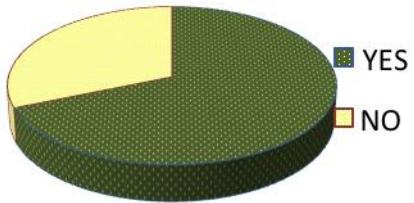
The t-test illustrated that the respondents who believed that internal audits were a critical factor to the ISO 9000 implementation had a statistically significant acceptance attitude (75%) when compared to 25% of the respondents who did not consider internal audits as an important factor to the implementation of ISO 9000,  $t(31) = 16.1$ ,  $p = 0.000$ . The significance was less than 0.05; the null hypothesis is thus rejected.

**Question # 16: Do you agree that understanding the importance of ISO 9000 is essential to your organisation?**

H0: Understanding of ISO importance has no effect on the implementation scale of ISO 9000.

H1: Understanding of ISO importance has a positive effect on the implementation scale of ISO 9000.

Table 4.18 Understanding of ISO importance t-test Result		
N	Valid	32
	Missing	0
Mean		1.3125
Median		1.0000
Mode		1.00
Std. Deviation		0.4709
Skewness		0.849
Std. Error of Skewness		0.414
Kurtosis		-1.3682
Std. Error of Kurtosis		.809
Sum		42.00
Valid	Yes	22
	NO	10
Total		32

One-Sample Test	Test Value = 0					
	t	df	Sig. (2-tailed)	Mean Difference	95% Confidence Interval of the Difference	
					Lower	Upper
Understanding The Importance Of ISO 9000	15.76	31	.000	1.3125	1.1427	1.4822

The t-test illustrated that the respondents who believed that understanding the importance of ISO was a critical factor to the ISO 9000 implementation had a statistically significant acceptance attitude (68.7%) when compared to 31.2% of the respondents who did not consider it to be an important factor to the implementation of ISO 9000,  $t(31) = 15.7, p = 0.000$ . The significance was less than 0.05; the null hypothesis is thus rejected.



## 4.5 Regression Analysis

Regression analyses were employed to predict the values of the dependent variable quality management progress (the preparation of the registration, the audit time and the organisation effort) from the independent variables (ISO requirements, training and education, customer satisfaction, size of documents, quality guidelines, top management, work system, employees resistance, internal audit, understanding of quality programme, financial resources, human resources, consulting boards, interdepartmental relations, ignorance of ISO importance, organisation culture) in this study. These predictor variables were selected from the literature and triangulated by the first questionnaire. The regression analysis looked at the significance of each independent. It was, therefore, able to find out the goodness of each independent, explaining how the tested factors explain variation on the response variable. Regression also gave the factor or factors that had the most significant effect on the response variable. If none of the given factors has a significant effect, the coefficients table indicates so. The result of regression analysis of this study is presented in the following section.

### 4.5.1 Registration Process Preparation

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.856 <sub>a</sub>	.733	.448	.42145

a. Predictors: (Constant), ISO 9000 Factors  
b. Dependent Variable: The period of preparation of the registration process of ISO 9000

The above output table 4.19 shows that the model which included ISO requirements, training and education, customer satisfaction, size of documents, quality guidelines, top management, work system, employees' resistance, internal audit, understanding of quality programme, financial resources, human resources, consulting boards, interdepartmental relations, ignorance of ISO's importance, and organisation culture can explain 73.3 per cent of the variation in the preparation of the registration process

of ISO 9000. Moreover, according to Sekaran (2003) the result in Table 4.20 shows that there is a strong relationship between the dependent variable and the independent variables as  $R=0.856$ .

**Table 4.20 ANOVA<sup>a</sup>**

Model	Sum of Squares	df	Mean Square	F	Sig.
Regression	7.304	16	.457	2.570	.037 <sup>b</sup>
Residual	2.664	15	.178		
Total	9.969	31			

a. Dependent Variable: The period of preparation of the registration process of ISO 9000  
b. Predictors: (Constant), ISO 9000 Factors

The output above shows that the model is significant ( $p= 0.037$ ) and the conclusion made is that the implementation factors have a positive effect on the preparation of the registration process of ISO 9000.

**Table 4.21 Coefficients<sup>a</sup>**

Model	Unstandardized Coefficients		Stand Coefficients			Collinearity Statistics	
	B	Std. Error	Beta	t	Sig.	Tolerance	VIF
(Constant)	5.00	.770		6.50	.000		
Top Management	-.120	.107	-.255	-1.11	.281	.34	2.91
Training and Education	-.087	.166	-.106	-.52	.608	.43	2.30
Interdepartmental Relations	-.071	.195	-.128	-.36	.722	.14	7.00
Understanding of Quality Programme	.047	.207	.077	.23	.821	.16	6.22
Organisation Culture	-.101	.210	-.191	-.48	.638	.11	8.94
Work System	-.282	.132	-.490	-2.13	.050	.33	2.96
Human Resources	.046	.197	.077	.23	.817	.16	5.99
Consulting Boards	-.033	.239	-.048	-.14	.891	.15	6.53
Customer Satisfaction	.045	.132	.067	.34	.736	.47	2.12
Employees' Resistance	-.056	.228	-.092	-.24	.810	.12	7.97
Quality Guidelines	-.082	.111	-.134	-.74	.471	.54	1.84
Size of documents	.075	.199	.104	.37	.712	.23	4.31
Internal Audit	-.082	.138	-.147	-.59	.560	.29	3.42
Financial Resources	-.021	.171	-.042	-.12	.905	.14	6.69
Ignorance of ISO Importance	.059	.223	.094	.26	.795	.14	7.09

ISO Requirements	.166	.169	.295	.98	.341	.19	5.06
a. Dependent Variable: The period of preparation of the registration process of ISO 9000							

As shown in the above coefficients model, only one factor has a significant effect from the implementation factors to the period of preparation for the registration process of ISO 9000 in the Saudi manufacturing sector. As table 4.21 shows one of the results is 0.05 (maximum amount for significant effect). This means that work system ( $\beta=-0.490$ ) has a significant effect on the organisation's effort in ISO 9000 implementation in the Saudi manufacturing sector. The VIF shows that all of the independent variables are less than ten, hence, they are not correlated or collinear, thus there is no real cause for concern. Similarly, the VIF confirms there is nothing wrong with the coefficients.

#### 4.5.2 Amount of Auditing

Mod e	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.916 <sup>a</sup>	.840	.669	.41316

a. Predictors: (Constant), ISO 9000 Factors  
b. Dependent Variable: Amount of auditing until achieving the ISO certificate

The above output table.4.22 shows that the model which included the ISO requirements, training and education, customer satisfaction, size of documents, quality guidelines, top management, work system, employees' resistance, internal audit, understanding of quality programme, financial resources, human resources, consulting boards, interdepartmental relations, ignorance of ISO importance, and organisation culture can explain 84 per cent of the variation in the amount of auditing until achieving the ISO certificate. Moreover, according to Sekaran (2003) the result in Table.4.22 shows that there is a strong relationship between the dependent variable and the independent variables as  $R=0.916$ .

Model	Sum of Squares	df	Mean Square	F	Sig.
Regression	13.439	16	.840	4.921	.002 <sup>b</sup>
Residual	2.561	15	.171		
Total	16.000	31			

a. Dependent Variable: amount of auditing until achieved the ISO certificate

b. Predictors: (Constant), ISO 9000 Factors

The output above shows that the model is significant ( $p= 0.02$ ) and the conclusion made is that the implementation factors have a positive effect on the amount of auditing until achieving the ISO certificate.

Model	Unstand Coeff		Stan dCo eff			Collinearity Statistics	
	B	Std. Error	Beta	t	Sig.	Tolerance	VIF
(Constant)	5.70	.75		7.55	.00		
Top Management	-.25	.10	-.428	-2.42	.028	.34	2.91
Training and Education	-.30	.16	-.292	-1.85	.083	.43	2.30
Interdepartmental Relations	-.28	.19	-.393	-1.46	.165	.14	7.00
Understanding of Quality Programme	.23	.20	.295	1.13	.274	.16	6.22
Organisation Culture	.14	.20	.213	.70	.496	.11	8.94
Work System	.00	.13	.001	.02	.984	.33	2.96
Human Resources	.01	.19	.013	.06	.957	.16	5.99
Consulting Boards	-.06	.23	-.075	-.26	.790	.15	6.53
Customer Satisfaction	.09	.12	.116	.76	.458	.47	2.12
Employees' Resistance	.02	.22	.037	.12	.901	.12	7.97
Quality Guidelines	-.27	.10	-.354	-2.52	.0242	.54	1.84
Size of documents	-.14	.19	-.155	-.71	.483	.23	4.31
Internal Audit	-.04	.13	-.063	-.31	.757	.29	3.42
Financial Resource	.07	.16	.112	.41	.684	.14	6.69
Ignorance of ISO Importance	-.22	.21	-.282	-1.02	.322	.14	7.09
ISO Requirements	.01	.16	.016	.07	.947	.19	5.06

a. Dependent Variable: The amount of auditing till you achieved the ISO certificate

As shown in the above coefficients model two factors had a significant effect from the implementation factors to the amount of auditing until achieving the ISO certificate in the Saudi manufacturing sector. As table 4.24 shows two of the results are **0.028** and **0.024** which are less than 0.05 (maximum amount for significant effect) this is means that Top Management ( $\beta= -0.428$ ) and Quality Guidelines ( $\beta= -0.354$ ) have a significant effect on the amount of auditing until achieving the ISO certificate in the Saudi manufacturing sector. The VIF shows that all of the independent variables are less than

ten, hence, they are not correlated or collinear, thus there is no real cause for concern. Similarly, the VIF confirms there is nothing wrong with the coefficients.

### 4.5.3 The Organisation's Effort

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.963 <sup>a</sup>	.927	.850	.52838

a. Predictors: (Constant), ISO 9000 Factors  
b. Dependent Variable: The organisation's effort towards ISO 9000 implementation.

The above output table.4.25 shows that the model which included the ISO requirements, training and education, customer satisfaction, size of documents, quality guidelines, top management, work system, employees' resistance, internal audit, understanding of quality programme, financial resources, human resources, consulting boards, interdepartmental relations, ignorance of ISO importance, and organisation culture can explain 92.7 per cent of the variation in the organisation's effort towards ISO 9000 implementation. Moreover, according to Sekaran (2003) the result in Table 4.26 shows that there is a strong relationship between the dependent variable and the independent variables as R=0.963.

Model	Sum of Squares	df	Mean Square	F	Sig.
Regression	53.531	16	3.346	11.984	.000 <sup>b</sup>
Residual	4.188	15	.279		
Total	57.719	31			

a. Dependent Variable: The organisation's effort in ISO 9000 implementation  
b. Predictors: (Constant), ISO 9000 Factors

The output above shows that the model is significant ( $p= 0.000$ ) and the conclusion made is that the implementation factors have a positive effect on the organisation's effort towards ISO 9000 implementation.

Table 4.27 Coefficients <sup>a</sup>							
Model	Unstand Coeff		Stand Coeff Beta	T	Sig.	Collinearity Statistics	
	B	Std. Error				Tol	VIF
(Constant)	-2.77	.96		-2.87	.01		
Top Management	.25	.13	.22	1.91	.07	.343	2.91
Training and Education	.20	.20	.10	.98	.33	.43	2.30
Interdepartmental Relations	.39	.24	.29	1.59	.13	.14	7.00
Understanding of Quality Programme	.14	.25	.10	.57	.57	.16	6.22
Organisation Culture	-.29	.26	-.23	-1.11	.28	.11	8.94
Work System	.50	.16	.36	3.05	.00	.33	2.96
Human Resources	.04	.24	.02	.16	.87	.16	5.99
Consulting Boards	.37	.29	.22	1.26	.22	.15	6.53
Customer Satisfaction	.04	.16	.02	.26	.79	.47	2.12
Employees' Resistance	.04	.28	.02	.13	.89	.12	7.97
Quality Guidelines	.13	.14	.09	.97	.34	.54	1.84
Size of documents	.04	.24	.02	.15	.87	.23	4.31
Internal Audit	-.03	.17	-.02	-.18	.85	.29	3.42
Financial Resources	-.02	.21	-.02	-.11	.90	.14	6.69
Ignorance of ISO Importance	.22	.28	.14	.80	.43	.14	7.09
ISO Requirements	-.29	.21	-.21	-1.38	.18	.19	5.06

a. Dependent Variable: The organisation's effort in ISO 9000 implementation

As shown in the above coefficients model, only one factor has a significant effect from the implementation factors to the organisation's effort in ISO 9000 implementation in the Saudi manufacturing sector. As table 4.27 shows one of the results is 0.00 which is less than 0.05 (maximum amount for significant effect) this is means that work system ( $\beta=0.36$ ) has a significant effect on the organisation's effort in ISO 9000 implementation in the Saudi manufacturing sector. The VIF shows that all of the independent variables are less than ten, hence, they are not correlated or collinear, thus there is no real cause for concern. Similarly, the VIF confirms there is nothing wrong with the coefficients.

#### 4.6 AHP Result Finding

The characteristics of the four manufacturing organisations (Companies A, B, C, and D) involved in this study are summarized in Table 4.28 The characteristics were chosen to reflect the unique characteristics of manufacturing organisations, in terms of their structure, procedures, behaviour, culture, processes, people and contacts

endemic in Saudi Arabia. A '✓' means that the company possesses that characteristic, while '✗' means that it does not. The interviews were conducted with top managers, middle-level managers and quality managers of the organisations. These personnel are responsible for and/or involved in the implementation of manufacturing practices and performance measures in their organisations. Their views provided a wide spectrum of experience and expertise within their organisations and across various manufacturing sectors in Saudi Arabia.

**Table 4.28** Selection of ISO 9000 Certified Manufacturing organisations for the Study

Lists of selection items	Company			
	A	B	C	D
<b>Sector Type</b>				
Engineering	✓	✗	✓	✓
Chemical	✗	✓	✗	✗
<b>No. Employees</b>				
More than 500	✓	✓	✓	✓
<b>Ownership type</b>				
Mixed government and private sector	✓	✓	✗	✗
Saudi private	✗	✗	✓	✗
Joint venture with foreign company	✗	✗	✗	✓

The local and global percent priorities of the different levels of performance criteria are depicted in Table 4.29. The weightings of the criteria at each level represent to varying degrees how important that criteria is towards the successful implementation of ISO 9000 in the Saudi manufacturing sector. The criteria that greatly influenced the implementation of ISO 9000 Standard would be represented by the highest percent priority. Similarly, those with low percent priorities would represent the criteria which poorly influences or had no influence on ISO 9000 implementation. It was found that the Saudi manufacturing sector put higher emphasis on the duration of the preparation for the ISO 9000 implementation, with the mean weights (i.e. percent priority) of 54.4 % and 44% for the effort which the organisation had to make to implement the ISO 9000.

A closer examination of the percent priorities in level 2 criteria helped identify the

strong and weak factors in the Saudi manufacturing sector. At level 2, top management (16.6 %) and customer satisfaction (12.47 %) were the leading sub-criteria. The lowest ranked sub-criteria was inflating size of documents (0.85 %). This weakness reflects the fact that the size of documents does not have any effect on the implementation of ISO 9000 in the Saudi manufacturing sector. Table 4.30 gives the overall ranking in terms of the percent priority of these sub-criteria. The inconsistency indices of the AHP analysis for Companies A, B, C, and D were 0.09, 0.09, 0.08 and 0.09, respectively. These fall within the acceptable level of 0.10 as recommended by Saaty (1996). This indicated that the evaluators assigned their weight consistently on examining the priorities of decision criteria towards the factors affecting the implementation of ISO 9000 standard.

**Table 4.29** Priority weights of stages and sub-criteria from evaluators

Level 1 criteria	Evaluator 1	Evaluator 2	Evaluator 3	Evaluator 4	Mean
Effort	3.33	2.66	2	2	<b>2.49</b>
Preparation	3.33	3.33	3	2.66	<b>3.08</b>
Auditing	0.07	0.08	0.10	0.09	<b>0.09</b>
Sub Total	6.73	6.07	5.1	4.77	5.66

Level 2 criteria	Evaluator 1	Evaluator 2	Evaluator 3	Evaluator 4	Mean
Top management	4.37	4.81	5.93	6.87	<b>5.49</b>
Training	2.88	3.01	4.27	6.01	<b>4.04</b>
Inter-departmental relations	0.67	0.67	0.90	0.94	<b>0.79</b>
Insufficient knowledge in quality programme	1.52	1.54	2.58	2.62	<b>2.07</b>
Organisational culture	0.75	0.77	0.57	0.62	<b>0.67</b>
Work systems	0.73	0.72	0.53	0.52	<b>0.62</b>
Human resources	0.88	0.82	0.49	0.49	<b>0.67</b>
Consulting boards	1.65	1.65	2.66	5.46	<b>2.85</b>
Customer satisfaction	3.60	3.71	4.28	4.90	<b>4.12</b>
Employee resistance	1.30	1.29	1.05	1.23	<b>1.21</b>
Absence of quality guidelines	2.14	2.13	2.63	2.50	<b>2.35</b>
Shortage of financial resources	3.30	3.17	2.99	3.38	<b>3.21</b>
ISO 9000 requirements are unrealistic	1.01	1.17	0.88	1.19	<b>1.06</b>
Inflating size of documents	0.21	0.21	0.38	0.34	<b>0.28</b>
Internal audits	0.71	0.75	0.41	0.38	<b>0.56</b>
Ignorance of ISO importance	2.21	2.19	4.40	3.40	<b>3.05</b>
Sub Total	27.93	28.61	34.95	40.91	<b>33.04</b>

**Consistency Ratio (CR) = 9.9%**



Table 4.30 Ranking of the per cent priority weightings		
Level 1 criteria	Per cent (%)	Ranking
Effort	44	2
Preparation	54.4	1
Auditing	1.6	3

Level 2 criteria	Per cent (%)	Ranking
Top management	16.6	1
Training	12.2	3
Inter-departmental relations	2.4	11
Insufficient knowledge in quality programme	6.3	8
Organisational culture	2	12A
Work systems	1.9	13
Human resources	2	12B
Consulting boards	8.6	6
Customer satisfaction	12.5	2
Employee resistance	3.7	9
Absence of quality guidelines	7.1	7
Shortage of financial resources	9.7	4
ISO 9000 requirements are unrealistic	3.2	10
Inflating size of documents	0.85	15
Internal audits	1.7	14
Ignorance of ISO importance	9.2	5

In order to check the simulated result given in table 4.29, a manual recalculation of the data provided by the following steps:

- Developing a single pair-wise comparison matrix for the criteria.
- Multiplying the values of each row together and calculating the 16th root of said;
- Normalizing the aforementioned nth root of products to get the appropriate weights;
- Calculating the Consistency Ration (CR).

Table 4.31 demonstrate the pair-wise comparison matrix, the column labelled “16th Root” in the matrix shown below is calculated by dividing each row together and multiplying the result by (1/16) because there are 16 criteria in this case. Moreover, the column labelled “Priority Vector” in the matrix below is calculated by dividing the (SUM) of each column by the (16th Root) of each row.

**Table 4.31 Pair-Wise comparison matrix**

	Top management	Training	Inter-departmental relations	Insufficient knowledge in quality programme	Organisational culture	Work systems	Human resources	Consulting boards	Customer satisfaction	Employee resistance	Absence of quality guidelines	Shortage of financial resources	ISO 9000 requirements are unrealistic	Inflating size of documents	Internal audits	Ignorance of ISO importance	16 <sup>th</sup> root	Priority Vector
Top management	1	3	5	4	7	6	7	4	2	8	4	2	8	7	7	6	<b>4.11</b>	<b>0.20</b>
Training	0.25	1	4	2	5	4	3	4	1	2	3	2	5	7	5	3	<b>2.54</b>	<b>0.12</b>
Inter-departmental relations	0.14	0.17	1	0.33	1	2	1	0.2	0.17	0.5	0.2	0.5	1	5	2	0.2	<b>0.54</b>	<b>0.03</b>
Insufficient knowledge in quality programme	0.25	0.5	3	1	5	4	6	3	0.17	1	1	0.5	4	3	6	4	<b>1.66</b>	<b>0.08</b>
Organisational culture	0.14	0.14	1	0.2	1	1	1	0.25	0.2	0.33	0.2	0.14	0.5	2	2	0.17	<b>0.41</b>	<b>0.02</b>
Work systems	0.14	0.14	0.5	0.25	1	1	2	0.17	0.17	1	0.5	0.25	0.33	1	1	0.12	<b>0.41</b>	<b>0.02</b>
Human resources	0.2	0.33	1	0.5	1	1	1	0.17	0.2	1	0.17	0.17	1	1	1	0.25	<b>0.48</b>	<b>0.02</b>
Consulting boards	0.17	0.33	3	1	2	3	4	1	0.2	4	1	0.25	1	5	1	0.5	<b>1.04</b>	<b>0.05</b>
Customer satisfaction	0.5	0.5	4	2	5	4	7	5	1	5	3	3	4	3	3	4	<b>2.72</b>	<b>0.13</b>
Employee resistance	0.17	0.25	2	1	1	1	1	0.25	0.2	1	0.25	0.33	3	6	2	0.25	<b>0.70</b>	<b>0.03</b>
Absence of quality guidelines	0.14	0.33	2	1	4	5	3	1	0.33	4	1	0.33	1	6	4	1	<b>1.29</b>	<b>0.06</b>
Shortage of financial resources	0.17	0.25	4	4	5	4	4	4	0.33	3	3	1	5	8	3	3	<b>2.16</b>	<b>0.10</b>
ISO 9000 requirements are unrealistic	0.2	0.33	2	0.25	4	3	1	1	0.2	0.33	1	0.2	1	4	1	0.33	<b>0.73</b>	<b>0.03</b>
Inflating size of documents	0.17	0.2	0.33	0.2	0.25	0.25	0.2	0.2	0.33	0.17	0.14	0.12	0.25	1	0.25	0.33	<b>0.24</b>	<b>0.01</b>
Internal audits	0.2	0.33	1	0.5	0.5	1	1	1	0.25	0.5	0.25	0.33	1	4	1	0.25	<b>0.58</b>	<b>0.03</b>
Ignorance of ISO importance	0.25	0.25	3	1	4	5	4	2	0.25	4	1	0.33	3	3	4	1	<b>1.44</b>	<b>0.07</b>
<b>Sum</b>	<b>4.09</b>	<b>8.05</b>	<b>36.83</b>	<b>19.23</b>	<b>46.75</b>	<b>45.25</b>	<b>46.2</b>	<b>27.24</b>	<b>7</b>	<b>35.83</b>	<b>19.71</b>	<b>11.45</b>	<b>39.08</b>	<b>66</b>	<b>43.25</b>	<b>24.4</b>	<b>21.07</b>	<b>1.00</b>
<b>Sum x PV</b>	<b>0.80</b>	<b>0.94</b>	<b>0.94</b>	<b>1.01</b>	<b>1.21</b>	<b>1.18</b>	<b>1.25</b>	<b>1.38</b>	<b>0.93</b>	<b>1.29</b>	<b>1.30</b>	<b>1.20</b>	<b>1.34</b>	<b>0.76</b>	<b>1.24</b>	<b>1.61</b>		

Furthermore, the CR is calculated in order to inform the decision maker how consistent is the pair-wise comparison, this is can be achieved by four steps:

- First, multiplying the (SUM) of each column by the (Priority Vector) for that criteria, as shown in table 4.31.
- Second, in table 4.31 the aforementioned values shown in the row labeled "SUM\*PV" are added together to yield a total of 18.39, this value is known as Lambda Max .

$$\lambda \text{ max} = \text{Total value of Sum x PV} = 18.39$$

- Third, the Consistency Index (CI) is then calculated using the following formula:

$$CI = \frac{\lambda \text{ max} - n}{n - 1}$$

Where  $n$  is the number of criteria being compared. In this case  $n = 16$

Therefore;  $CI = \frac{18.39-16}{16-1} = 0.159$

- Fourth, the consistency Ratio (CR) is calculated by dividing the Consistency Index (CI) from the previous step by Random Index (RI), which is determined from a lookup table.

Table 4.32 shows the RI for Saaty scale (Saaty, 1977):

$n$	Random Index (RI)	$n$	Random Index (RI)
1	0.00	9	1.47
2	0.00	10	1.48
3	0.58	11	1.50
4	0.90	12	1.52
5	1.12	13	1.55
6	1.32	14	1.57
7	1.41	15	1.59
8	1.45	16	1.61

Therefore,  $CR = \frac{CI}{RI} = \frac{0.159}{1.61} = 0.0987 = 9.9\%$

According to Saaty, the inconsistency is acceptable if the consistency ratio (CR) is smaller or equal to 10%. Therefore, CR = 9.9% is acceptable.

In conclusion of the results of the manual calculation and the simulated ones, it justifies that both are the same and the simulated result is correct.

#### 4.7 Chapter Summary

This chapter displayed the findings from the three stage survey which was identified in the methodology chapter. The most common 16 factors were identified, reviewed, and presented to the manufacturing industry in Saudi Arabia in an attempt to triangulate the extracted data with data obtained from the field. The analysis has tested the 16 hypotheses. All these cases involved testing the significance of the models. The results obtained assisted in making conclusions on whether the specified models were significant. The t-test was conducted on the sixteen responses. All of them had a significance that was less than 0.05. The null hypothesis was, therefore, rejected and the conclusion made was that the responses obtained had a significant difference. A regression analysis was conducted to reveal the significance level of the factors and the effect of these factors on the implementation progress (preparation, effort and auditing). Moreover, the findings gathered from the pairwise comparison were illustrated and analysed using AHP. In the next chapter, the findings will be discussed and compared with the literature to see what is unique or similar to other studies.

## CHAPTER 5 : DISCUSSION OF RESULTS

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### 5.1 Introduction

The outcomes of the qualitative and quantitative data offered in chapter 4 are interpreted in this chapter. Initially, this chapter establishes the characteristics of the sample, together with the respondents and the member companies. Next, the conclusions drawn from the ISO 9000 implementation factors in the questionnaire are examined, followed by the regression analysis results, together with the AHP analysis. This chapter concludes with a summary.

### 5.2 Discussion of First Questionnaire Findings

This section presents the findings collected from the first questionnaire, which was issued to 100 manufacturing companies in Saudi Arabia by e-mail. 37% of the questionnaires were returned. The first questionnaire aimed to gather the most important 15 factors affecting the implementation of ISO 9000 which were identified in the literature review. Those 15 factors were presented to the manufacturing industry in Saudi Arabia in an attempt to match the extracted data with data obtained from the field.

From the responses, it was found that 40% of the organisations were in the engineering sector and more than 46% had more than 500 employees, which indicates that ISO 9000 is more popular in medium and large organisations. 46.7% of companies operating for more than 20 years have held the ISO 9000 standard for more than 10 years. Of the companies who responded to the survey, 40% are joint ventures with foreign companies and 33.3% are mixed government and private sector companies, indicating that the Saudi sole private sector is still struggling with the implementation of ISO 9000. Respondents also declared that commitment from senior management had the most impact on the success of the implementation of ISO 9000, describing this as a

critical factor, as shown in Table 4.2. Moreover, the customer satisfaction was raised by some of the participants as one of the most important factors, which affects the implementation of ISO 9000 in the Saudi manufacturing industry. Therefore, it was included in the list of factors.

The second most important factor was said to be insufficient human resources and the difficulty of performing internal audits, which was ranked third in importance of all factors, followed by insufficient employee training. One factor of less significance in the implementation of ISO 9000 was the shortage of financial resources, this is could be due to the fact that the participants of the first questionnaire were not only from the managerial positions and they might not involve in the financial issues of their companies. The factor considered the most important was commitment from senior managers, which is supported by the findings of other researchers such as Hesham (2010) and Carlsson M and Carlsson D (1996). Their studies found that insufficient human resources and a lack of qualified internal auditors who are able to support organisations to comply with ISO 9000 requirements were essential factors to the successful implementation of ISO 9000. In respect of human resources, this can be affected by other factors such as inadequate levels of education, misinterpretation of the standards, low worker morale, and high worker turnover (Sabah, 2011).

### **5.3 Discussion of Second Questionnaire Findings**

This section deals with the findings collected using a questionnaire that was distributed to 100 respondents of which 37 were returned but only 32 were usable. The aim of the second questionnaire was to answer and analyse a list of sixteen hypotheses relating to the effects of ISO 9000 data using the t-test, and to look at the significance of each factor relating to ISO 9000 implementation using regression analysis.

#### **5.3.1 Characteristics of the Sample: Respondents and Companies**

The target of this section was to consider the representation of the sample with reference to the total population.

### **5.3.2 Participants' Job Titles**

The respondents appeared to be responsible for executing ISO 9000 activities in their companies and, as justified in the methodology chapter, the general managers and quality managers were the respondents. Being the primary subjects who were replying to the research questions, it became imperative to investigate the characteristics of the people who were responsible for ISO 9000 activities in the Saudi manufacturing companies; hence, this became a fundamental need to accomplish the research targets. As discussed by Madu (1997) with reference to the quality system within their organisation, the quality managers and workers have to implement the decisions of the top management, so it was appropriate to extract information from them. This is because they communicate with top as well as lower management. Hence, it is possible for them to comprehend the functioning of their organisations together with the consequences to low level workers with reference to quality practice. This makes them the most competent people to understand the difficulties influencing the organisation with reference to quality. Having the appropriate data, they can accurately answer questions relating to quality. The notion that quality managers are the primary source of information was decided by these researchers on the basis that these are the people who are actually in charge of planning and executing quality management. 31.3% of the respondents categorised themselves as quality managers while the remaining 68.8% graded themselves as general managers.

### **5.3.3 Sector of Company**

The results revealed that 3.1% of the respondent organisations were in the pharmaceutical sector, followed by 12.5% in the chemical sector and the engineering sector led at 84.4%. It is, therefore, evident that the results of this study and survey are highly relevant to the area of study. This is especially true with the organisations in the engineering sector as they are the most represented of all the organisations. Though unfairly distributed to cover the other organisational sectors in the area of study, it is noteworthy that all the common organisational sectors are as well-represented.

#### **5.3.4 Numbers of Employees**

The report also concluded that 9.4% of the organisations with 100-200 workers were regarded by the respondents as large, followed by 6.3% of the organisations having 200-300 workers, and lastly, organisations having over 500 workers were regarded as large by 6.3% of the respondents. Manufacturing organisations having less than 100 workers were not regarded as large organisations by 78.1% of the respondents. This survey was appropriate and relevant to most of the organisations and especially those which have between 50 and 100 employees.

#### **5.3.5 Ownership of Participant Companies**

A good number of the organisations included in the survey were privately owned and managed. The other kind of ownership present in the survey was that of joint ventures with foreign companies. This kind of ownership affects the implementation process of the ISO 9000. Ownership affects the decision-making process for new technologies and changes in the system. Different organisation ownerships implement the ISO 9000 strategies differently. It all lies in the process and procedures that need to be taken before any strategies are implemented. The easier the decision-making process, the faster and more effective the implementation process for the various strategies for ISO 9000. 9.4% of the organisations were revealed by the collective data as joint ventures with foreign companies, whereas, the private organisations were 90.6%.

#### **5.3.6 The Operation Period of the Company**

Most of the organisations within the region had been in operation for less than 10 years, 44% of them having been in operation for between 3 and 10 years. Those that had been in operation for between 10 and 20 years were represented by 22% of the organisations, while those which had been in operation for more than 20 years were represented by 34% of all the interviewed organisations.



### **5.3.7 The Period of ISO 9000 Registration**

Most of the companies had been registered to the ISO 9000 standards for between 3 and 10 years. The figure was supported by 53% of the respondents from the organisations. Additionally, 38% of the organisations had been registered to the ISO 9000 standards for between 1 and 3 years while the lowest number, represented by 6%, had been registered for less than 1 year.

### **5.3.8 The Length of Preparation Time for the Registration Process of ISO 9000**

68.8% of the companies had prepared themselves for the ISO 9000 registration process for more than a year, but 21.9% of the organisations completed the preparation in less than a year. However, only as few as 9.4% prepared themselves in less than six months. The registration process to the ISO 9000 standard is a process that requires much preparation and organisation of the entire system in order to meet all the adjustments required. It can be seen from those results that the Saudi manufacturing organisations' preparation progress for ISO implementation was reasonable; they had enough time to measure the benefit that can be gained from the ISO quality standards. Price (1999) pointed out that Saudi organisations undergo a relatively faster registration process than UK-based organisations. He mentioned that, if proper consultation is provided to the organisation, it may take only 3-6 months for them to become registered. On the contrary, if not guided well, the process may even take two years. The conclusion from this is that Saudi organisations have the potential to achieve ISO 9000 registration more quickly than others. These findings are also supported by the evaluators to whom Kadasah (2000) sent the questionnaire.

### **5.3.9 The Auditing Times of the Organisation**

Only 9.4% of the organisations were granted the ISO certificate at the first attempt, while 34.4% were granted it at the second attempt. Additionally, 53.1% of the organisations were granted the certificate at the third attempt. Finally, 3.1% were successfully granted the ISO certificate after more than three attempts. Consequently,

a large number of organisations could not make it through the first audit, which required them to go to another audit for ISO 9000 certification.

### **5.3.10 The Level of Satisfaction with the Organisations' Efforts in ISO 9000 Implementation**

In order to study the effort of the organisations towards the implementation of ISO 9000, the researcher asked the respondents to clarify their level of satisfaction with their organisation's effort towards the implementation of ISO 9000. The results show that 28.1% of the respondents were strongly dissatisfied with the effort of their organisations, while 25% of them were dissatisfied and 15.6% were moderately dissatisfied. 21.9% of the survey respondents showed some satisfaction and 9.4% were very satisfied.

## **5.4 Discussion of the Factors Affecting the Implementation of ISO 9000**

An examination of the results of the factors responsible for the implementation of ISO 9000 in Saudi manufacturing organisations is incorporated in this section.

### **5.4.1 Top Management Commitment**

The questionnaires found that the top managers who devoted time to quality scored 3.21 (Likert Scale 1-5), while top managers who allocated adequate resources to improve quality scored 3.50. The lowest score recorded was in the inclination of top managers to discuss the importance of quality at company meetings, with a score of 3.53. Finally, those top managers who supported any change required in style or structure in order to promote the new culture, scored 3.68. As the questionnaire results show, all the statements in the top management commitment and support section recorded more than 3, the mid of the five points on the Likert scale, which shows that the commitment of the top managers in ISO 9000 registered manufacturing companies in Saudi Arabia is reasonable.

The general managers and quality managers in the Saudi manufacturing organisation considered the value of top management commitment and support as a critical factor in the Saudi manufacturing sector by being straightforward, having clear vision, being responsible and giving the time and effort to support quality. Additionally, they were conscious of the essential role that top management commitment could play in implementing the ISO 9000 standard in their organisation. These results referred to the general and quality managers' experience in working in the quality field and their frequent attendance at national and international quality conferences. The results reflect the ISO 9000 and quality management literature. Salaheldin (2003) highlighted that top management commitment to quality is a very significant factor, which affects the implementation of quality management standards in Egypt, ranking 4.88 (using the five-point Likert scale). Furthermore, the result of the Palestinian study conducted by Baidoun (2004) showed that top management was committed and supportive of quality management efforts.

#### **5.4.2 Employees' Training and Education**

The questionnaire's findings revealed that the Saudi manufacturing companies pay noticeable attention and consideration to training and education, with 3.44 as an overall mean. The general managers and quality managers in the Saudi manufacturing organisations considered training and education to be a critical factor in the Saudi manufacturing sector, since most of the statements scored more than 3 apart from the last statement, which asks whether seminars and workshops in quality issues are arranged for employees on an ongoing basis. However, seminars and workshops are a most appropriate method of training and the Saudi manufacturing organisations should give more attention to them in order to improve the training and the quality of the organisations.

According to Dale (2003), education makes it possible for behaviour and attitude to be modified while training plays its role in overcoming problems. He emphasised that the workers should receive appropriate education and training from the organisations

irrespective of their job level. This will make certain they have an overall knowledge and comprehension of quality management concepts; hence, he recognised the importance of imparting training to all employees irrespective of their position. Additionally, it is vital that the workers should be acknowledged for their input and should not feel isolated from the organisation, as stated by Tsang and Antony (2001). It is possible to stimulate the workers to target higher achievements by dedication, acknowledgement and positive responses.

#### **5.4.3 Inter-Departmental Relations**

The questionnaire results showed that Saudi manufacturing companies need to pay more attention to inter-departmental relations, as shown by the overall mean score of 2.86. An absence of bottom-up communication between the management and the employees was quite evident. It was noticed that information regarding companies' policies, as well as the communication channels, were restricted by the managers. The concept of teamwork has been adapted to an extent but that too is not put into practice by using cross-functional teams for identification and solution of problems. This is a cause of the lower levels of cordiality and communication in the organisations.

This research backs up the study carried out by Adebajo and Kehoe (1998) regarding the implementation of TQM in the UK-based manufacturing companies. The study showed that manufacturing companies did not employ team-building techniques but considered them as a quality management problem. According to Bayazit (2003), if the concepts of teamwork and cross-functional teams are not adopted, it may affect the companies' operational functions as well as hamper the adoption of TQM. As per the research literature of Dale (1999), Deming (1986) and Oakland (2003), manufacturing companies do give importance to the facilitation of quality communication within the company. They make sure that they maintain a constant communication channel between management and employee. They ensure the presence of high-quality communication so that operational teams can communicate internally as well as with external teams.

#### **5.4.4 Knowledge of Quality Programme**

The questionnaire results showed that Saudi manufacturing companies have knowledge of the quality programme, with 3.31 as an overall mean. The results obtained from the questionnaire provided that Saudi manufacturing companies have good knowledge of quality management and that they can effectively employ the ISO 9000 or any other such quality models. However, the literature review of Al-Khalifa and Aspinwall (2000) and Baidoun (2004) showed that Saudi organisations are in the very early stages of awareness regarding quality management techniques and most of the Middle Eastern companies are still oblivious of the effects which quality management could have on the efficiency of the organisations.

#### **5.4.5 Organisational Culture**

The questionnaire results showed that Saudi manufacturing companies pay reasonable attention to the importance of the organisational culture, with 3.38 as an overall mean. The respondents from the manufacturing companies mostly scored more than 3 in most of the statements, thus giving a positive appraisal of their company's current quality environment. This reveals that the development and adoption of quality culture is quite effortless in Saudi organisations. Tsang and Antony (2001) stated that a culture should be created with all the company's employees having a say in the quality enhancement projects. They should be enabled to take part in the quality awareness programme together with quality enhancement projects, particularly those related to their workplace. Organisational culture is crucial and performs an important role that ensures efficient quality management implementation (Rad, 2006). It is also explained as the forerunner of quality management (Prajogo and McDermott, 2005).

#### **5.4.6 Work Systems**

The questionnaire results showed that Saudi manufacturing companies pay noticeable attention and consideration to work systems; the score of the overall mean is 2.68, as

the questions in the statements were negative. The result showed that the leadership style of the Saudi manufacturing organisation is not autocratic as the mean score is less than 3. Moreover, there are no prohibitions and excessive layers of management in the Saudi manufacturing organisation, which could prevent the employees from contacting the top manager. However, the result of the questionnaire also revealed that the employees **do not** feel afraid of disagreeing with their managers. The current results of the work systems indicate that the management of the Saudi manufacturing organisations understand the significance of the work system and they are aware of their duty to keep their organisation working smoothly and properly. Lee (1999) and Leung (1999) conducted a survey and provided the following as major problems for most of the companies: inadequate communication, complicated management techniques, poor fellowship and lack of motivation.

#### **5.4.7 Human Resources**

The questionnaire results showed that Saudi manufacturing companies pay noticeable attention and consideration to human resources, with 3.50 as an overall mean. The results showed that human resources in the Saudi manufacturing organisations are doing well and understand the importance of encouraging the employees to develop better ways to do their work. Moreover, managers are also aware of their responsibilities in order to keep their business running well and to ensure that all the staff are focused on continuous improvement effort in all areas and that they are motivated on an ongoing basis. This study mirrors the findings of the literature. Wiele (2001) gave the following major functions of human resource management: organisation of training programmes, integrating and coordinating managers and employees and bringing awareness of quality management standards among employees

#### **5.4.8 Consultancy Agency**

The questionnaire results showed that Saudi manufacturing companies believed that

consultants were available but not everyone can afford their expense, with 2.79 as an overall mean. The results showed that consultancies were present and that Saudi manufacturing organisations have no difficulties in finding a consultancy at any time. However, the Saudi manufacturing organisations believed that consultants were costly and that not all organisations can afford them, especially the small manufacturing organisations. This research is based on the study carried out by Kadasah (2000) on the Saudi manufacturing organisations. It was found that external consultants used in the implementation of quality management techniques assisted 60% of the organisations who had the ISO 9000 registration. 21.1% of all the costs were paid as consultancy fees to the concerned bodies.

#### **5.4.9 Customer Satisfaction**

The questionnaire results showed that Saudi manufacturing companies pay noticeable attention and consideration to customer satisfaction and requirements, with 3.62 as an overall mean. This research also reviewed the studies of Arora (1996), Kanji and Asher (1996) and Laszlo (1996), which stated that an organisation's positive impression in terms of image, culture, and performance plays an important role in establishing customer loyalty and satisfaction with the organisation. Moreover, it was found that Saudi manufacturing companies were fully aware of the importance of high-quality customer service and, consequently, the managers of the companies ensured availability, delivery, reliability, maintainability, and cost effectiveness of the companies' products to its customers.

#### **5.4.10 Employee Resistance**

The questionnaire results showed that Saudi manufacturing companies pay noticeable attention and consideration to employee resistance, with 3.52 as an overall mean. The managers of the Saudi manufacturing companies were found to understand that the introduction of a quality culture in the companies may be resisted by the employees at first. They knew that new changes would not be welcomed as they may be presumed

by the employees to be bringing complications into the routine functions. As per the survey conducted by Kadasah (2000), it was revealed that 36% of the quality managers strongly agreed that introduction to the ISO 9000 was the second major problem of the employees in Saudi organisations. However, promoting awareness through training sessions, meetings and seminars appreciably reduced the issue. It has been found that since 2000 Saudi companies have managed to bring about significant improvement in their perceptions of quality management.

#### **5.4.11 Quality Guidelines**

The questionnaire results showed that Saudi manufacturing companies pay noticeable attention and consideration to quality guidelines, with 3.17 as an overall mean. The result showed that quality guidelines were always available to the Saudi manufacturing organisations. However, while they believed that the quality guidelines were always available, they thought that they had some disadvantages. The disadvantages were that they were too complicated and inadequate. The literature review of the study carried out by **Vloeberghs and Bellens (1996)** showed that the ISO 9000 quality manual had the following drawbacks: it burdens the administration and does not show any flexibility, and it is too theory based and very complex to understand.

#### **5.4.12 Financial Resources**

The questionnaire results showed that Saudi manufacturing companies understand the importance of financial resources in order to successfully implement the ISO 9000 standard, with 3.44 as an overall mean. The result showed that the Saudi manufacturing organisations believed that ISO 9000 involves high implementation costs, employees' training and maintaining the registration. The study of Fuentes et al. (2000) showed that insufficient financial resources for implementation and maintenance of QMS was one of the obstacles that Spanish companies faced in the employment of ISO 9000 standards. Stevenson and Barnes (2001) explained the insufficiency of resources as due to the high implementation costs regarding time, training and



consultancy fees. Similarly, Dickenson, Campbell and Azarov (2000) also observed the same trend in Russian companies, where the internal establishment as well as the development of the companies' structure as per the standards of ISO 9000 were quite costly and consequently created a lot of problems. The same was the case with the external costs of implementation, consultation and certification. Ashrafi (2008) and White et al. (2009) also agreed, in their study, that the high costs of introduction and sustenance of ISO 9000 in a company was the biggest major problem in its certification. Moreover, customers have different perceptions and attitudes for product price and certification of the company.

#### **5.4.13 ISO Requirements**

The questionnaire results showed that Saudi manufacturing companies understand the importance of ISO 9000 and were trying to overcome the complexity of ISO 9000 requirements, with 3.07 as an overall mean. The result showed that the Saudi manufacturing organisations were still struggling with ISO requirements and believed that ISO requirements were vague, complicated and time-consuming. However, the respondents did not think that the surveillance visits were difficult to cope with. The ISO 9001 requirements were considered to be impractical by most of the participants (76%), as declared by Sabah (2011). Many factors were considered to be responsible in this research such as: inspection achieves quality, sub-optimisation of output is a result of standards, and people may infer quality differently; hence, standards may vary. Also, bureaucracy is an outcome of standards, which is not healthy for the company (Seddon, 1998).

#### **5.4.14 Size of Documents**

The questionnaire results showed that Saudi manufacturing companies believed that the size of documents was one of the obstacles to the ISO 9000 implementation, with 3.42 as an overall mean. The result showed that the Saudi manufacturing organisations believed that ISO requirements were long, full of bureaucratic

documentation, difficult and time-consuming. Moreover, they also confirmed that ISO 9000 needs continuous monitoring and measurement which is time-consuming and difficult to handle. The literature review of the study carried out by Calingo (1995) revealed that Singaporean companies also faced similar hurdles while implementing ISO 9000 standards. Sampaio, Saraiva and Rodrigues (2009) also found that companies in Western Australia were fully dependent upon their consultants for time management and advice, for implementing quality management.

The most common problems noted by quality management experts are insufficient time and more focus on the improvement activities. Experts reasoned it as due to the increased size of the documents. According to Yong and Wilkinson (2001), 78% of the Singaporean companies considered lack of sufficient time was a hurdle for quality management employment. Another hindrance indicated by Low and Ling Pan (2004) was giving comparatively less time to the registration process.

#### **5.4.15 Internal Audits**

The questionnaire results showed that Saudi manufacturing companies agreed that internal auditing was a barrier in ISO 9000 implementation, with 3.72 as an overall mean. The result showed that the Saudi manufacturing organisations were suffering from the internal audit procedures; they revealed that the internal audits were complicated, costly and time-consuming. The review of the study conducted by White (2009) revealed that the most astonishing fact observed is that, in the implementation of the internal audits, some problems are faced which arise mainly due to the nature of the standard employed, such as the cost of the internal audit. Also, if the internal audits are not employed carefully, they may result in some negative results.

There may be an interruption in the regular flow of labour if there is an attempt to solve the problems mentioned in the audit e.g. it may cause a lot of time loss. The decision-making process for the rectification of the prevailing problems may consume a lot of time for the management. The relationship among the employees may be affected due

to the auditing process i.e. those audited may have their weaknesses and failures mentioned by the auditors. Despite these drawbacks, it is evident that internal auditing is a great help in the improvement and development of a company's standards and also provides motivation for more efficiency. Thus, the positive effects are greater than the negative. However, the management's perception and understanding of the auditing principles and its effects on the QMS greatly influence the results and its consequent effects. The management's behaviour and attitude towards the audit determine the extent of the effectiveness of internal audits.

#### **5.4.16 ISO 9000 Importance**

The questionnaire results showed that Saudi manufacturing companies pay noticeable attention and consideration to the importance of ISO 9000, with 3.68 as an overall mean. The results showed that the Saudi manufacturing organisations were aware of the importance of ISO 9000 quality standards. They agreed that the ISO 9000 quality standard improved the quality of the products, improved the efficiency of the quality system, reduced defective rates and waste and avoided their exclusion from the European market. Moreover, they said that they used the ISO 9000 quality standards as a promotional tool. The following research does not account for the study carried out by Targaghia (1996), which revealed the problems of Libyan industry such as inadequate awareness of the techniques to be employed to identify the quality issues. Sandholm (1999) also provided the following factors as responsible for a decline in the quality systems of the developing countries: poor economic conditions, lack of resources, foreign exchange limitations, incomplete infrastructure, incompetent leadership and inadequate awareness.

#### **5.5 Regression Analysis Result**

In the second questionnaire, with reference to the effective implementation of ISO 9000 standard, the questions were directed towards the respondents. Its motive was to fulfil the main aim of this survey which was to investigate the influence of ISO 9000 factors

on the implementation progress (preparation, effort and auditing). The questions that were asked are as follows:

1. How much time did the company spend before the registration procedure of ISO 9000?
2. What was the auditing period in which the ISO registration was accomplished?
3. With reference to the ISO implementation, what was the degree of satisfaction with the efforts of their organisation?

With the help of the regression analysis and, following the computation of the mean of these three queries, the answers were investigated against the sixteen implementation factors. The model with sixteen factors was suggested by the outcomes of regression as predictors by the regression outcomes while a sound link was found amid the dependent (preparation) and independent variables as ( $R=0.856$ ). An important relationship was also revealed by the result of the model ( $p=0.037$ ). It is apparent from the size of its standardised coefficients that the greatest influence on the preparation for ISO 9000 was the work system ( $\beta =0.490$ ). Hence, it can be concluded that the greatest impact of the registration procedure for ISO 9000 is on the work system, but implementation factors also influence it constructively.

A link was found between the dependent and independent variables as  $R=0.916$  by the regression analysis outcome of the model which consists of sixteen factors as predictors together with auditing as an independent variable. An important relationship was revealed by the result of the model ( $p=0.002$ ). Also, the top management ( $\beta= -0.428$ ) and quality guidelines ( $\beta= -0.354$ ) have a leading influence on auditing in the Saudi manufacturing sector until the ISO certificate is attained, as signified by the size of the coefficients. Conclusively, preparation of the registration procedure for ISO 9000 is constructively influenced by the implementation factors but mainly by the top management and quality guidelines. A strong relationship was displayed between the dependent and independent variables as  $R=0.963$ . The ultimate model, which

consisted of sixteen factors as predictors, indicated this and the independent variable was the organisation's effort. In addition, an important factor was found by the result of the model ( $p=0.000$ ). The leading impact on the organisation's effort in the implementation of **the ISO 9000 in** the Saudi manufacturing sector was the work system ( $\beta=0.366$ ), as signified by the size of the standardised coefficients. The conclusion is that the leading influence on the preparation of the registration procedure for the ISO 9000 is the work system; yet, it is also influenced constructively by the implementation factors.

## **5.6 AHP Findings**

There are many obstacles to the implementation of the ISO 9000 but, as disclosed by the research, it is necessary that the company is fully prepared before its execution. To help companies to successfully implement ISO 9000, the ranking of ascertained criteria and sub-criteria can be made the yardstick. In the Saudi manufacturing industry, on the grounds of this research, tactics can be planned that are particularly targeted towards the factors having the maximum priority weighting that will influence the implementation of the ISO 9000. It is important for companies to know the significant factors which will make the implementation of ISO 9000 successful. These factors include top management commitment, customer satisfaction, and training and education. Being interconnected, all three factors are very important if the successful implementation of the standard is to be achieved. It is necessary that the customer requirements are not overlooked. In order to make the workers ready for any possible modification, it is necessary that they are offered training and education programmes to enhance their learning and that every worker is equipped with the necessary knowledge needed for the successful implementation of ISO 9000. The managers will be equipped to take knowledgeable decisions and assign the required resources to make sure that the standard runs smoothly for a long time if they have a deep understanding of these factors.

## 5.7 Critique of Research Methodology

Chapter 3 gave reasons for the research strategy. The most appropriate strategy considered by the researcher was the multi-media strategy (qualitative and quantitative) of a questionnaire and interviews, together with cross-sectional research. The pairwise comparison interviews helped the primary means of data collection i.e. the questionnaire, and generated conclusions. Statistical approaches were employed to realise the target to examine relationships between particular variables in the research. Recognition of the factors influencing the application of ISO 9000 in the Saudi manufacturing industry was also undertaken by this research. Primary and secondary strategies comprising of pairwise comparison interviews and questionnaires were not used alone, but were coordinated with professional opinions and literature reviews. Data was triangulated by collecting from many diverse participants in various organisations together with the data from the literature review. Hence, the queries regarding the aims and objectives of the research were answered convincingly by the research.

A debate may arise on behalf of the researcher regarding the suitability of the research choice. The summaries, comparisons and generalisations were comparatively simple. The reason is that the researcher had previously used the quantitative and qualitative approach. After the design was planned the researcher guided and enhanced the interview questions, until the ultimate form of the instrument was achieved. It was accompanied by a covering letter describing the aim of the research. This was delivered personally by the researcher (drop-in and pick-up method) at the desired organisations. The research participants (managers) have a very hectic routine and may not be able to take time out to offer primary data via any other approach. This was anticipated by using the personally administered questionnaire as a data gathering strategy, which ensured not only the prompt reply from the busy managers but, when a survey strategy is employed; this is regarded as the ideal method for collecting information.

The researcher encountered certain problems. One of the problems was that it required many attempts to obtain consent from the organisations to distribute the questionnaire, because of urgent business obligations permission was delayed more than once. Generally everywhere, and in particular in Arab countries where a lot of importance is given to relationships, the researcher left no stone unturned to use all his contacts to overcome this hurdle. Another important difficulty that he faced was that he had to return to his homeland (Saudi Arabia) and travel throughout the country to various destinations of diverse companies to gather data; hence, this particular fieldwork increased his financial costs considerably.

The selection of a suitable approach with reference to data analysis should be in coordination with the entire procedure of the data characteristics, the kind of data, the properties and assumptions of the statistical approaches, and ultimately the viewpoint of research. AHP analysis was exercised for the interview outcomes, while t-test was chosen for the questionnaire and, to analyse the results, the method was regression analysis and reliability tests.

## **5.8 Chapter Summary**

In this chapter the researcher discussed the findings from the three-stage approach that were presented in chapter four. These findings were linked with the literature to show whether they were unique for the Saudi manufacturing industry or similar to other studies. All the sixteen factors have been discussed according to the data analysis and findings. Moreover, the t-test, regression analysis and the AHP results also been discussed. The researcher also critiqued the research methodology. The next chapter will discuss the conclusion, contributions and recommendations for further research work.

## CHAPTER 6 : CONCLUSION AND RECOMMENDATION

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### 6.1 Chapter Introduction

The objective of this chapter is to provide a relevant conclusion to this thesis, evaluating the significant areas of the research matter, covering all the topics of this study and encompassing a research overview. The purpose of the thesis was to discuss the ISO implementation factors in the Saudi manufacturing industry and to present a research overview along with a discussion of the contributions. Consequently, an epigrammatic discussion of the practical implications of the research findings will be included with a future research review regarding directions concerning the ISO 9000 implementation factors and a framework of probable research limitations.

### 6.2 Overall Conclusion

In the Saudi manufacturing industry, there are sixteen broad factors which affect the ISO 9000, as per the study outcomes. These sixteen factors include: ISO 9000 knowledge, internal audits, size of documents, ISO requirements, financial resources, quality guidelines, employee resistance, consultation agency, human resources, work systems, top management commitment, organisational culture, employee training and education, knowledge of quality programme and inter-departmental relations.

The researcher had the opportunity to cover the significant variables in the research project along with facilitating the assimilation of the information collected from the prior studies. This method was beneficial in widening the researcher's knowledge, assisting him to modernise the recently developed concepts, authenticate the uniqueness of the research in accordance with the study and fine-tune the research and its objectives, while recognising the differences in prior research and literature based on the quality management and the implementation of the ISO 9000 standards in manufacturing organisations. It can also be said that the literature review provided an excellent



fundamental framework for further investigation.

Following the literature review, the set of factors having a great effect on the implementation of the ISO 9000 in Saudi manufacturing organisations were identified.

The fundamental factors influencing the preparation, auditing, and the effort were subsequently recognised.

Regression analysis used in order to test the significance level of the factors affecting the successful implementation procedure of ISO 9000. These procedures have been identified as: the preparation of the organisation for the implementation of the ISO standard, the effort made by the organisation in order to complete all the required documents prior to the implementation and the amount of auditing done before achieving the ISO standard certificate.

Making use of the AHP to evaluate the data obtained from the managers by means of conducting pairwise comparison interviews, which is beneficial for recognising the most significant priorities for the ISO 9000 implementation factors in the Saudi manufacturing industry.

Finally a theoretical framework to analyse the influence of these factors in Saudi Arabia has been established by the use of the evidence from primary and secondary data, interviews and questionnaires

### **6.3 Contributions to Body of Knowledge**

The following are some of the major contributions of this research study:

- The literature review is very significant in the construction of the framework, while the outcomes of the survey investigation assist the successful implementation of the ISO 9000 standard in Saudi manufacturing industries. This is the major contribution of this thesis, playing a crucial role for both academics and professionals. From the professional perspective, managers will be able to consider the practical implications of this effort and the probability of executing the

implications of this research in their organisations. From the academic perspective, this research is fruitful as its main objective was to direct academic attention to the neglected territory of the context of this research. On the other hand, a structure has been produced with the intention of enhancing the effectiveness of the implementation of ISO 9000. However, the significance of ISO 9000, in regard to this research, is expanding currently out-dated knowledge and information in countries where it could make a great contribution, as it is needed to improve organisations in developing countries, specifically in the Arab world.

- This research study is beneficial for ISO 9000 as it fills the remaining gaps in the prior research conducted on this topic, while at the same time addressing the obstacles of ISO 9000 implementation in Saudi Arabia. Moreover, this research study is highly effective in developing a framework for the assistance of organisations in adapting ISO 9000.
- Another contribution is the evaluation of the entire model in this thesis, which comprehensively determines the effect of all the factors on the areas of the quality management process that includes preparation, auditing, and effort. In the prior research studies conducted upon this subject matter, limited factors were discussed regarding quality management. Additionally, most of the prior studies include theoretical studies in the literature review, while some of them include empirical research. Only a few discussed and related to the Arab world, and least of all with Saudi Arabian ISO 9000 manufacturing organisations. This knowledge gap is filled by this research thesis.
- The final contribution is the evaluation and amalgamation of the literature in terms of factors that are influential in the implementation of ISO 9000 in the manufacturing context, making it convenient for readers or other researchers to comprehend and enable them to compare.

#### **6.4 Limitations of Research**

Limitations are part of all research and it is worth remembering that the outcomes

derived can be influenced by these limitations. Some important limitations of this research are listed below:

- As with nearly all research studies, this also had to face the time limitation and limitations related to economic funds.
- The questionnaire may not have been distributed to all companies by the same method due to certain hurdles. On the one hand, some organisations not only readily accepted the questionnaire, but also helped to hand it over to the desired people, and some of the organisations gave consent to hand over the questionnaire and deliver it to the desired people. However, there were some organisations that were not willing to take the questionnaire. The data gathering procedure may be rendered unpredictable due to this limitation but it was believed that its influence was minor on the authenticity and authority of this study.
- To facilitate the comparisons with other countries, other Arab nations could have been involved. To facilitate the comparisons between registered and non-registered companies, non-registered companies (companies not registered with the ISO 9000) could have been made part of the research. To enhance the generalisations of the results drawn by diverse industry sectors, it could have been repeated with non-manufacturing organisations.
- The outcomes drawn by the latest research are only applicable to the ISO 9000 standard certified manufacturing organisations in Saudi Arabia. Due to the various organisational structural environments and also due to diverse economic, social and political systems, it is not possible to generalise the results of this study to various other business sectors operating in Saudi Arabia.

## **6.5 Recommendations for Further Research**

It is to be conceded that no individual specialist can claim to have covered all parts of the research topic. Supplementary research opportunities typically arise from any study, while these research opportunities give bearings for future researchers having an intention to conduct associated studies. The present researcher acknowledges the

possibility of pursuing several future research channels for better understanding of the factors influencing the implementation of the ISO 9000. The recommendations mentioned below are valuable in this regard:

- If a researcher desires to commence further research then they must start with a validation of this study. However, the research design of this study was founded on a survey, so alternative research strategies, such as case studies, might assist in verifying the findings acquired through this study. For example, the current research study could be replicated in the context of another Middle Eastern or Arab country, and the compatibility of the outcomes could then be compared. Moreover, the study may be imitated in developing countries for comparison of outcomes with the present research.
- The sixteen factors which have been identified in this study should be **investigated** in depth for an understanding of the factors affecting implementation of the ISO 9000, which remains an activity requiring more attention from researchers. In this way, researchers will be motivated to carry out a lengthy study.
- The subject matter of this study is limited to analysis and investigation of the Saudi manufacturing industry, but it could be applied to various sorts of industries. For this reason, future research must be carried out on individual/industrial service sectors in order to analyse the differences and similarities among industries. Furthermore, the restrictions of this study can be assimilated for prospective research and further exploration purposes. Such research studies might encompass all of the manufacturing companies in Saudi Arabia and investigate the discrepancies existing between the non-ISO 9000 and ISO 9000 companies in the same area. The employees present at distinct levels of organisations can be surveyed and interviewed for the development of a true profile of quality management in Saudi Arabian organisations.
- More in-depth details of the effect of each of the factors of the model on quality management progress will be valuable. This specifically relates to the

organisational culture, employee resistance, training and education and top management commitment factors.

- It will be highly effective to conduct research on the effect of government support on quality management procedures.

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Dear participant

The researcher is currently doing PhD research project regarding an investigation of ISO 9000 implementational issues in Saudi manufacturing industry.

The researcher is carrying out the study as one of the requirements for the Doctorate program at Northumbria University, Newcastle upon Tyne, United Kingdom.

The aim of this research is to investigate, identify and analyse the motivation factors and/or barrier that influence implementation of ISO 9000, in Saudi manufacturing industries. Moreover, the study also aims to provide academic study that would benefit researchers, academics, and government planners in the future.

We would be most grateful if you could help him by completing the enclosed questionnaire, expressing your view freely and truthfully.

Please be assured that all information given will be treated strictly confidential, it will be used only for academic purpose. By responding to the questionnaire and showing evidence of your opinion, it is the researcher's belief that the results will help guide and influence future researches.

Thank you very much for your time and co-operation.

Mechanical and Construction Engineering Department  
Faculty of Engineering and Environment  
Northumbria University, Newcastle upon Tyne, United Kingdom.  
Tel: 0191 243 7235



**The most common implementation factors which effect the ISO 9000 implementation in Saudi manufacturing sector**

**1) Personal information (about the respondent):**

- The name of your company is .....
- What is the sector of your company?
  - Engineering       Pharmaceutical.       Food.       Extraction.
  - Textile.       Chemical.       other, please specify.....
- What is the number of employees in your organization in general?
  - less than 50       50-100       100-200
  - 200-300       300-500       More than 500
- What is the type of ownership is your business?
  - Mixed government and private sector       Saudi private
  - Joint venture with foreign company       Other .....
- What is the period of your organizations operating in Saudi Arabia?
  - from 3 - 10 years       10 to 20 years       Above 20 years
- How long has your company been registered to the ISO 9000 standards?
  - Less than a Year       1 to 3 Years       4 to 10 Years
  - more than 10 years

**2) Factors that effect the ISO 9000 implementation in Saudi manufacturing sector.**

- Please note the factors listed below are the most common factors facing organizations in

implementing ISO 9000 certification.

- Please tick the appropriate option in the right hand columns, where (5: strongly agree, 4: Agree, 3: Neutral, 2: Disagree and 1: Strongly Disagree).
- Your selected answer must represent your opinion about what is present in overall organisation.
- For non-ISO 9000 organizations, please exclude any statement not related to your company.
- If the organisation faced other factors, please write them in the last page of this questionnaire or if you want to write some comments about your answers.

Factors	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
Top management commitment					
Employee resistance					
Difficulty of performing internal audits					
Absence of consulting boards					
ISO 9000 requirements are unrealistic					
Shortage of financial resource					
Insufficient human resources					
Insufficient employee training					
Insufficient knowledge in quality program					
Ignorance of ISO importance					
Weak interdepartmental relations					
Unwillingness to change work system					
Inflating size of documents					
Unwillingness to change organizational culture					
Absence of quality guidelines					

**3) Please list any other factors you think affecting ISO 9000 implementation**

.....  
 .....

## CHAPTER 9 APPENDIX 2 SECOND QUESTIONNAIRE

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### Part 1: Personal information (about the respondent):

- The name of your company is .....
- Your job title in the company:
  - General Manager  Quality Manager
- What is the sector of your company?
  - Engineering  Pharmaceutical.  Food.
  - Extraction.  Textile.  Chemical.
  - other, please specify.....
- What is the number of employees in your organization in general?
  - less than 50  50-100  100-200
  - 200-300  300-500  More than 500
- What is the type of ownership is your business?
  - Mixed government and private sector  private
  - Joint venture with foreign company  other .....
- What is the period of your organizations operating?
  - from 3 - 10 years  10 to 20 years  Above 20 years
- How long has your company been registered to the ISO 9000 standards?
  - Less than a Year  1 to 3 Years  4 to 10 Years
  - more than 10 years
- How long did your firm spend in the preparation of the registration process of ISO 9000?
  - Less than 3 months  Less than 6 months  Less than a year
  - more than a year
- Did you achieve the ISO registration during the:
  - 1<sup>st</sup> Audit  2<sup>nd</sup> Audit  3<sup>rd</sup> Audit  More than 3 Audits

**Part 2. ISO 9000 in general:**

Please tick (✓) under Yes or No

Statements	Yes	No
1. Do you agree that the Top management support and commitment is important to your organization?		
2. Do you agree that quality related training is important to your organization?		
3. Do you agree that effective interdepartmental relations system is important in your organization?		
4. Do you agree that understanding the quality programs is essential to your organization?		
5. Do you agree that organizations unwilling to change organization cultural will have difficulty in ISO 9000 implementation?		
6. Do you agree that organizations unwilling to change the work system will have difficulty in ISO 9000 implementation?		
7. The role of the Human resource is important in your organization?		
8. Do you agree that consulting body is important to your organization?		
9. Do you agree that customer satisfaction is important to your organization?		
10. Do you agree that overcoming the employees' resistance to change is very important to your organization?		
11. Do you agree that a quality guideline is important to your organization?		
12. Do you think shortage of financial resource will effect the implementation of ISO 9000?		
13. Do you think that the requirements of ISO 9000 unrealistic?		
14. Does the inflating size of documents affecting the implantation ISO 9000?		
15. Do you agree that performing the internal audits is important within your organization?		
16. Do you agree that understanding the importance of ISO 9000 is essential to your organization?		

**Part 3.1. Top Management Commitment and Support**

This part aims to measure senior management commitment and support to quality management programmes.

**Please tick (✓) in the box that best reflects your answer**

1= Strongly disagree 2= Disagree 3= Neither agree nor disagree 4= Agree 5= Strongly agree

Statements	Strongly Disagree	Disagree	Neither Agree nor Disagree	Agree	Strongly Agree
1. Top managers devote time to quality					
2. Top managers allocate adequate resource to improve quality					
3. Top managers often discuss the importance of quality at company meetings.					

4. Top managers support any change required in style or structure in order to promote the new culture					
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### 3.2 Training and Education

This part aims at identifying the importance of the training and education courses related to quality management in the adoption of quality management programmers.

**Please tick (√) in the box that best reflects your answer**

1= Strongly disagree 2= Disagree 3= Neither agree nor disagree 4= Agree 5= Strongly agree

Statements	Strongly Disagree	Disagree	Neither Agree nor Disagree	Agree	Strongly Agree
1. Training is regarded as one of the most important factors in improving quality.					
2. Quality-related training is given to all employees throughout the company.					
3. Quality awareness building among employees is ongoing in the company.					
4. Seminars and workshops in quality issues are arranged for employees on an ongoing base.					

### 3.3. Interdepartmental relation

**Please tick (√) in the box that best reflects your answer**

1= Strongly disagree 2= Disagree 3= Neither agree nor disagree 4= Agree 5= Strongly agree

Statements	Strongly Disagree	Disagree	Neither Agree nor Disagree	Agree	Strongly Agree
1. A teamwork approach is adopted to identifies and solves problems					
2. Bottom-up communications are welcome by the top management.					
3. Managers accept any criticism.					
4. Cross-functional teams are often employed					
5. Management share information regarding the company policies with employees.					

### 3.4. Understanding of quality programme

This part is concerned with how the purpose of ISO 9000 is perceived, and understood.

**Please tick (√) in the box that best reflects your answer**

1= Strongly disagree 2= Disagree 3= Neither agree nor disagree 4= Agree 5= Strongly agree

Statements	Strongly Disagree	Disagree	Neither Agree nor Disagree	Agree	Strongly Agree
1. to demonstrate that products are of high grade or standard					

2. to produce paperwork to satisfy customers					
3. to provide a disciplined means of producing goods/service for customers					
4. to strengthen the control over operations					
5. to demonstrate that this is total quality organization					

### 3.5. Unwilling to change organizational Culture

This part aims at investigating the effect of the prevailing organizational culture on quality management the adoption of ISO 9000.

**Please tick (✓) in the box that best reflects your answer**

1= Strongly disagree 2= Disagree 3= Neither agree nor disagree 4= Agree 5= Strongly agree

Statements	Strongly Disagree	Disagree	Neither Agree nor Disagree	Agree	Strongly Agree
1. The creation of quality awareness among employees being ongoing in the company					
2. The managers trust the employees to do their work without direct supervision					
3. Change of organisational culture is not easy the idea of supporting the changes made by the General manager					

### 3.6. Unwilling to change work system

**Please tick (✓) in the box that best reflects your answer**

1= Strongly disagree 2= Disagree 3= Neither agree nor disagree 4= Agree 5= Strongly agree

Statements	Strongly Disagree	Disagree	Neither Agree nor Disagree	Agree	Strongly Agree
1. An autocratic leadership style is highly employed in the company.					
2. There are excessive layers of management in the company.					
3. Employees feel afraid to disagree with their managers.					

### 3.7. Human Recourses

This part aims measure the important of the human resource activity on the quality management and the implementation of ISO 9000.

**Please tick (✓) in the box that best reflects your answer**

1= Strongly disagree 2= Disagree 3= Neither agree nor disagree 4= Agree 5= Strongly agree

Statements	Strongly Disagree	Disagree	Neither Agree nor Disagree	Agree	Strongly Agree
1. I encourage personal growth of my staff					

2. Each member in my business is encouraged to develop new ways to do their job better					
3. All staff in my business understand how their tasks fit into an overall plan of things					
4. I ensure that all my staff are focused on continuous improvement effort in all areas					

### 3.8. Absence of consulting Boards

This part aims at identifying the importance of the consulting Boards related to quality management in the adoption of quality management programmers.

**Please tick (√) in the box that best reflects your answer**

1= Strongly disagree 2= Disagree 3= Neither agree nor disagree 4= Agree 5= Strongly agree

Items	Strongly Disagree	Disagree	Neither Agree nor Disagree	Agree	Strongly Agree
1. There is a shortage of consulting boards					
2. Finding a consultant body is difficult					
3. Consulting bodes are costly					

### 3.9. Customer satisfaction

This part aims at investigating the effect of customer satisfaction on quality management the adoption of ISO 9000.

**Please tick (√) in the box that best reflects your answer**

1= Strongly disagree 2= Disagree 3= Neither agree nor disagree 4= Agree 5= Strongly agree

Items	Strongly Disagree	Disagree	Neither Agree nor Disagree	Agree	Strongly Agree
1. Customer satisfaction is a priority.					
2. Consumer is always right.					
3. Customer satisfaction is recognized as one of the driving criteria for any organization.					
4. Customer satisfaction must always be observed and measured.					

### 3.10. Employees resistance

This part aims at investigating the effect of employees resistance on quality management the adoption of ISO 9000.

**Please tick (√) in the box that best reflects your answer**

1= Strongly disagree 2= Disagree 3= Neither agree nor disagree 4= Agree 5= Strongly agree

Statements	Strongly Disagree	Disagree	Neither Agree nor Disagree	Agree	Strongly Agree
1. Explaining the benefits and advantages					

of ISO 9000 will reduce the employees' resistance.					
2. Awareness and training programmes can reduce the employees' resistance.					
3. Sometimes employees know better than managers, and their feedback is important to the organization.					
4. Meeting/seminars are very essential to overcome the resistance.					

### 3.11. Absence of quality guidelines

Please tick (✓) in the box that best reflects your answer

1= Strongly disagree 2= Disagree 3= Neither agree nor disagree 4= Agree 5= Strongly agree

Statements	Strongly Disagree	Disagree	Neither Agree nor Disagree	Agree	Strongly Agree
1. Quality guidelines not always available					
2. Quality guidelines are too complicated					
3. Quality guidelines are inadequate					

### 3.12. Shortage of financial resource

Please tick (✓) in the box that best reflects your answer

1= Strongly disagree 2= Disagree 3= Neither agree nor disagree 4= Agree 5= Strongly agree

Statements	Strongly Disagree	Disagree	Neither Agree nor Disagree	Agree	Strongly Agree
1. ISO implementation involves high costs					
2. Employees training involves high costs					
3. Maintaining registration involves high costs					

### 3.13. ISO requirements are unrealistic

Please tick (✓) in the box that best reflects your answer

1= Strongly disagree 2= Disagree 3= Neither agree nor disagree 4= Agree 5= Strongly agree

Statements	Strongly Disagree	Disagree	Neither Agree nor Disagree	Agree	Strongly Agree
1. ISO requirements are vague and complicated					
2. The surveillance visits are difficult to cope with					
3. ISO implementation is time consuming					



**3.14. Inflating size of documents**

**Please tick (√) in the box that best reflects your answer**

1= Strongly disagree 2= Disagree 3= Neither agree nor disagree 4= Agree 5= Strongly agree

Statements	Strongly Disagree	Disagree	Neither Agree nor Disagree	Agree	Strongly Agree
1. Long and bureaucratic Documentation					
2. ISO requirements and documents are difficult and time consuming					
3. ISO 9000 needs continuously monitoring and measurements					

**3.15. Difficulty in performing internal audit**

**Please tick (√) in the box that best reflects your answer**

1= Strongly disagree 2= Disagree 3= Neither agree nor disagree 4= Agree 5= Strongly agree

Statements	Strongly Disagree	Disagree	Neither Agree nor Disagree	Agree	Strongly Agree
1. Internal audit procedures are complicated.					
2. Internal audit fees are high					
3. Internal audit time is lengthy					

**3.16 Ignorance of ISO importance**

**Please tick (√) in the box that best reflects your answer**

1= Strongly disagree 2= Disagree 3= Neither agree nor disagree 4= Agree 5= Strongly agree

Statements	Strongly Disagree	Disagree	Neither Agree nor Disagree	Agree	Strongly Agree
1. To improve the quality of the products.					
2. To improve the efficiency of the quality system.					
3. To reduce defective rates and waste					
4. To use ISO as a promotional tool					
5. To avoid being excluded from the European market					

**5.0 What is your level of satisfaction with your organization effort in ISO 9000 implementation**

1 is the lowest and 5 is the highest satisfaction (Please circle one number only)

(Low satisfaction      1      2      3      4      5      High satisfaction)

**6.0 Please list any other factors you think affecting ISO 9000 implementation**

.....  
 .....

**CHAPTER 10 APPENDIX 3 AHP QUESTIONNAIRE**

A - Importance - or B?			Equal	How much more?
1	<input checked="" type="radio"/> Top Management	or <input type="radio"/> Training	<b>1</b> <input checked="" type="radio"/>	2 <input type="radio"/> 3 <input type="radio"/> 4 <input type="radio"/> 5 <input type="radio"/> 6 <input type="radio"/> 7 <input type="radio"/> 8 <input type="radio"/> 9 <input type="radio"/>
2	<input checked="" type="radio"/> Top Management	or <input type="radio"/> Interdepartmental relation	<b>1</b> <input checked="" type="radio"/>	2 <input type="radio"/> 3 <input type="radio"/> 4 <input type="radio"/> 5 <input type="radio"/> 6 <input type="radio"/> 7 <input type="radio"/> 8 <input type="radio"/> 9 <input type="radio"/>
3	<input checked="" type="radio"/> Top Management	or <input type="radio"/> Understanding of quality	<b>1</b> <input checked="" type="radio"/>	2 <input type="radio"/> 3 <input type="radio"/> 4 <input type="radio"/> 5 <input type="radio"/> 6 <input type="radio"/> 7 <input type="radio"/> 8 <input type="radio"/> 9 <input type="radio"/>
4	<input checked="" type="radio"/> Top Management	or <input type="radio"/> organizational Culture	<b>1</b> <input checked="" type="radio"/>	2 <input type="radio"/> 3 <input type="radio"/> 4 <input type="radio"/> 5 <input type="radio"/> 6 <input type="radio"/> 7 <input type="radio"/> 8 <input type="radio"/> 9 <input type="radio"/>
5	<input checked="" type="radio"/> Top Management	or <input type="radio"/> work system	<b>1</b> <input checked="" type="radio"/>	2 <input type="radio"/> 3 <input type="radio"/> 4 <input type="radio"/> 5 <input type="radio"/> 6 <input type="radio"/> 7 <input type="radio"/> 8 <input type="radio"/> 9 <input type="radio"/>
6	<input checked="" type="radio"/> Top Management	or <input type="radio"/> Human Recourses	<b>1</b> <input checked="" type="radio"/>	2 <input type="radio"/> 3 <input type="radio"/> 4 <input type="radio"/> 5 <input type="radio"/> 6 <input type="radio"/> 7 <input type="radio"/> 8 <input type="radio"/> 9 <input type="radio"/>
7	<input checked="" type="radio"/> Top Management	or <input type="radio"/> consulting Boards	<b>1</b> <input checked="" type="radio"/>	2 <input type="radio"/> 3 <input type="radio"/> 4 <input type="radio"/> 5 <input type="radio"/> 6 <input type="radio"/> 7 <input type="radio"/> 8 <input type="radio"/> 9 <input type="radio"/>
8	<input checked="" type="radio"/> Top Management	or <input type="radio"/> Customer satisfaction	<b>1</b> <input checked="" type="radio"/>	2 <input type="radio"/> 3 <input type="radio"/> 4 <input type="radio"/> 5 <input type="radio"/> 6 <input type="radio"/> 7 <input type="radio"/> 8 <input type="radio"/> 9 <input type="radio"/>
9	<input checked="" type="radio"/> Top Management	or <input type="radio"/> Employees resistance	<b>1</b> <input checked="" type="radio"/>	2 <input type="radio"/> 3 <input type="radio"/> 4 <input type="radio"/> 5 <input type="radio"/> 6 <input type="radio"/> 7 <input type="radio"/> 8 <input type="radio"/> 9 <input type="radio"/>
10	<input checked="" type="radio"/> Top Management	or <input type="radio"/> quality guidelines	<b>1</b> <input checked="" type="radio"/>	2 <input type="radio"/> 3 <input type="radio"/> 4 <input type="radio"/> 5 <input type="radio"/> 6 <input type="radio"/> 7 <input type="radio"/> 8 <input type="radio"/> 9 <input type="radio"/>

				8 <input type="radio"/> 9 <input type="radio"/>
11	<input checked="" type="radio"/> Top Management	or <input type="radio"/> financial resource	1 <input checked="" type="radio"/>	2 <input type="radio"/> 3 <input type="radio"/> 4 <input type="radio"/> 5 <input type="radio"/> 6 <input type="radio"/> 7 <input type="radio"/> 8 <input type="radio"/> 9 <input type="radio"/>
12	<input checked="" type="radio"/> Top Management	or <input type="radio"/> ISO requirements	1 <input checked="" type="radio"/>	2 <input type="radio"/> 3 <input type="radio"/> 4 <input type="radio"/> 5 <input type="radio"/> 6 <input type="radio"/> 7 <input type="radio"/> 8 <input type="radio"/> 9 <input type="radio"/>
13	<input checked="" type="radio"/> Top Management	or <input type="radio"/> size of documents	1 <input checked="" type="radio"/>	2 <input type="radio"/> 3 <input type="radio"/> 4 <input type="radio"/> 5 <input type="radio"/> 6 <input type="radio"/> 7 <input type="radio"/> 8 <input type="radio"/> 9 <input type="radio"/>
14	<input checked="" type="radio"/> Top Management	or <input type="radio"/> internal audit	1 <input checked="" type="radio"/>	2 <input type="radio"/> 3 <input type="radio"/> 4 <input type="radio"/> 5 <input type="radio"/> 6 <input type="radio"/> 7 <input type="radio"/> 8 <input type="radio"/> 9 <input type="radio"/>
15	<input checked="" type="radio"/> Top Management	or <input type="radio"/> Ignorance of ISO importance	1 <input checked="" type="radio"/>	2 <input type="radio"/> 3 <input type="radio"/> 4 <input type="radio"/> 5 <input type="radio"/> 6 <input type="radio"/> 7 <input type="radio"/> 8 <input type="radio"/> 9 <input type="radio"/>
16	<input checked="" type="radio"/> Training	or <input type="radio"/> Interdepartmental relation	1 <input checked="" type="radio"/>	2 <input type="radio"/> 3 <input type="radio"/> 4 <input type="radio"/> 5 <input type="radio"/> 6 <input type="radio"/> 7 <input type="radio"/> 8 <input type="radio"/> 9 <input type="radio"/>
17	<input checked="" type="radio"/> Training	or <input type="radio"/> Understanding of quality	1 <input checked="" type="radio"/>	2 <input type="radio"/> 3 <input type="radio"/> 4 <input type="radio"/> 5 <input type="radio"/> 6 <input type="radio"/> 7 <input type="radio"/> 8 <input type="radio"/> 9 <input type="radio"/>
18	<input checked="" type="radio"/> Training	or <input type="radio"/> organizational Culture	1 <input checked="" type="radio"/>	2 <input type="radio"/> 3 <input type="radio"/> 4 <input type="radio"/> 5 <input type="radio"/> 6 <input type="radio"/> 7 <input type="radio"/> 8 <input type="radio"/> 9 <input type="radio"/>
19	<input checked="" type="radio"/> Training	or <input type="radio"/> work system	1 <input checked="" type="radio"/>	2 <input type="radio"/> 3 <input type="radio"/> 4 <input type="radio"/> 5 <input type="radio"/> 6 <input type="radio"/> 7 <input type="radio"/> 8 <input type="radio"/> 9 <input type="radio"/>
20	<input checked="" type="radio"/> Training	or <input type="radio"/> Human Recourses	1 <input checked="" type="radio"/>	2 <input type="radio"/> 3 <input type="radio"/> 4 <input type="radio"/> 5 <input type="radio"/> 6 <input type="radio"/> 7 <input type="radio"/> 8 <input type="radio"/> 9 <input type="radio"/>
21	<input checked="" type="radio"/> Training	or <input type="radio"/> consulting Boards	1 <input checked="" type="radio"/>	2 <input type="radio"/> 3 <input type="radio"/> 4 <input type="radio"/> 5 <input type="radio"/> 6 <input type="radio"/> 7 <input type="radio"/> 8 <input type="radio"/> 9 <input type="radio"/>

				8 <input type="radio"/> 9 <input type="radio"/>
22	<input checked="" type="radio"/> Training	or <input type="radio"/> Customer satisfaction	1 <input checked="" type="radio"/>	2 <input type="radio"/> 3 <input type="radio"/> 4 <input type="radio"/> 5 <input type="radio"/> 6 <input type="radio"/> 7 <input type="radio"/> 8 <input type="radio"/> 9 <input type="radio"/>
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109	<input checked="" type="radio"/> quality guidelines	or <input type="radio"/> internal audit	1 <input checked="" type="radio"/>	2 <input type="radio"/> 3 <input type="radio"/> 4 <input type="radio"/> 5 <input type="radio"/> 6 <input type="radio"/> 7 <input type="radio"/> 8 <input type="radio"/> 9 <input type="radio"/>

				8 <input type="radio"/> 9 <input type="radio"/>
110	<input checked="" type="radio"/> quality guidelines	or <input type="radio"/> Ignorance of ISO importance	1 <input checked="" type="radio"/>	2 <input type="radio"/> 3 <input type="radio"/> 4 <input type="radio"/> 5 <input type="radio"/> 6 <input type="radio"/> 7 <input type="radio"/> 8 <input type="radio"/> 9 <input type="radio"/>
111	<input checked="" type="radio"/> financial resource	or <input type="radio"/> ISO requirements	1 <input checked="" type="radio"/>	2 <input type="radio"/> 3 <input type="radio"/> 4 <input type="radio"/> 5 <input type="radio"/> 6 <input type="radio"/> 7 <input type="radio"/> 8 <input type="radio"/> 9 <input type="radio"/>
112	<input checked="" type="radio"/> financial resource	or <input type="radio"/> size of documents	1 <input checked="" type="radio"/>	2 <input type="radio"/> 3 <input type="radio"/> 4 <input type="radio"/> 5 <input type="radio"/> 6 <input type="radio"/> 7 <input type="radio"/> 8 <input type="radio"/> 9 <input type="radio"/>
113	<input checked="" type="radio"/> financial resource	or <input type="radio"/> internal audit	1 <input checked="" type="radio"/>	2 <input type="radio"/> 3 <input type="radio"/> 4 <input type="radio"/> 5 <input type="radio"/> 6 <input type="radio"/> 7 <input type="radio"/> 8 <input type="radio"/> 9 <input type="radio"/>
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119	<input checked="" type="radio"/> size of documents	or <input type="radio"/> Ignorance of ISO importance	1 <input checked="" type="radio"/>	2 <input type="radio"/> 3 <input type="radio"/> 4 <input type="radio"/> 5 <input type="radio"/> 6 <input type="radio"/> 7 <input type="radio"/> 8 <input type="radio"/> 9 <input type="radio"/>

120

internal audit

or  Ignorance of ISO importance

1

- 2  3  4
- 5  6  7
- 8  9