An assessment of quality management system indicators for the ISO 9001: 2008 certified work organizations in Kuwait

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Abstract

The purpose of this research is to assess the performance of quality management systems in the Kuwaiti work organizations as per ISO 9001:2008 from the customers' perspectives (end users) based on the auditing practices and quality implementations. The research has taken a long path of research methodology starting with the development and customizations of two different survey questionnaires and ending up with a data analysis using several statistical software packages such as SPSS and Minitab. Most of the data analysis has used the method of non-parametric statistical techniques except for the modeling part where advanced statistical techniques have been used. One survey was directed to all business types and the other was only directed to manufacturing organizations. The target respondents for both surveys were provided in the form of listed names of ISO 9001 certified work organizations by a government agency for the state of Kuwait, public authority for industry (PAFI). Reliability and validity of both surveys were statistically justifiable enough to make the author to proceed with: (1) comparison against Swedish certified work organizations, and (2) building up a statistical model from each survey. The comparison between the Kuwaiti and Swedish work organizations has shown many significant differences in the auditing practices and quality implementations. Moreover, the resulted differences between the two culturally work environments (Kuwaiti and Swedish), shed the lights about the existing gaps of ISO implementations and auditing practices in the two countries and help the author analyze these gaps for suggesting any prospect of quality improvements. Aside from descriptive and inferential analysis on the surveyed data, a model building was the final objective of this research. The main model was built up based on 10 interrelated factors, extracted from the survey questionnaire using LISREL software as a structural equation modeling technique. Furthermore, the model has shown the capability of predicting the total and direct effects from one factor to another. From modeling, it was statistically shown that the ISO certified manufacturing organizations outperformed the ISO certified services organizations in Kuwait.

Acknowledgement and Recognition

Chapter 1

Introduction

1.1   History and definition of Quality

Since the topic of my research is mainly concerned with the concept of quality and its applications worldwide essentially in different work organization sectors and types, the author finds it necessary to briefly write down what has been said about quality by practitioner and researchers before introducing the ISO 9001 quality standard system. Quality is considered to be a competitive weapon in the marketplace. Quality engenders competitive advantage by proving products that meet or exceed customer needs and expectations (Lee and Zhou, 2000). Quality is defined using different perspectives as it is still a subjective goal that has indefinable characteristics (Kazan et al., 2006). An early definition for quality is presented by Juran (1974) who defines quality as "*fitness for use*". Juran's definition originates mainly from customer's perspective in defining quality. It is the customer who determines whether the received products or services satisfy his or her needs. Reeves and Bednar (1994) similarly agrees with this definition and define quality as excellence, value, conformance to specifications, and meeting or exceeding customers' expectation. The term "fitness for use" defined by Juran (1974) is also included in the quality definition presented by Reeves and Bednar (1994). Thus, the customer perspective with respect to quality is the master key that should be understood while determining any term for quality or definition of quality. Garvin (1987) sees quality as a multidimensional construct. He describes quality as having eight dimensions which include: performance, features, reliability, conformance, durability, serviceability, aesthetics, and perceived quality.

These dimensions originally match with the definition of quality as seen by the customer. For interested readers, the author has tabulated more definitions of quality in chronological order with various authors' names.

No.	Definition	Name of Authors
1	Fitness for use	Juran, 1974
2	Quality should be aimed at the needs of the consumer, present, and future	Deming, 1986
3	There are eight dimensions of quality as defined from the customer's view point namely, performance, features, reliability, conformance, durability, serviceability, aesthetics, and perceived quality	Garvin, 1987
4	To practice quality control is to develop, design, produce and service a quality product which is most economical, most useful, and always satisfactory to the customer	Ishikawa, 1989
5	The total composite product and service characteristics of marketing, engineering manufacture, and maintenance through which the product and services in use will meet the expectations of the customers	Feigenbaum, 1991
6	Quality is the ability to satisfy the needs and expectations of the customers	Bregman and Klesfsjo, 1994
7	Conformance to specifications	Crosby, 1996
8	Quality is meeting the customer requirements	Oakland, 2003

If the above arguments about the various definitions of quality are considered, it can be concluded that quality provides competitive advantage for an organization through satisfying the customer needs. Therefore, scholars have reached a conclusion that quality must be linked to competitive strategy. Prajogo (2007) considers quality as a strategic performance which is a reflection of a competitive strategy of the firms. He agrees with the notion that the quality definition has been gradually developed from an operational level to a strategic level. This concludes that a work organization should strongly consider quality as its strategic objective when fulfilling customer requirements. Therefore, quality should help work organizations enhance their competitiveness and lead to or even improve customer loyalty through meeting customers' requirements and expectations.

So far, quality was introduced merely as a definition with no means to achieve it. TQM, ISO 9000 standards, Six sigma, lean manufacturing, and other quality practices are ways of quality implementation methods. Collis and Montgomery (1997) suggested that the implementation of practices (i.e., quality) such as ISO 9000 can raise organizational performance and result in real competitive advantage. This makes the organization to view quality as a very competitive weapon that should be adopted and implemented as a competitive strategy for playing a major role in creating, sustaining, and maintaining the competitive advantage of a given work organization.

1.2   Background and History of the ISO 9001 standard

Basically ISO is a Greek word meaning "Equal". Unfortunately, many people even today misunderstand the word ISO, thinking it is an abbreviated term for some three long words. However, there is a word with a semi-similar abbreviation, International Organization for Standardization, which cannot logically be equivalently abbreviated to "ISO". It is best close to an IOS abbreviation. International organization for standardization (IOS) is the international authority body responsible for issuing various quality standards, one of which is the ISO 9001 standard for the quality management system. Quality management system (QMS) is a set of interconnected processes designed and executed for the purpose of meeting customer requirements. From the QMS definition, it is explicitly understood that quality is nothing more than an initial compliance with customer requirements. Initial compliance with customer needs is the pathway toward quality achievements. Some quality professionals define QMS as the system to manage customer requirements. International organization for the standardization has authorized a technical committee, called TC176, comprising of 113 members from different countries to be responsible for preparing, establishing,

documenting, and maintaining the ISO 9001 standard document. ISO 9000 standard document has undergone several changes and amendments for last two decades. The first standard was published in 1987. From 1987 until today the standard has been revised three times. The latest one which is being used worldwide is the ISO 9001:2008. The 9001 reflects the code of the standard for the quality management system and the 2008 reflects the publishing year of the standard. The changes in the standards were necessary since they reflected the new needs of customers by removal of ambiguities or re-editing of written text in the previous standards. The ISO 9001:2008 standard is embedded with eight quality management principles. These principles, the fundamentals of any quality-oriented work organization, are the following:

1. Customer focus

2. Leadership

3. Involvement of people

4. Process approach

5. System approach to management

6. Continual improvement

7. Factual approach to decision making

8. Mutually beneficial supplier relationship

The 2000 and 2008 versions of standards are very generic and applicable to all types of business or operations sector. Only the 1994 ISO version was particularly focused on the manufacturing sector. The structure of the new standard (2008) is a set of requirements mainly covered in eight well-written English clauses. The above principles have contributed to the establishment of the ISO 9001:2008 standard requirements. It is clearly understood that quality principles as these establish a direction to the people in charge of documenting and establishing the ISO 9001 standard for all interested stakeholders. A strong belief in the adoption of these principles makes the roadmap to

quality, flexible enough to encounter random and sudden changes from the surrounding work environment. In the following textual paragraphs, quality principles are briefly explained for the purpose of understanding ISO 9001 main requirements.

Starting with customer focus, where the definition implies that work organization depend on their customers and therefore organizations shall understand the current and future customer needs, and to be able to meet customer requirements, and strive to exceed the customer expectations. Customers are the bloodstream of any organization. Organization shall start investing further and externally into their customers primarily, rather than on their profit engine process. In other words, outward seeking focus is more important than inward seeking focus. The customer focus principle is addressed and reflected in the ISO 9001 standard requirements by: communication with customers; care for customer property; the determination of customer needs and expectation; appointment of a management or operations representative; and finally a top management commitment.

The second quality principle is leadership which implies that leaders should establish the unity of purpose and direction for the organization. This is where motivation should be enhanced by leaders of the organization. Leaders can be at different functions and levels within the work organizations. They are responsible for creating a work environment with employees motivated toward the achievement of business or operations objectives for the organization. Leaders shall encourage and motivate their subordinates rather than aggravate them. The concept of leadership is the cultural transition from aggravation to motivation within the work organization. This principle is reflected in the standard by setting up organization objectives, such as planning, internal communication, and creating and effective work environment.

The third quality principle is concerned with the involvement of people. Involvement of people implies that all employees are essential and their full involvement enhances productivity and benefits to the organization. The concept behind this principle is the transition from operating to cooperating. This principle is reflected in the standard by reviewing designs, defining objectives at different functions of the organization, creating work environment in which people are motivated, having proper internal communication channels, and identifying competence needs.

The fourth quality principle is based on a process approach. This principle focuses on how an organization deals with its production and business operations regardless of the operations system complexity. Thus, the effectiveness and efficiency of any production or business operations can be measured with the implementation of this quality principle, a process approach. The process approach method suggests that traditional business organization transit from procedure approach to process approach. The procedure approach is subject to causing much waste with low efficiency and little productivity in business operations unlike a process approach with high efficiency and productivity. Indeed, not all implemented processes are effective and efficient unless they are well studied, developed, monitored, maintained and updated periodically. The update is necessary as it is a requirement in the standard as explicitly stated in clause 8 of the standard, a continual improvement requirement. This quality principle can be found from the standard and reflected by identifying processes, defining process inputs and outputs, and providing the infrastructure, information and resources for processes to function.

The fifth quality principle is a system approach to management. This principle implies that all processes are interrelated and interconnected to meet the organization's business goals. Goals are achieved effectively through full understanding of organization processes. The macroscopic view of the whole organization performance is

simply behind the concept of the system approach to management. Understanding this principle makes the whole organization to transit from functional approach to system approach. This principle is reflected in the standard through: establishing, implementing, and maintaining the management system; interconnecting and interrelating processes; and establishing measurement processes.

The sixth quality principle is a continual improvement. The terminology intentionally used here by the standard is 'continual' not 'continuous'. 'Continuous' means without breaks or interruptions, while 'Continual' means repeated regularly and frequently. This definition of 'continual' brings the concept to the ISO 9001 users that a process shall be planned, developed, and implemented to encounter the changes that may occur in the QMS or at least to keep the customers satisfied. The transition needed in this principle is to have organization move from error correction process to course correction process. The continual improvement principle is reflected in the standard through: improvement processes, identifying improvements, and reviewing documents and processes for opportunities of improvement.

The seventh quality principle is a factual approach to decision making. This principle basically drives the organization toward taking the appropriate corrective and preventive actions based on factual data analysis and not on emotions or self-opinions. Thus, an organization shall adopt a process for measurements to verify outputs against inputs and validate processes where necessary. Clause 7.0 from the standard addresses these verification and validation issues as processes that must be documented. Documented processes - according to the terminology used by the standard – means processes shall be planned, established, implemented and maintained. This principle is reflected in the standard through: management reviews; monitoring tools to obtain facts; control of measuring devices; analysis to obtain facts from information; records for documenting facts; and approval based on facts.

The last quality principle is mutually beneficial supplier relationships. This principle justifies that the final quality of a product delivered to the customer is also influenced by external processes rather than the organization's internal operation processes. For instance, some manufacturing firms take part of the manufacturing and production processes, in which they have to purchase raw materials from different suppliers. This is why the organization has to assure their customers with the quality of their finally delivered products and that is done by strengthening the relationships with their suppliers. Therefore, a quality control and assurance process has to be adopted by the work organization in relation to their suppliers. This principle requires organization to transit from the culture of adversarial approach to alliance approach. The principle is addressed in the standard through: control of suppliers; evaluation of suppliers; and analysis of the supplier data.

Through understanding the above quality principles, the ISO 9001 standard requirements were established with revised various versions to help organizations comply with the standard via answering the following:

1- Where is the customer focus in the organization processes?

2- Where in the processes, is there a leadership to motivate the organization's employees?

3- Where in the processes, is the involvement of people?

4- Where is the process approach to achieve organization's objectives?

5- Where is the systems approach to management of the processes to eliminate bottlenecks?

6- Where in the processes are the facts collected to help leaders take effective decisions?

7- Where is the continual improvement process to enhance effectiveness and efficiency?

8- Where in the processes are quality control and assurance programs to confirm the conformity of delivered raw materials from the suppliers?

The requirements, stemmed mainly from the eight quality principles of the ISO 9001 standard, are documented in clauses 4, 5, 6, 7, and 8. These requirements are listed as follows:

1. QMS General requirements.

2. Management responsibility.

3. Resource management.

4. Product realization.

5. Continual improvement.

Thus, the five requirements from the standard will determine to what extent the organization is compliant with the ISO 9001 quality management system. In other words, work organizations are required to establish full understanding and cultural awareness of the five requirements prior to getting certification.

1.3   ISO 9001 and its relation to TQM

In business field, TQM and ISO 9001 systems are considered to be similar at the level of quality practices. Several researchers, Ahire et al. (1996), Dale et al. (1994) and Flynn et al. (1994), Martinez-Lornte et al. (2000), have defined the common eight dimensions that are common in the ISO 9001 standard and TQM practices and these are exactly the same as the eight ISO 9001 principles. This is the reason why many researchers consider ISO 9001 as first step toward TQM practices (Taylor, 1995; Tummala and Tang, 1996; Skrabec, 1999; Sun, 2000; Escanciano et al. , 2001). Though similarities exist between the two quality systems, other researchers also see the differences that exist between them and these are summarized as below :

1. One of the TQM pillars (Deming, 1982), the continuous improvement, is proactive in TQM, rather than being passive in the ISO 9001 standard requirements (Lee et al., 1999; Zhu and Scheuermann, 1999).

2. Customer focus principle in the ISO 9001 standard is an application of procedures focused on the fulfillment of design and production requirements, while it is considered to be the king of TQM work environment (Lee et al., 1999)

3. Workforce and employee participation is paid more attention and focused on the TQM practices than in the ISO 9001 application (Tummala and Tang, 1996; Gotzamani and Tsiotras, 2001).

The above three dissimilarities between the two systems are somehow not convincing enough and may lead ISO 9001 system auditors and implementers and the author to argue that :

1. Continuous improvement is fully addressed in clause 8.0 of the standard and the wording in the standard was carefully chosen to make ISO 9001 users develop and implement an effective continual improvement program.

2. Documentation and keeping records of customer inquiries, customer contracts, and his or her requirements must be controlled and fully monitored by a process to help prevent any unexpected circumstances. This would be part of enhancing customer focus principle from initial customer inquiry to customer's final product delivery.

3. Clause 5.0 and 6.0 in the standard, require the top management to allocate the competent employees to perform their assigned tasks. Thus, top management must provide the necessary resources in order to achieve the effectiveness of the organization's QMS.

The arguments about which QMS system is better than the other, continue to expand in the literature. Some researchers have shown that benefits are gained to the organizations if each system is adopted separately (Martinez-Lorente and Martinez-Costa, 2004) and others see that the benefits are enhanced when the two systems are implemented simultaneously. The author believes that there are barriers that make the differences in perceiving benefits from ISO 9001 QMS. These barriers could be the cultural factors which may differ from region to region and country to country. Nevertheless, the main issue remains that ISO 9001 standard is just like any other quality management practices that adopt similar TQM principles and may achieve effectiveness and efficiency in the manufacturing and business firms.

However, TQM is a unique and tailor made approach, which has nothing to do with minimum or specific quality standards in any dimension (Pheng and Teo, 2009). As indicated by Lewis et al., (2006a), organizations implementing TQM are not obligated in any manner to develop such strategies. The content of quality management under TQM is thus varied across organizations and any similarities that originate from reasons other than the existence of basic and minimum standards is stipulated by any recognized institution.

Although TQM also targets the entire organizations, it can also be designed to focus on a specific aspect of the organization (Lewis et al., 2005). As a result, this tailor-made strategic imperative can be used for a limited period, under certain circumstances and over limited aspects of the organization. Levine and Toffel (2010) posited the fact that TQM emerges as a result of internal pressures making it a highly volatile and flexible approach to quality management.

Eventually, TQM represents the earliest efforts to establish QMS at the organizational and international level (Costa et al., 2009). Amuragam et al. (2008) proposed that the aspects of TQM play a major role in the establishment of ISO standards, considering that the successes of the fragmented efforts by organizations resulted in the need to tap into the benefits of the universal standards. Although numerous factors resulted in the emergence of ISO 9000 standards, customer focus and the need to protect consumers from exploitation remains a primary rationale for the universal standards (Lopes et al., 2011). Eventually, firms implementing QMS have the opportunity to target both approaches, considering that they are synergistic and interoperable.

Since Anvari et al. (2011) have shown that lean manufacturing and TQM principles and methods have much in common, and the author has shown above the existing similarities in quality principles between the TQM and ISO 9001, these findings make me think that a good research point, particularly in the field of manufacturing and industrial engineering, would be to start studying the status of ISO 9001 certified work organizations in Kuwait. The study will initially enable me to explore macroscopically about the quality practices adopted in all business and operation sectors and finally, in a microscopic view, understand the effectiveness and efficiencies of the manufacturing firms' QMS implementation in Kuwait.

1.4   Problem statement

Over the last decade, working sectors in Kuwait have witnessed high motivations to go with the implementation of available quality management system standards. The one that is most popular standard is the ISO 9001 quality management systems. The author has taken the responsibility to investigate whether there are perceived benefits for those organizations seeking ISO 9001:2008 quality management system (QMS) certificate. Such a research was done before, from different perspectives, in different countries of the same region and worldwide. It has been found that Kuwait is one of the countries which has not been effectively evaluated for the ISO 9001 quality management system implementation from the perspective of the end users. End users in this research are the customers who are affected by the ISO 9001 standard systems. Such customers can be government and private sectors with various business operation types which have already been certified as per ISO 9001:2008 quality management system standard. From literature review, there were several investigative and comparative studies on the effect of ISO 9001 implementation in different countries mainly in Europe and USA. However, not many studies were done in the Middle East, specifically, even by people who are already experiencing the works of quality implementation rather than reading about it from textbooks. Organizations need experts, in the field of quality, to identify problems and eliminate them immediately. This research is conducted by a quality manager, a certified lead auditor as well, who works in an organization that has already been certified. One publication of research previously done in Kuwait was by Mady (2008) who only investigated the TQM practices in the food and refractor industries but he did not focus on whether these organizations were all ISO 9001 certified. Mady (2008) suggested in his conclusion that the government of the state of Kuwait, through the public authority for industry

(PAFI), should impose a new requirement from these manufacturing firms to receive an

ISO 9001 certificate in order to enhance their performances. Therefore, a decision was

made to focus on the ISO certified organizations regardless of the size of business

sector and their types. The method used to collect such information was to develop two

types of questionnaires as the sole instruments in this research. The first type of

questionnaire was used for the first phase of the research and the second one was used

for the final stage of research. The first type of questionnaire was to measure

performance of a quality auditing assessment of the Kuwaiti ISO certified work

organizations in order to give some indications of the current status of organization

QMS as per ISO 9001 standard systems. This type of survey is very lengthy but is

worthy of the measured information. The second type of questionnaire is shorter and

directed specifically to manufacturing sector. Furthermore, a comparative analysis

between Kuwait and Sweden would be carried out to see if there are any statistically

significant differences between the two views. The analysis is basically stemmed from

the view point of customers toward the auditing process as being conducted by the

external auditor. Poksinska et al. (2007) has discussed in his paper 'Beyond compliance

with the standard', the added value from external auditing. Thereby, focusing on the

added value of auditing will eventually explore other quality management system

parameters such as customer satisfaction level, top management commitment,

improvements, involvement of people, quality management functions, ISO compliance

assessment, level of control on documentation and records, adopted continual

improvement programs, and finally the ISO impact on the whole work of the

organizations. Then, a reader may ask: Why is it necessary to compare Kuwait with

Sweden? The answer is to benchmark the ISO 9001 certified Kuwaiti organizations

against other international work organizations for the purpose of: understanding the

gaps and differences in ISO 9001 implementation and possibly trying to suggest ways to narrow these gaps by improving the current QMS, adding value and contributing further to the quality experience, in the realm of research. Other reasons for comparing Kuwaiti organizations against the Swedish ones are attributed to the survey used by Poksinska et al. (2007), which meets the objectives of my research; and the last reason for the comparison between these two countries was due to the limited cooperation from the researchers in the neighboring countries.

The research goes further to assess the level of quality implementation of raw materials delivery from external suppliers to their final effects on the existing ISO 9001 certified manufacturing firms. After setting up the mission of this research with its consistent objectives, appropriate research instruments such as well-designed questionnaires will be essentially utilized for the data collection.

1.5   Aim of the research

The main purpose of this research is primarily embedded in the title of this research and it is mainly to achieve the following:

- Investigate about the existing ISO 9001implementation in the Kuwaiti certified organizations.

- Investigate about the existing auditing practices and how these affect implementations.

- Enhance any prospect for quality improvements.

Thus, the aim requires some key objectives have to be formulated in order to achieve the mission of this research. These objectives would be to:

1. Shed the light on the importance of ISO 9001 QMS implementation for the Kuwaiti work organizations through understanding the motivations behind certification.

2. Investigate and measure the organization compliance and abidance level with the standard requirements and employees' awareness level.

3. Compare and analyze descriptively the various certified organization sectors and their sizes in Kuwait with respect to their ISO implementation.

4. Compare two different work environments and cultures between the Kuwaiti and Swedish work organizations through the implementation of ISO 9001.

5. Analyze the benefits to organization in getting certified.

6. Investigate the percentage of organizations that have complied with all clauses of standard requirements and their association with the cost and the length of auditing.

7. Build up a statistical model that describes the main factors, latent variables, which play significantly important roles in the ISO 9001 QMS Impact.

Besides the simple descriptive statistics done on the survey questionnaires, inferential statistical analyses are also performed to provide a set of scientific answers to the above objectives. Therefore, a formulation of set of hypotheses were constructed and categorized under different titled objectives. The hypotheses are predefined prior to data collections and formed according to the author's knowledge of the cultural aspects in Kuwait, experience in the field of quality, and literature review. Given below are the objectives that are only indicated by their numbers and correspondent with a set of hypotheses.

Objective # 1

H1: There are no significant differences between the government and private sectors with respect to motives in seeking the ISO 9001 certification.

H2: There are no significant differences between the business sectors with respect to motives in seeking the ISO 9001 certification.

H3: Motives are seen significantly different with respect to the respondents' job positions.

H4: Motives are seen significantly different between the quality and non-quality related employees.

Objective # 2

H1: The QMS functions remain the same for all business and operations sectors.

H2: The organization awareness level toward ISO 9001 implementation is significantly different among various organization types.

H3: Private and government sectors share the same level of awareness.

H4: The nature of business sectors influences the level of QMS awareness in the work organization.

H5: Job positions play significant role in the QMS awareness level.

H6: Significant QMS awareness level differences exist between quality and non-quality related staff.

H7: Enhancing top management commitment and involvement will improve awareness levels of ISO 9001 implementation within the work organization.

Objective # 4

Only descriptive statistics can be presented to show the percentage of certified organizations according to their nature of business or operations performance.

Objective # 5

H1: Role of external auditors are seen significantly different between Swedish and Kuwaiti ISO certified organizations.

H2: Auditors' performances are seen significantly different between Swedish and Kuwaiti ISO certified organizations.

H3: Auditor's source of information for QMS assessment is seen significantly different between Swedish and Kuwaiti ISO certified organizations.

H4: Auditor's concluding audit reports is seen significantly different between Swedish and Kuwaiti ISO certified organizations.

H5: Benefits, besides the ISO certificate are significantly seen different between the Swedish and Kuwaiti ISO certified organizations.

Objective # 6

H1: Percentage of organizations that noticed the benefits of the ISO certifications, are significantly higher than ones which did not.

Objective # 6

H1: Percentage of organizations that have a standard exclusion is significantly the same as the ones without the exclusions.

H2: Organization with exclusion has an association with the cost of certification.

H3: Organization with exclusion has an association with the length of auditing.

<u>Objective # 7</u>

Several hypothesized models, conceptually based on the author's experience with ISO 9001, are to be tested for significant correlation with extracted quality factors from the used research instrument by using a confirmatory factor analysis, LISREL (linear structural relationship), and partial least squares method (Smart PLS).

Chapter 2

Literature Review

As explained in the previous chapter, requirements of the ISO 9001 standard are documented based on eight quality management principles. These principles are: 1) customer focus; 2) leadership; 3) involvement of people; 4) process approach; 5) system approach to management; 6) continual improvement; 7) factual approach to decision making; and 8) mutually beneficial supplier relationship (International Organization for Standardization, 2008b). The effective implementation of ISO 9001 quality management system (QMS) has been internationally recognized in the last two decades as a competitive advantage for various types and sizes of work organizations. Therefore, ISO 9001 standard is a document that consists of a set of criteria purposely made for small, medium, and large enterprises to demonstrate their abilities to achieve a basic level of quality by formalization and documentation of their quality management systems (Beattie et al., 1999).

In this chapter, the author will introduce two sections of literature reviews. The first section would be very general about the ISO and other quality methods of implementation worldwide (i.e., General Review). The second section would be very specific toward the thesis of this research (i.e., Specific Review).

2.1   General Review

2.1.1   ISO 9001 standard system impacts on performance and benefits

Different regional studies of the ISO 9001 impact, on the performance of work organizations, have shown some results with significant differences. Liao et al.(2004) has studied Australian manufacturing firms and found that certification is most likely to

lead to both, actual and perceived quality improvements. Drew and Healy (2006) have shown that Irish organizations using quality management systems were performing better in assuring effective relations with customers and employees. Their research method included survey data taken from 932 companies in the private and public sector. The analysis of the results suggested that a high percentage of companies believe that their reputation, products and services increased for the better since achieving the ISO 9000 certification. Other studies, done in the US industries by Ebrahimpour et al. (1997), suggested that ISO 9001 quality management system implementation in the work organizations expect design, product, process, and supplier relationship improvements. Brown et al. (1998) reported in their research for small and medium certified enterprises in Australia that benefits and improvements are only significant in relation to internal improvement, greater quality awareness, improved product quality, and improved awareness of problems within the work organizations; while other researches have resulted with partially opposite findings when adopting ISO 9001. David and Idemerfaa (2005) have shown improvements in product development processes based on ISO 9001 standard recommendation. Simmons and White (1999) found no positive correlation between ISO certified organizations and performance. This also confirms the study done by Heras et al. (2002) who surveyed 800 Spanish companies and resulted with no positive impacts on sales and profitability. Also, a study carried out by Lai and Cheng (2005) shows that, a certification alone would not improve performance. They suggested that implementation of the quality management system in work organization, does not have a direct impact on a successful performance. They argue that benefits are only perceived internally rather than externally.

In spite of the continually updated version of the ISO 9001 standard requirements, starting from the first version in year 1987 until the latest one issued in the year 2008, and its widespread application in many different countries, there are still

ambiguities whether ISO 9001 has helped organizations achieve actual performance improvements. Regardless of the type and size of businesses the organizations are running, the question "If there is an actual benefit and improvement" is still argumentative. Many work organizations could not verify the present association between ISO 9001 implementation and its performance improvements. Some work organizations have reached a level of frustration and disappointment since positive outcomes from applying the ISO quality system were not significantly noticed. The reason for that is, most probably due to the fact that most studies done on ISO 9001 QMS were not done empirically and were mostly case studies, which were descriptive, or prescriptive (Costa and Lorente, 2003). As a result of this non ending argument, Koc (2007) has decided in his paper to investigate questions about performance improvement and how this performance is improved. This was done by surveying 106 small and medium enterprises where 79 of them were ISO 9001 certified enterprises. Koc (2007)'s findings showed significant differences in performances between certified and non-certified firms. Koc (2007) has addressed ISO 9001 effect on the manufacturing parameters through improvement of competitive priorities. The manufacturing parameters defined in his paper were the following:

1- Product design performance   2- Production planning performance

3- Machine set-up performance   4- Part inspection performance

5- Material handling performance 6- In process waiting

7- Manufacturing time utilization 8- Maintenance performance

9- Defective part production   10- Tool utilization

11- Fixture utilization   13- Raw material inventory need

14- Work in process inventory need   15- Finished product inventory need

16- Capacity utilization   17- Batch size constraint

The competitive priorities are defined as cost, quality, delivery, and product flexibility. The above 17 elements of manufacturing parameters were used by Koc (2007) to use as the criteria for indicating whether performance in certified organizations has been improved. Thus, measuring performance improvement for a firm against these criteria is fully explained as a requirement in the ISO 9001 standard document. For instance, Clause 7.3 from the standard states a requirement about design and development. Thus, ISO 9001 QMS requires a documented procedure, a procedure to be established, documented, implemented, and maintained, for the purpose of controlling and verifying the design of manufactured products (Novack and Bosheers, 1997). Further to clause 7.3, other clauses from the standard require existing competency among human resources and adequately available physical resources to fulfill the requirements of the production lines. The competency is not sufficient to improve performance if no communication channels are open between subordinates and superiors. Zuckerman and Hurwitz (1996) have revealed by their research on ISO 9001 certified manufacturing firms that interpersonal communication, specifically on the design and development section, improved performance in relation to design and product. Koc (2007) has also explained that some organizations benefit from ISO and some do not because those organizations consider that ISO 9001 QMS as a first step approach to total quality management implementation. Sun (2000) also agreed with the findings of Koc (2007) and explained that the determinant factor for obtaining differences with ISO 9001 QMS implementation was by how the organizations perceive ISO 9001. Unfortunately, not all manufacturing parameters showed improvement when organizations have implemented ISO QMS. Some of these parameters that failed to show improvement with the ISO 9001 QMS implementation are maintenance performance, defective part production,

fixture utilization, and finished product inventory need. However, it was evident that non-value added activities were diagnosed and removed from the manufacturing processes by the proper and effective ISO 9001 QMS implementation. Reed et al. (1996) agrees with ISO 9001 QMS's ability to eliminate non-valued added processes by stating that with the adoption of ISO 9001 standard the operations orientation produces increased revenues through enhanced product reliability and reduced costs through process efficiencies. This is why other authors like Gaunt (2003) place high emphasis upon having the organizations understand the requirements fully, prior to implementation. He explained that the misinterpretation of the ISO 9001 requirements would lead to non-values to the work organizations. His findings revealed that misinterpretation of ISO 9000 requirements and lack of focus on business needs while executing quality systems were the main causes of their misalignment with the business processes. His research also focused on the lack of broad focus on business needs and ineffective execution of quality management systems.

So far, it can be seen that much literature was written on whether work organizations have gained benefits from ISO 9001. The answer to this question is still debatable. In 1996, Dun and Bradstreet conducted a comprehensive survey (ISO 9000 survey, 1996) of all ISO 9000 certified U.S. organizations and found that the average company benefited from the implementation, while Terziovski et al. (1997), Curkovic and Handfield (1996) did not agree with the proposition that a significant relationship between ISO 9000 implementation and organizational performance exists. Batchelor (1992) showed that the benefits were only observed on procedural efficiency and error rate reduction and not on market share, staff motivation, or cost reduction. Allan (1993) and Brown (1994) pointed out that managers use the ''firefighting'' method even after they have implemented ISO 9000 rather than using a preventive action method through the continual improvement approach. Carroll and Blue (1991) had already reached the same finding before Allan (1993) and Brown (1994) by measuring over 55 different

indicators to monitor quality products and services to external customers. Carroll and Blue (1991) concluded that US companies appreciated more the corrective actions as firefighting than preventions.

Contrary to the above findings, Robin and Dennis (1994) ensured that ISO 9000 had a positive impact because of the introduction of statistical process control, though the standard itself did not explicitly require it in the standard's previous version. Askey and Dala (1994) claimed that managers or the people in charge of quality in the work organizations viewed certification as an end in itself, not as a means to an end, and that after certification they reverted to old work practices. Hunt (1997) concluded that ISO 9000 did not necessarily guarantee product quality. This conclusion is also reached by Naveh and Marcus (2005) who demonstrated that ISO 9001 has not conclusively produced benefits. However, it was found that other researchers who noted ISO benefits as significant in their research papers were : Basil (1994), Lawrence (1996), Eugenia (1996), Edmunds (1996), Wade (1996), Dov (1998), Smith (1994), Houten (1994), Donna (1995) and Avery (1995). Moreover, Elmuti and Kathawala (1997) claimed that productivity, quality of product, and quality of work practice improved due to certification. Brown et al. (1998) found improvement in quality awareness, and better product quality, but did not verify improvements in productivity, costs, wastage rates, staff motivation and staff retention. However, Walker (1997), on his research method over evaluating the ISO 9001 quality management system impact on university research enterprise, found that implementation of quality management systems could eliminate unproductive activities in research projects; thereby diminishing wasted efforts and incrementing positive change. One negative finding as noted by Walker, is that, the university environment could easily lead to intellectual arrogance and discipline when it comes to compliance with a practical standard as ISO 9001, though University already accepted to teach courses in the quality management systems.

2.1.2 Customer satisfaction and loyalty

I understand now that ISO 9001 quality management systems deals not only with improvement in quality levels of products and services, but also provide the means and guidelines to achieve it. Thus, this search was not only narrowed to the term ISO 9001 quality management systems, but it was also broadened to include components of QMS such as customer satisfaction, top management commitment, ISO auditing, quality assurance, productivity, and benefits and cost. It is known that customer satisfaction is the final intangible product that any ISO 9001 certified organizations seeks to deliver to its customers after the delivery of the product. Figure (2.1) below as quoted from the ISO 9001:2008 standard document explains how it is important for the ISO 9001 certified firms to continually keep their customers satisfied.
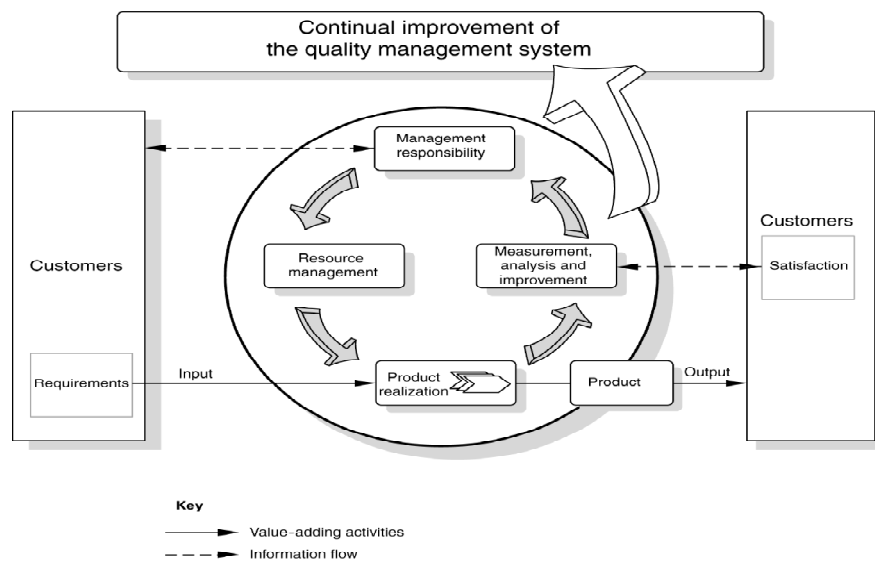
Figure (2.1) ISO 9001 requirements process map

Source by: ISO 9001 standard document

Thus customer satisfaction is a result of a continual improvement process that organizations must always adopt. From the standard perspective, the customer is a key player in the whole ISO implementation process. Thus, the customer is the determinant factor that can provide a reasonable picture of a quality management system

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implementation. In order to address the customer satisfaction issue, it would be necessary to define customers. In many quality texts, customers are the end users. However, some customers are considered to be the producers of the services; these are called internal customers. Groocock (2000) classified customers into three various categories: 1) Powerful; 2) Weak; and 3) patients). He explained that powerful customers are more influential on their suppliers than the weak and patients customers. The powerful customers make suppliers to abide by the quality assurance system and quality improvement programs than the other two types of customers. Terziovski et al. (2001) showed that customer could put pressure on the work organization to seek ISO 9001 certification. Thus, customer satisfaction must be the primary vision for any work organization that wishes to seek or maintain a quality management system as per ISO 9001. Furthermore, customer satisfaction requirement is fully illustrated in the ISO 9001 standard – clause 8.2.1. PDCA Deming's cycle (International Organization for Standardization, ISO 9001:2008(E)) determines the key components that enhance the customer satisfaction within the certified work organization. These components, are the fundamentals of ISO 9001 standard which comprise of management responsibility, resource management, product or service realization, and measurement, analysis and improvement. Besides from achieving customer satisfaction externally, Guimaraes (1996) demonstrated that job satisfaction through fulfilling internal customer needs would enhance performance improvement leading to customer satisfaction. Shrestha and Chalidabhongse (2006) explained over their survey on 300 employees working in 60 Thai companies to what extent job satisfaction is affected by the existing performance appraisal system used by these companies. They conclude that since the performance appraisal system is part of the company's running processes, employees would show lower performance level if the appraisal system is not satisfactorily controlled. Their results were then further used in quantifying the performance

measurement system aimed at ensuring employee satisfaction. Jiang et al. (2007) addressed the impact of job dissatisfaction on the global supply chain. Their research was a survey based on coastal industries in China, and the results from the study were used in assisting the managers in understanding the implications and successfully dealing with labor related risks. Prajogo and Cooper (2008) have emphasized on the impact of TQM practices on job satisfactions. The main aim of their research was to examine the relationship between people-related TQM practices and job satisfaction of service employees. The study triggers the question whether a TQM has an effect on employees' satisfaction. They collected data from 201 employees among 23 different organizations in Victoria, Australia. They have analyzed this topic from two perspectives: the people related TQM practices and organizational performance, and the people related TQM practices and job satisfaction. The results suggested that employees' job satisfaction was highly influenced by people-related elements of TQM, and that TQM with a hierarchical model positively related to employee satisfaction. It is then obviously understood how an internal customer takes an effective role in the whole performance process of the organization's quality management system. Moving from internal customer role to an external customer satisfaction, Pitterman (2000)'s findings on Telecordia technologies showed that customer satisfaction figures had gone up from 60% in 1992 to 95% at the time of implementing ISO 9001 quality system. Also, there was a 63% reduction noted in test cost efficiency since 1993 that 98% of major software released by Telcordia between 1995 and 1998 were delivered in time, even though the number of releases had tripled during the four year time. Sakthivel and Rajendran (2005) findings indicated that there was a significant positive correlation that existed between the five TQM variables (commitment of top management, course delivery, campus facilities, courtesy, and customer feedback and improvement) and the students' satisfaction; a significant difference in the students' perception of quality of educational

service between ISO certified and Non ISO certified institutions; ISO quality management implementation has brought about a qualitative change in the academic institutions; and a top management commitment and campus facilities strongly predict the students satisfaction. Customer satisfaction is not only narrowed to certain business sectors. In health care industries, Padma et al. (2008) have put much effort in understanding the dimensions which constitute and enhance customer satisfaction level on the health care industry in India. Their research method was based on the existing quality management models and literature on healthcare services. They aimed at providing a model to the hospitals to synchronize their service delivery frameworks with the needs of the patients. It is then clearly understood that a quality management system should be implemented to meet patients' needs as customer requirements and meet their expectations. Takala et al. (2006) have gone even further to seeking customer satisfaction by improving and ensuring that customer satisfaction survey is supposed to be well designed and validated in order to be an effective measurement tool for its intended purpose. In their research paper, the purpose was to verify the reliability of customer satisfaction survey in context to three aspects of service; quality, delivery and responsiveness. Takala et al. (2006) concluded that there was a need to work on the flexibility of the customer satisfaction survey to ensure the reliability in the qualitative analysis of the supply chain. Tang and Wang (2008) have also done the same by improving the fulfillment of the customer satisfaction requirement in clause 8.2.1 (International Organization for Standardization, ISO 9001:2008(E)). They suggested a method to help companies manage the questionnaires delivered to their customers that was via contracting such a service to a third party organization, the so called application service provider (ASP). Their results suggested that real-time data analysis can help organizations in meeting the needs of the customers and providing the best quality service at low cost and with high efficiency, and even compensate their inability to

venture in the field of innovative production. Customer satisfaction can also be measured from customer complaints records as reported by organizations' customers. Sitko-Lutek et al. (2010) examined the customer complaint handling process with respect to the information quality, thereby suggesting possible areas of improvements in the process. Their research method involved in reviewing documents, complaint handling procedures and interviews through a social network analysis (SNA) model. The software used for SNA was UCInet. The results suggested that process engineering leadership played a vital and responsive role in disseminating quality assurance information to other staff, and it also suggested that an identification in potential areas of process improvements, will thereby enhance, and improve customer satisfaction. Another was of achieving customer satisfaction, in a work organization, to enhance the internal quality audit process for the existing quality management systems. Hernandez (2010) concluded that implementation of quality management system in organizations with no knowledge of implementation should implement an effective internal auditing process to meet customer requirements and achieve customer satisfaction. These findings also agree with the findings of Russell (2002). Russell (2002) suggested that internal auditing process be controlled as per ISO 9001:2008 to achieve improvements. This is exactly what the standard is talking about. The standard in clause 8.2.2 "Internal audit" is requesting ISO 9001 users (certified organizations) to effectively implement and maintain an internal audit process to ensure implicitly the effectiveness and efficiency of the quality management system performance (International Organization for Standardization, ISO 9001:2008(E)).

From this brief history of how customer satisfaction is achieved by firms or any business work organizations, other organizations consider customer loyalty as a precious target to accomplish. Yang et al. (2010) strategized a model for a service system while addressing customer loyalty, brand image, customer satisfaction and

service quality. They studied the relationship between customer loyalty, brand image, customer satisfaction, and service quality. The results were applied towards identifying factors influencing customer loyalty in the service sector. It was found that the coefficient variable between perception value and customer satisfaction is 0.90, i.e. customer satisfaction improves by 9% and customer loyalty improves by 7.56% with a 10% change in perception value. Another study in the mobile telephony industry was done by Santouridis and Trivellas (2010), who studied about the customer satisfaction and service quality factors that influenced the mobile telephony in Greece. They showed that pricing and billing system were highly influential in quantification of customer loyalty and satisfaction. These research results indicated there was a link between customer satisfaction and customer loyalty. I think that this relationship between customer satisfaction and loyalty is explicitly expected especially if the work organization is continually improving its quality management system by implementing corrective and preventive actions procedures.

2.1.3   ISO 9001 synergy with other quality standard systems

Other forms of improvements with ISO 9001 implementation took place when organizations were found to be adopting more than one management systems standards. This is what can be referred to as various system integrations and understanding synergies between system standards. In the research institute a need for quality management system integration with ISO 9001 was found to increase the performance as analyzed by Pfeifer (1997). Jorgensen et al. (2004) studied three levels of integration in management systems and focused on the culture of learning and continuous improvements realized by the integrated management systems. Their findings concluded that organizations could achieve sustainable competitive advantage by expanding integrated management systems over the whole product chain and to all stakeholders. Karapetrovic and Willborn (1998) focused on development of

performance management systems integrated with the quality system based on the ISO 9001 and the ISO 14001 environmental management system standard. Their research method was based on conceptualizing interrelations between different quality and environmental management systems and a description of systems and integration of auditing with quality and management systems. They concluded that businesses could minimize wasted time and effort and achieve improved environmental and quality performance by integrating ISO 9001 and ISO 14001 performance management systems. Also, an article that was documented by Karapetrovic and Casadesus (2009) aimed at understanding the implementation of environmental management systems (EMS) in Catalonia, Spain, based on ISO 14001: 2004 standards in organizations that are having more than one management systems. Their research involved survey of 176 organizations with both ISO 14001 and ISO 9000 certifications. The data obtained was analyzed with integration to multiple management systems and the results were utilized in emphasizing the possibilities of implementing EMS in organizations. Other results revealed that 96% of organizations, which were ISO 14001 certified, were already implementing ISO 9001 standard management systems. This result is very much expected since ISO 9001 QMS standard is a core of various types of ISO standards. Casadesus et al. (2009) have also analyzed the possible synergies among different organizational management systems, and examined the advantages of implementing ISO 9001 standard within the organization. Their study involved a survey of 500 Spanish companies. The data was categorized on the basis of depth of integration into company management systems. A hypothesis testing analysis was constructed to investigate whether synergy can occur if two different management system standards (MSSs) were integrated. The results were analyzed and it was concluded that the organizations implementing multiple management systems realized more benefits from the ISO 9001 standard application, than those that implemented the standard management systems ISO 9001 alone. Bernardo et al. (2010) aimed at understanding

the internal and external auditing of standardized management systems and how these audits were integrated in different management system standards. During their research, data was acquired from 435 Spanish organizations registered with both the ISO 9001: 2000 and ISO 14001: 2004 standards, and the distinctive typology of these organizations was analyzed. A descriptive of data, multivariate, and cluster analyses were used and showed that 3 distinct groups of organizations were found and could be classified by their level of integration. The results obtained were analyzed, compared and integrated for different organizations and it was concluded that organizations registered with multiple standards employed both internal and external auditing within the respective management systems, and that internal auditing was integrated to a higher level than external audits. As a result, organizations prefer integration of management system audits to manage and conduct them separately. White et al. (2009) have also indicated in their research, which involved different methods of certification and how ISO 9001 could be successfully implemented in small medium enterprises, that integration of quality management systems lead to business performance enhancements for an organization. However, other researchers found that the standard systems integration is ineffective when certain conditions were not met. Wilkinson and Dale (2002) studied and analyzed the ISO 9001: 2000 quality management system standards and the subsequent effects on the issues surrounding integration of management systems. Their research was done by examining the recently published ISO 9001: 2000 standards for compatibility and organizational culture issues related to integration of management systems. The results indicated that although ISO 9001 standards were compatible with the ISO 14001 and OHSAS 18001 standards, there was a significant difference in the scope of these standards which gave rise to a difference in culture, thereby hindering integration of management systems. It was suggested that a model approach towards integrated management systems should be based on a strong culture

which supports the TQM practices, and should also take into account the differences in the scope of the integrated systems.

2.1.4   Comparative assessment of ISO implementation among different nations

Other studies from literature were done based on comparative assessments between two nations at minimum to investigate the differences in implementation and understand the cultural awareness in ISO 9001 QMS related employees. A study was done by Malik et al. (2007) to analyze and compare the continuous improvement practices in the manufacturing sector of Pakistan and China. Their research included ISO certified organizations of which 50 Pakistani and 45 Chinese manufacturing firms of all levels, which were surveyed and the data of which was used to analyze the differences in the implementation of quality systems and the barriers. The results of their study indicated that although these two countries implemented different quality management practices and used different methods to encourage local manufacturers to attain quality certifications, organizations were not successful in meeting their objectives. Other results indicated that both industries (Pakistani and Chinese) were ignoring continuous improvement practices in quality departments which should have been given higher preference. Moreover, it is an essential requirement as stated in the ISO 9001 QMS standard. Another study was done by Craig and Lemon (2008) to examine the ability of quality and environmental management systems in improving the technical capabilities and economic growth of rapidly developing countries such as China and Poland. Their research method comprised of surveying 112 heavy industrial factories in Poland and China and the data from these factories were analyzed for determining the quality and environmental performance of each factory. The results suggested that perceptions of employees are highly influenced by socio-cultural factors in the management chain. It was also concluded that the empirical and perception

realities in quality and environmental systems was not coherent with each other and varied from organization to organization.

2.1.5 Top management role

From literature review, it is understood that perceived or actual improvement from ISO 9001 implementation is not only a function about adopting certain quality controls and methods but a deeper understanding of the ISO 9001 standard was required. However, a leadership and a top management commitment can be both, the affecting parameters in the QMS performance and also play bigger roles in the improvement prediction and effective implementation of ISO 9001 QMS. Guimaraes (1996) explained in general how organizational commitment is highly related to final results of QMS performance. His findings also indicated that there were direct relationships between job satisfaction and organizational commitment. His findings were not so specific about top management commitment but rather to the whole organization's employees. Nevertheless, his findings are beneficial since top management is part of the whole work organizations. Laszlo (1998) has shown in his Canadian case study that managerial commitment toward ISO 9001 implementation would also increase productivity, overcome problems, and conflicts. He studied the quality progress beyond ISO 9000 and towards TQM of a Canadian private manufacturing organization, Chic Fashions, comprising of 200 employees. His research method was based on studying the details of the quality journey of the company over the past two years. The company's department store has implemented its quality system based on ISO 9001 standard and then adopted TQM practices. Going beyond meeting standard requirement of ISO 9001, key business indicators such as on time deliveries, manufacturing, cost, variance, overall quality costs showed numerical improvements within two operating quarters. On the other hand, Kumar and Harms (2002) have shown that efficiency and profitability would improve if top management commitment took

part in educating their workforce toward implementing a process mapping technique. This will bring the issue of the awareness factor among organization staff. Therefore, the employees' awareness level will most probably increase if top management has shown a documented commitment policy and a practical translation of that policy in the same organization. Al-Rawahi and Bashir (2011) have shown that top management commitment was a leading factor to a successful ISO 9001 implementation in the work organizations. London (2005) also indicated that the extent of managerial commitment was a fundamental factor behind the success of quality policy implementation. Other results of research have shown specifically that the manager's role in commitment and involvement plays a dominant factor in bringing success to quality implementation (Rad, 2006). Other researchers (Lee and Lam, 1995) have gone further and identified that the main barrier in implementing a quality program is attributed to the managerial commitment. Similar findings with Ashrafi (2008), and Magd (2008), have also shown that management commitment was behind the success of ISO implementation in the business organizations. From other and all the above literatures, it would be concluded that improvement can be achieved, if at least, the managerial commitment takes an effective role in quality management system implementation. Goffin and Szwejczewski (1996) identified and emphasized the importance of managers in the success of total quality management, and the degree to which this success is influenced by managerial commitment. Data for their research was gathered from six factories across UK, which had been awarded for their managerial excellence regarding TQM. The results were analyzed and it was concluded that there were four primary elements to managerial commitment namely; time, clear goals, manufacturing expertise and team work. Their findings have recommended that further studies and research shall focus on top management to demonstrate its commitment to TQM. Back in the academic institute, Sakthivel and Rajendran (2005) emphasized on the role of top management commitment as one of the 5 factors that direct toward ISO 9001 and TQM successful

implementation. Their research aimed at developing a TQM model of academic excellence and studying the relationship between TQM implementation and student's satisfaction of academic performance. The research has been made by taking a stratified sample of 256 students from ISO and Non ISO certified institutions. The analysis was mainly focusing on 5 essential variables. The results indicated that top management commitment and campus facilities strongly predicted the students' satisfaction. Prajogo and Cooper (2008) indicated that top management commitment is one of the main parameters in a work organization that would lead to successful TQM practices. Yong-zhong et al. (2009) investigated the relationship between managerial commitment, customer orientation, job satisfaction, service efforts and service quality of a service employee. Their research method was based on self-regulation theory and established a conceptual model for determining the relationship between managerial commitment to service quality (MCSQ) and emotional response to serve quality. The results of the analysis indicated that MCSQ was highly influenced by the orientation of the service employee towards the customer, which therefore, affects the service quality in service delivery processes. For the purpose of meeting effectively a continual improvement requirement in the standard clause 8.5.1 (International Organization for Standardization, ISO 9001:2008(E)), Liebesman (2003) suggested that the sub clause 8.5.1 be moved from its current location to management responsibility location in the ISO 9001 standard in order to make the top management understand and be more aware of the continual improvement loop. Indeed, Liebesman (2003) did not reach a suggestive conclusion as such unless he was very much aware that top management was the driving wheel toward ISO 9001 successful implementation. Mohammad et al. (2010) have also shown that top management commitment and support is very crucial to make improvements happen in the organization. Their paper aimed at giving the reader (interested party) a method of selecting the appropriate improvement initiatives for a given situation with respect to quality management systems. They have done extensive

literature reviews and several interviews in New Zealand and Malaysia with directors and senior managers, and other staff and subordinates in various companies. Therefore, it can be said so far that commitment plays an important role in the success or failure of the work organizations. Academically, it was demonstrated by Sakthivel (2007) who surveyed 922 students from India, and concluded that top management commitment was extremely essential for training excellence in education for engineering colleges. Furthermore, London (2005) conducted a research that aimed at determining the extent of involvement of managerial commitment in quality-policy implementation. The research process involved a survey of four small pharmaceutical companies with less than 500 employees, the data from which was assessed on the basis of 40 managerial commitment attributes of a four-part implementation cycle. Deming's PDCA (Plan-Do-Check-Act) cycle was used as a tool or a method to implement the quality policy for an individual company. The results indicated that the extent of managerial commitment was a fundamental factor behind the success of policy implementation, and it was important to implement well-structured policy plans across different sectors of a company in order to monitor the progress of effective policies. Lee et al. (2002) have pointed out that there were four major difficulties encountered during the implementation of quality programs and considered them as main obstacles. One of which that takes priority number one to deal with was the top management commitment.

From all the above literature, I understand that ISO 9001 standard is a whole system to be implemented all various work organizations regardless of their nature of businesses. It was clearly understood that ISO 9001:1987 was specifically designed and targeted to manufacturing sectors. However, the later versions of the standard, primarily those starting in year 2000, were developed to meet production, service and all types of business or operations sectors. Most literature appeared to address the issue of improvements or whether ISO 9001 has made a difference in performance improvement

or at least has initiated improvement in the work organizations. From the practical experience and understanding of the ISO 9001 implementation, I see improvement as a function of multiple variables. If these variables are monitored and controlled effectively, positive outcomes would result when implementing ISO 9001 quality management system. Improvement can be a function of all the eight quality management principles or maybe more. It can also be a function of the ISO 9001 main requirements: Management responsibility, resource management, product or service realization, and measurement and analysis instruments. Simply controlling the above given four requirements and assuring their effective presence will definitely have a compliant work organization with the ISO 9001 requirements and ready for certification. From this literature review, I also understand that ISO 9001 benefits are still debatable. Some organizations in industrial countries have witnessed benefits and some have not. It is thought that all benefits depend on how these organizations perceive them. Benefits do not always have to be improvements in the organizations' financial accounts. In some circumstances, improvements can be looked at from the business and operations perspectives. In other words, management and operations performance could be enhanced without necessarily expecting any immediate noticeable profits for the ISO 9001 certified organizations. Yes, profits might be expected in the long run but with continually improving management and operations processes in the work organizations. This is exactly what ISO 9001:2008 standard quality management system calls for, as depicted in figure (1) for a process-based quality management system. I have done extensive literature review to understand more about these types of improvements and what are the parameters that determine or initiate them. It has also been made sure to understand and see more about what has been done in Kuwait about ISO 9001 and what has been done and left for future research. As mentioned in the previous chapter, Mady (2008) was focusing more on refractor and food stuff industries with respect to their TQM practices. He was very much interested in learning more about customer focus and measuring QMS performance in relation to TQM

implementations. In his final conclusion and recommendation, Mady (2008) suggested that industrial firms should be ISO 9001 registered to improve their quality practices. Therefore, it was decided to survey as many ISO 9001 certified organizations as possible for sampling, to draw a full picture of the ISO 9001 QMS practices and its level of implementations in Kuwait.

2.2   Specific Review

In this section, the author dedicates the review of certain components which are supposedly believed to play major roles in gaining any positive or negative effects from the implementation of ISO 9001 quality system.

2.2.1   Motives for seeking ISO 9001 Certification

Numerous studies have focused on the basic motives as to why organizations or firms seek out ISO 9001 certification, including Prajogo (2011); Santos and Millan (2012); Magd and Curry, 2003 and McCrosson et al. (2013). The motives identified for the adoption of ISO 9001 standards apply severally to individuals and to organizations. However, it is important to note that these motives uniquely influence the organization. Motives can be classified as internal and external. According to Sampaio et al. (2010) internal motivations are present in those companies that are really committed to the continuous improvement of their internal processes, and therefore aim to achieve effective organizational improvements. External motivations, on the other hand, are related mostly to promotional and marketing issues, customers and market pressures and market share enlargement goals. Even though all organizations present both kinds of motivations to some extent, only one is usually the most predominant and determines the organizations' decision to become ISO 9001 certified. Miguel and Dias (2009) observed, that from marketing advantages of certification in ISO 9001 standards, has received numerous reviews by researchers. Proponents of the marketing advantage of the acquisition of the standards are keen on establishing the fact that the assurances to

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the customers results to prominence of the firm. The studies conducted by Santos and Millan (2012), Basir et al. (2011) Grigoroundis and Siskos (2010) and Magd and Curry (2003) all point towards the imperativeness of quality in market prominence. Firms in the manufacturing industry, just like any other industry, thrive on the prominence of their marketing mix, including product, pricing, place and promotion which are also drawn from accreditation in ISO 9001 standards.

2.2.2   Top management commitment and leadership

The involvement and commitment of top management provides a life line to any strategy and action in the organization (Douglas et al., 2003). Extensive literature exists to support the imperativeness of top management in the success of strategic imperatives (Lohrke et al., 2004; Nedelea and Paun, 2009; and Savanevicience and Stankeviciute, 2011). Each of these studies established a direct link between participation of top management and the success of primary strategies in the workplace.

The top management has executive roles in addition to being the agents of the wide range of stakeholders. A study carried out by Al-Khadra et al. (2012) on Jordanian firms indicated that the most prominent reason for the failure in the implementation of ISO standards was lack of top management support. The fact that they are answerable to all categories of stakeholders places them slightly higher in the chain of command. In this regard, the top management commitment and involvement in maintenance of QMS are both imperative and obligatory (Marson and Blodget, 2008). Management teams, under the patronage of top management perform the basic functions of planning, organizing, staffing, controlling, directing and communicating (Nedelea and Paun, 2009). In more ways than one, these functions can be attributed to the maintenance of quality in production, especially in the manufacturing setting, as indicated in figure (2.2).

Otto et al. (2007) explain that it is the role of the quality management department, or the specific party to convince the management that registering and complying with the standards will provide the organization with more benefits than what it has to forego. The cost benefit analysis of the process ought to be specifically designed to appeal to the management (Prajogo, 2011). The type of benefits and costs will depend on the intrinsic aspects of the business. However, improvement in the overall business efficiency cuts across all industries and sectors. It is thus imperative for the custom designed aspects of efficiency to be outlined, in order to get the management on board. When the pressure to comply is from external sources, as is the case for large scale firms, there is a possibility that top management will be driving the change (Ruzevicius et al., 2004). In spite of their executive powers, they are obligated to communicate their intentions to all stakeholders and acquire the necessary approval, in addition to providing the basis for communication of expectations and roles. Ways through which the top management is involved are included in figure (2.2).

However, it is important to note that executive management plays a distant role in the actuation of these goals (Al-Khadra et al., 2012). Savanevicience, and Stankeviciute (2011) pointed out that the bulk of the responsibilities rests on the QMS department and all other departments involved in the production of goods and services, although they are limited to the internal aspects of the management of quality. As a result, the management provides a link to the external aspects of quality management, thereby creating a viable environment for expansion of productivity.
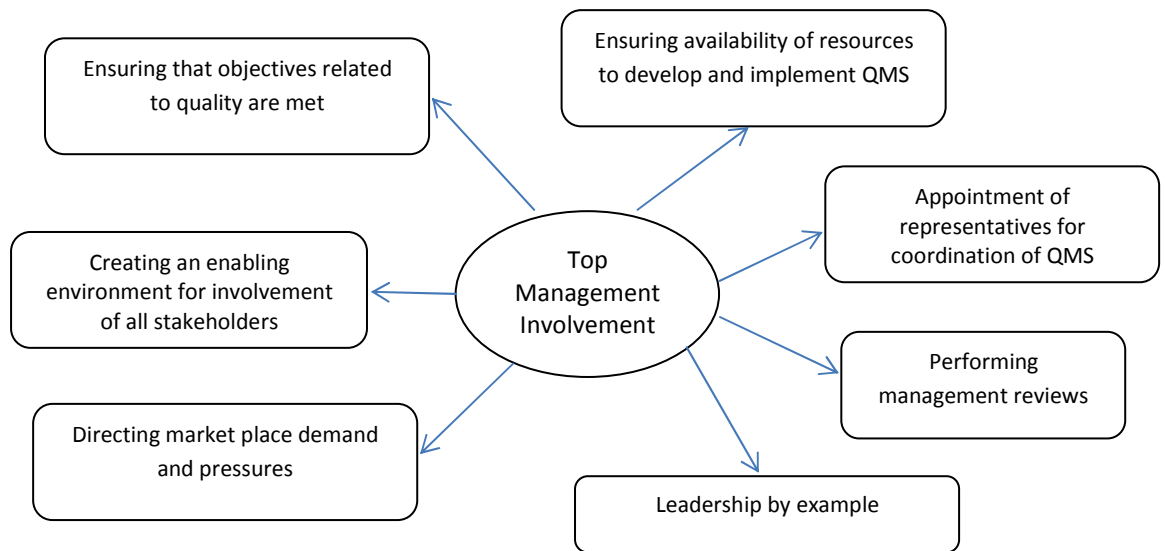
Figure (2.2) Top management Roles

2.2.3 Main quality management system functions

According to Al-Rawahi and Bashir, (2011), "a quality management system consists of all the organization's policies, procedures, plans, resources, processes, and delineation of responsibility and authority, all deliberately aimed at achieving product or service quality levels consistent with customer satisfaction and the organization's objectives. When these policies, procedures, plans, etc. are taken together, they define how the organization works and how quality is managed". The relevance of ISO 9001 certification to the manufacturing scenario, originates from the fact that the elements of standards are aligned with continuous improvement cycle. Sustainable and continuous development can only be achieved through planning, doing, checking and acting (the PDCA approach) as indicated by To et al. (2011).

2.2.4 Control of Documentation and Records

Douglas et al. (2003) proposed that ISO 9001 results in an unnecessary increase in the amount of documentation required. Documentation provides records for review of compliance, with the reviews performed by the accrediting body. The presence of these records makes it possible for ascertainment of adherence to the ISO 9001 requirements. The additional documentation has major implications as indicated here under.

Since its introduction in 1987, numerous changes have been made to the standards, with the dimensions of change summarized into two. First, is the establishment of simple and fundamental range of standards which are equally applicable regardless of the scale of production (Singh, 2008). Additionally, to ensure that the detail and extent of documentation needed for compliance is pertinent to the achievement of the organizations goals and objectives (Tannock and Ahmed, 2008). In ISO 9001 standards, documentation becomes imperative, with records and procedures for quality manuals for all aspects of standards maintained on a continuous basis.

According to Al-Khadra et al. (2012), documentation is a primary aspect of quality management for firms which are certified or not. As a communication tool, documentation provides the management with the necessary authority to make decisions and uphold judgments (Zeng et al. , 2005). Normally, the process of documentation entails creation of the various aspects, authorization for the contents, approval by the responsible individual, implementing updates and changes to the versions which can be edited, distribution to the relevant stakeholders and disposal of the unnecessary components of the documentation.

ISO 9001 standards are keen on quality across all aspects of management, including the documentation which becomes a necessary aspect of quality management (Briscoe et al., 2005). All revisions are thus expected to be clearly indicated, with serialization in

a chronological order. Digitized documentation is also provided for the standards owing to the prominence of IT in management. However, the establishment of hard copies remains a primary requirement, in order to ease referencing, sourcing, review and inspection by the management.

2.2.5   Customer and External Supplier Focus

The design and structure of ISO 9001 standards recognizes the prominence of inputs to production on the quality of products (Magd and Curry, 2003). According to Ilkay and Aslan (2012), most firms tend to focus on customers and processes, forgetting the imperativeness of suppliers and raw materials in the supply chain. Levine and Toffel (2010) and Sroufe and Curkovic (2008) indicated that firms compliant with the standards stood higher chances of growth in profits and revenues among other key performance indicators on a year to year basis.

Customers on the other hand are the ultimate determinants of the suitability of the products (Briscoe et al., 2005). Although organizations possess the creativity and ingenuity in the development of products and services, the suitability of these products and services is based on whether the consumers find them capable of providing utility. As a result, it is imperative for firms to establish the needs of the consumers in the process of developing the standards of quality and the products. Naveh and Marcus (2005) pointed out that technical and logistical realities make this impossible. As a result, it is common for most firms to rely on a bottoms-up approach when determining the needs and wants of the clients (Oskarsson and Malmborg, 2005). By designing products and improving them based on the customer reviews, it is possible for quality standards to be established.

Suppliers on the other hand provide the most basic and crucial component of quality in any manufacturing setting. The imperativeness of raw materials in the maintenance of

quality standards cannot be overlooked (Lewis et al., 2006). The process of acquiring

suppliers is laced with numerous challenges and opportunities, all of them associated

directly with quality. For example, suppliers affect the ultimate cost of the product, as

well as determining the availability of the products and services. As a result, this

stakeholder has widespread effects on the reliability of supply and the intrinsic aspects

of products on offer (Castka and Balzarova, 2008).

2.2.6   ISO Compliance Assessment

To et al. (2011) pointed out that quality management is an ongoing and

continuous approach to achievement of standards in production and other operations.

Sustainability of these standards is based on continued compliance with specific

statutory provisions, which are ascertained during the audits (i.e., assessing a QMS).

These audits are designed to ensure compliance and establish the need for improvement

(Lewis et al., 2006a). ISO is not involved in the assessment of compliance, but does so

through national bodies appointed to establish the standards for the specific economy.

Essentially, these bodies also ascertain compliance and provide certification (Naveh and

Marcus, 2005). Subsequent training of members of the work organization provides

capabilities for internal audits to establish if systems are effective. Certified work

organizations must demonstrate their compliance with the ISO 9001 quality standard

requirements through the required clause 8.2.2 in the ISO 9001:2008 standard.

2.2.7   Continual Improvement Programs Adopted by the Organizations

Drew and Healy (2006) and Oskarsson and Malmborg (2005) pointed out that

continual improvement, provides an organization with the necessary capabilities for

sustainability and adoption of changes in the work environment. The dynamic market

forces in the global market make it necessary for the establishment of a trajectory for

adoption of changes and implementation of strategies to cope (IAEA, 2006).

Organizations are faced with an amorphous catalogue of changes, both disruptive and constructive. As a result, continual improvement is a necessary element in achievement of expectations and overcoming barriers to implementation of the dynamic QMS systems as prescribed by ISO 9001 standards (Zeng et al., 2007).

The nature of efforts to ensure continual improvement varies from one firm to the other, considering that other intrinsic and extrinsic factors set organizations apart. This represents the primary source of the need for continual improvement (Giuliano, and Moroncini, 2012).

The relevance of continual improvement is closely linked to innovativeness, training and development and other aspects of management, which are hinged on the objectives and goals of the firm. Strategic plans also communicate and tie an organization to the commitment to continual improvement. Essentially, all firms that seeks continual improvement are focused on the quality of goods and service (Chiarini, 2011). ISO standards recognize the importance of continual improvement, and the structure of the requirements, is cognizant of the fact that organizations are dynamic in nature. As a result, compliance is only concerned with minimum requirements.

Organizations are expected to implement standards which exude improvement over time. Maintenance of status is an indication that the firm is dormant (Basir et al., 2011). The absence of compliance leaves organizations without any tangible benchmark for change. Compliant firms have to perform self assessment, and provide the reports to the audit. Essentially, this report expands the horizons and appraisal tools for the stakeholders. As a result, the management faces stricter scrutiny, propagating the need for change, as observed by Aggelogiannopoulos et al. (2007).

Training and development becomes necessary after acquisition of certification. Although most firms implement training programs, ISO standards introduce a novel

approach to training (Lopes et al., 2011). Through the PDCA approach, organizations are mandated to provide objective-oriented training programs, which result to improvement in the capabilities of employees. The impact of training and development in quality management is widely documented (Bhuiyan and Alam, 2005).

Increased documentation provides the organization with the necessary information for the trajectory of change and improvement over the past (Basir et al., 2011). Although most firms rely on other approaches, the presence of records can propagate internally instigated need for change. External factors also change on the basis of information, especially considering that the range of stakeholders are never limited.

2.2.8   ISO Audit Report

Both internal and external audits for ISO are purposeful in ensuring that the organization attains quality standards (Casadesús and Castro, 2005). The reports from both audits are an indication of the achievements and gaps in minimum standards. These documents inform and communicate to the stakeholders about the outcomes of the operations and the most suitable approaches to management (Santos and Millan, 2012). Auditors are mandated to provide reports regarding their unbiased and independent view regarding the organization, notwithstanding the fact that the audit is a self-assessment.

In most cases, subsequent audits are based on checklists drawn from the minimum range of standards (Sampaio et al., 2009). This eases the role of the auditor, since the whole process is more objective that subjective. Audit reports are a gold mine for the national standards bodies, which are charged with the role of ensuring that customers are protected by the manufacturers (Casadesús and Castro, 2005). Although customer protection is a secondary role of the certification of bodies, it still suffices as a role of the standardization body. Reports from the various organizations provide details

regarding the most prevalent non-conformities based on industries and sectors, clauses propagating the highest number of non-conformities, the number of non-conformities classified with regard to auditors, firms and companies (Poksinska et al., 2007). Although these non-conformities may not play a role in the withdrawal of certification, the report will provide the standardization body with a number of advantages.

First, it will be possible to improve or change the range of requirements for compliance to suit the needs of the market (Pheng and Teo, 2009). If non-conformity with a specific aspect is observed across the industry and sectors, then there is need for further investigation. Secondly, it will provide motivation to ensure knee-jerk reaction for auditors and firms exuding non-conformity. This regulatory role is applied on a case-by-case basis, in addition to providing indication as to the source of motivation for certification (Sampaio et al., 2010).

Audit reports are statutory proof that the audit took place. Just like any other form of audit, the report signed and dated by the auditor provides evidence that compliance was assessed. Hernandez (2010) indicated that firms are mandated to perform these audits on a periodic basis after the certification. Documentation requirements for certification also recognize the audit report as a primary aspect of communication and record keeping. As a result, it is obligatory for the report to be developed (Nedelea and Paun, 2009).

Zeng et al. (2005) indicated that the report contains the views and recommendations of the auditor. These recommendations are the determining factors for the conformities and non-conformities which influence decision making on an organizational, national and international basis. Feed-back systems from the firm to the national standardization body to ISO plays a major role in adjustment of the minimum standards. It is important

that the audit reports play a role in establishment of the need to change (Miguel and Dias, 2009).

Third, auditing is normally carried out through the guidance of a check-list, specifically developed for the purpose (Massoud, et al., 2010). Koc (2007) pointed out that this checklist provides expectations for the auditor, who has to report outcomes. As a result, the report is a basis for assessing conformity and non-conformity. This report will provide details of the achievements of the organizations and the need for improvement. In spite of the prominence and reverence of ISO standards, it is important to remember that the checklist contains minimum standards (Hernandez, 2010). As a result, all efforts over and above what is contained in the checklist outline the competitive advantage by the firm, making it possible for decision-making associated with strategic placement. As a result, the report provides a checklist for minimum standards achieved and competitive advantage sought. This was revealed in a study, which indicated that most firms operate at standards which are over and above what the ISO prescribes, even before attaining the certification (Giuliano and Moroncini, 2012). As a result, the certification only provides aesthetic value to the organization, in addition to being a product of external pressure (Amuragam et al., 2008; and Drew and Healy, 2004).

2.2.9 Raw Materials Status in the ISO 9001 Work Environment

The relevance of raw materials to quality is undeniable (Bhuiyan and Alam, 2005). Products and services are manufactured from these raw materials, thereby opening the chapter for inclusion of the supply chain management (SCM) to QMS. The role of SCM is to ensure that the goods and services move from one stage of production to the others smoothly, and that all stakeholders create value along the production cycle.

Focus on raw materials introduces the need to associate suppliers with compliance to the ISO 9001 standards (Robitaille, 2010). Suppliers and customers are part of the

sources of external pressures for compliance, considering that some firms will only contract with certified firms. The need to ensure quality of inputs and outputs is aimed at eliminating quality let downs and sealing gaps in the objectives.

The quality of raw materials is important in the achievement of organizational goals and the objectives of an organization, especially with regard to quality of the products and services on offer (Otto et al., 2007). As stated earlier, firms seeking to acquire certification are best placed to benefit from compliance if there exists a strategic fit between the goals of the firm and the elements of the quality standards. As a result, whether the firm seeks to improve quality, increase cost efficiency, increase customer satisfaction or improve processes, the quality of inputs and resources, including raw materials, has to meet quality standards. The principles of garbage in, garbage out (GIGO) apply in this scenario.

The resource dependency theory outlined by Singh et al. (2011) proposed the imperativeness of resources such as raw materials and labor in maintenance of quality standards. The theory-based explanation for this assumption indicates that organizations rely on the procedures outlined in the standards to determine the best course of action. Additionally, the relevance of total quality management (TQM) in QMS affirms that the quality of raw materials stands out as a primary factor in the achievement of basic (external) and expected standards (internal) of quality (Singh, 2008 and Lewis et al., 2006b).

2.2.10 Equipment and Machinery Status in the ISO 9001 Work Environment

Quality management activities extend to all aspects of production; including machinery and equipment (Cassadesus and Karapetrovic, 2007). Plant and equipment are influential on the quality of goods and services provided, as well as the achievement of the objectives and motives of acquisition of certification. As a result, the contribution

of reliable capital components in the achievement of quality standards is imperative to any firm seeking to remain compliant.

Studies associating improvement of quality and procedures to acquisition of ISO 9001 standards recognize the imperativeness of fixed assets in the manufacturing setting (Otto et al., 2007; Singh, 2008; Bhuiyan and Alam, 2005 and Al-Rahwahi and Bashir, 2011). Machinery and equipment provide organizations with the necessary power to perform repetitive and complex processes, most of which are beyond human power. As a result, the suitability of the machinery to the type of goods and services provided cannot be overemphasized. Standards for automated systems are provided in the guidelines, especially with regard to the safe use of all functional aspects of the products (Al-Rawahi and Bashir, 2011b). It is imperative to note that standards for machinery and equipment are grounded on two aspects. First, the manufacturers have to adhere with specific standards when designing and producing these materials. Firms utilizing the equipment have to adhere to the optimal utilization of this equipment and develop reliable approaches for usage of energy, optimization of production, and other aspects of pollution (Matsumura and Kutotani, 2010).

2.2.11 ISO Impact and Customer Satisfaction Level

As discussed earlier, customer satisfaction stands out as a primary motivator for adoption of the ISO 9000 standards on quality, as observed by Drew and Healy (2004) and Gamboa and Melão (2012). Although firms have varied references in their objectives and mission statements, customer-orientation and customer satisfaction remains the most noticeable aspect of establishment of organization and investment in operations. The fact that products are developed for certain markets, implies that specific and general efforts are necessary to ensure that the customers are satisfied with the products (Hong and Phitayawejwiwat, 2005). The recurrent nature of certain needs

and wants implies that entities have an opportunity and need to ensure that past purchase decisions have positive impacts on the future purchases (Dick et al., 2008).

Al-Rawahi and Bashir (2011b) pointed out that ISO 9000 quality standards provide universal credibility to products and services from the certified firms. In spite of the gaps in perceived and actual quality of the goods and services, acquisition of these standards places a firm in a higher echelon in the market (Bhuiyan and Alam, 2005). Efforts to implement ISO standards necessitate acquisition of certain resources and inputs to enhance the quality of the products. The fact that a firm is confident enough in its ability to stand for scrutiny in the external and internal audits provides the customers with a certain proportion of confidence in the capabilities of the firm and reliability of its products.

Fundamental differences exist between certified and uncertified firms. Although quality cannot be tied to conceptual and theoretical foundations, conceptual aspects are a viable starting point for practicality in outcomes (Lewis et al., 2006a). As a result, ISO standards as QMS provide a higher level of customer satisfaction, considering that both physical and psychological satisfaction contributes hugely to the dimensions of satisfaction.

2.3   Research approach

After presenting a full extensive literature review, I believe similar studies can be performed in the state of Kuwait to understand more about the level of quality implementation with respect to the ISO 9001 standard system. It is suggested to develop initially a minimum of one instrument of research, to observe the ISO 9001 quality performance in the work organizations. Two instruments of surveys are suggested to at least cover what has been addressed in the specific review section. The first instrument will be based on designing and developing a smart survey or customize an already

existing survey which covers several important dimensions of measurements and eventually reflect the effect of ISO 9001 implementation. Each survey shall consider at least some of the 11 elements as stated in the specific section. The second instrument of survey will be directed towards the manufacturing business sector. The purpose of this approach is not only to see if there is any significant final effect (ISO impact) or a significant model fit but to study if significant correlations exist among these elements. After the analysis of the collected data for both surveys, I indeed hope to look forward to seeing a path model. The model is not expected to be a general one, useful for other geographical regions and different cultures, however, I do expect it to be a value-adding research for all interested quality stakeholders.

In the next chapter, the method developed for the research and the structure of the two instruments and their core content will be addressed.

Chapter 3

Research Methodology

From this chapter until chapter 6, I will focus only on the first part of research since it requires one big survey instrument for the data analysis. Because of the shorter survey in the second part of research and its coherence to the topic of research, the research methodology and data analysis will be discussed in chapter 7.

3.1   Research Procedure, Validity, and Reliability

This research started during summer 2011 and it has taken a considerable amount of effort by me and all interested parties that participated. I started by preparing a list of names for the ISO 9001 certified organizations, which was generously provided by the public authority for industry (PAFI) in Kuwait. Since PAFI belongs to the government sector, it is considered one of the most trusted organizations to refer to, with respect to ISO 9001 certified organizations. The list consisted of eminent government and private organizations only. The next step was to work on the contact details such as addresses and phone numbers. Eventually, the list summed up to 204 various organizations. 24 of these organizations are governmental and the rest were private. A research instrument, the survey, previously used by Poksinska et al. (2007) was customized. This survey questionnaire was originally developed by the Anderson School of Management at University of California, Los Angeles. The customization and modification on the survey questionnaire were necessary in order to meet the cultural factors of Kuwait and the research objectives. This was done by editing and rephrasing some questions to a clear understandable English language and adding more questions to also ensure and enhance the validity of the instrument. Before starting to use the survey, I consulted several quality auditing consultants in Kuwait. Then, a survey validation process took

place and minor changes were agreed to be made prior to its official use. The major changes in the survey questionnaire was done by adding a set of new questions as grouped by Q#23 in format (A) and Q#8 in format (B), in order to measure the awareness level of the work organizations employees. Another minor change was done by adding a set of new four general questions as grouped by Q#25 in format (A) and Q#10 in format (B). Unlike the survey by Poksinska et al. (2007), two formats of surveys were developed and customized to question two different job positions in the same organization. Format (A), with 96 questions, was intended for quality managers or a quality in-charge employees and Format (B) was intended for non-quality related staff in the same organization. Format (B), with 55 questions, is shorter than Format (A) but mainly directed to non-quality personnel in the same organization. Format (A) is longer than Format (B) since it includes demographic questions plus questions that can only be answered by quality related employees in the work organization. It is then expected that format (B) can be quite useful to view different opinions from the same organization which will eventually help the author create a job category for data analysis as it will be seen in chapter 4. Survey formats (A) and (B) are included in the appendix A(3.1) and A(3.2), respectively. 20% of the contacted organizations were personally interviewed for the purpose of data collection as part of the survey. Other organizations which were approached wished to receive the survey by email or fax. Indeed, caution was taken when collecting data over emailed surveys. Thus, follow-up contacts were made continuously with all organizations that were already emailed. I expected to finish the data collection by the end of year 2011. However, this did not happen because of the slow response from the contacted certified organizations. The response rate was almost 30% for Format (A) before the New Year. The deadline was then extended until the end of February 2012 and this increased the response rate to 50%. After reviewing all survey questionnaires manually, few emailed responded surveys were omitted for their inconsistency and response invalidity. The removal of

these few responded questionnaires from the analysis was performed after they fail to show a reasonable Alpha Cronbach value in SPSS (ver. 21). Hence, the response rate came down to 48% with valid 98 completed surveys. In Format (B), a valid 69 completed surveys were collected with lower response rate of 33.8%.

The reliabilities of the responded surveys are 86% and 92% in format (A) and (B) respectively. The reliability test was done using alpha of Cronbach in SPSS (ver. 21). Since Cronbach's alpha has shown a value higher than 70%, it is statistically agreed that the provided answers in the survey are reliable and consistent enough to proceed with further statistical analysis on the survey items. The survey items are meant to be all printed questions in the survey. Apparently, the resulted alpha in format (B) survey is higher than in format (A) survey is due to format (B) survey being with fewer items.

The survey was constructed to address several aspects of quality management system as per ISO 9001:2008 standard requirements. It was divided into several sections. Each section may have at least one variable for measurement. For instance, the section of Motives has 7 variables or research items. There are 24 sections in format (A) survey, including the demographic questions. While, there are 10 sections in format (B) survey (refer to Appendix A3.1, and A3.2). Unlike the range of scale used by Poksinska et al. (2007), the responses for the main questions were limited to 5 point likert scale. Most of the surveys are categorized to either 5 or 7 point scale (Bearden, Netmeyer, and Mobley, 1993; Shaw and Wright, 1967). Though Symonds (1924) and Ghiselli (1955) suggested that the reliability of the survey would be optimized with a 7 point likert scale, Miller (1956) argued that the human mind can only take 6 objects at a time and anything over 6 would be futile. Therefore, a decision was made to use a 5 point likert scale. A 5 point likert scale is very describable for every response category. For instance, category (1) means strongly disagree; category (2) means Disagree; category (3) means Neutral; category (4) means Agree; and category (5) means Strongly Agree.

However, if a 7 point likert scale was used, it would be almost impossible to give two new descriptions for the new additional category slots. Full statistical analysis was performed on each section. The most important ones for which the author finds relevant to the topic of this research would be presented clearly in the next section. The analysis was performed using the non-parametric techniques using SPSS (ver. 21) and Minitab (ver. 16), wherever possible. Since the answer of each question except question (21) in the survey of format (A) can be described as either nominal or ordinal; there is a slim chance that nominal or ordinal data to fall to be approximately normal. During data analysis, the normality for most of the collected data was not verified and justified. This result has lead my research analysis to proceed with the application of non-parametric methods. Moreover, the likert scaled categories of questions can only produce nominal and ordinal data and should only be analyzed by non-parametric tests (Sheskin, 2004). The process map of the research methodology is briefly illustrated as follows:

1. The author decided to learn more about the positive and negative aspects of ISO 9001 implementation in the Kuwaiti work organizations.
2. The author reviewed the literature.
3. The author defined the aim of the research.
4. The author contacted a reliable source of information in Kuwait such as PAFI.
5. The author developed and customized an appropriate survey questionnaire.
6. The author analyzed data from the surveys.

For further clarifications, figure (3.1) explains the process map for the whole research methodology scenario starting from the research stage, literature review, and ending with start data analysis.

```
┌─────────────────────────────┐          ┌──────────────────────────────┐
│                             │          │ 1. Reviewed more than 150    │
│     1. Review literature    │          │ publications from 1990 to 2011│
│                             │          │ and used scopus, web of       │
│                             │          │ science, and engineering      │
└─────────────────────────────┘          │ village2.                     │
              │                          │                              │
              ▼                          │ 2. Used keywords: commitment,│
┌─────────────────────────────┐          │ ISO 9001 in Kuwait, auditing │
│                             │          │ and etc..                    │
│     2. Define aim of the    │          │                              │
│          research           │          │ 3. Found useful publications │
│                             │          │ for research by Mady(2008)   │
└─────────────────────────────┘          │ and Poksinska et al., 2007   │
              │                          └──────────────────────────────┘
              ▼                          ┌──────────────────────────────┐
┌─────────────────────────────┐          │ Public authority for industry │
│                             │          │ (PAFI) is a government agency │
│     3. Contact a reliable   │          │ and considered to be a        │
│    source of information    │          │ reliable source to provide    │
│                             │          │ information about             │
└─────────────────────────────┘          │ certification bodies and a    │
              │                          │ list of certified             │
              ▼                          │ organizations as they are     │
┌─────────────────────────────┐          │ registered under the PAFI.    │
│                             │          └──────────────────────────────┘
│    4. Develop and customize │          ┌──────────────────────────────┐
│          a survey           │          │ 1. Customized a survey for    │
│                             │          │ the research.                 │
└─────────────────────────────┘          │                              │
              │                          │ 2. Survey reviewed by         │
              ▼                          │ specialists for validation.   │
┌─────────────────────────────┐          │                              │
│                             │          │ 3. Sent surveys to 204        │
│    5. Start data analysis   │          │ certified work organizations. │
│                             │          └──────────────────────────────┘
└─────────────────────────────┘          ┌──────────────────────────────┐
                                         │ 1.Used SPSS and Minitab       │
                                         │ software for descriptive and  │
                                         │ inferential data analysis.    │
                                         │                              │
                                         │ 2.Tested reliability of the   │
                                         │ data                         │
                                         │                              │
                                         │ 3.Used advanced statistical   │
                                         │ software such as Lisrel ver.  │
                                         │ 8.80 and smart PLS for        │
                                         │ building up a model based on  │
                                         │ the outcome of the survey.    │
                                         └──────────────────────────────┘
```

Figure (3.1) Research methodology process map

Each stage in figure (3.1) is briefly explained in the text boxes to the right of the figure.

However, at the final stage, the data analysis, required several statistical techniques such

as descriptive analysis, inferential analysis, and finally building up a model. In the

descriptive data analysis, both SPSS (ver. 21) and Minitab (ver. 16) were used to obtain some frequency and percentage tables, means and standard deviations, several pie charts and some other graphical outputs where necessary. While in the inferential analysis, SPSS (ver. 21) was heavily used to test all hypotheses required for this research, with a significance alpha value = .05. Minitab (ver. 16) was also used for the t-test, to compare the differences between the means of the two work organizations, Sweden and Kuwait. The final part of the data analysis was a statistical build a statistical model which can be assessed eventually. Lisrel (ver. 8.80) and smart PLS softwares are the most appropriate statistical tools for this purpose. The model building concepts require a deep understanding of the structural equation modeling (SEM) and that is explained fully in chapter 6.

3.2   Questionnaire Design

As mentioned in the earlier section, the questionnaire comes in two formats, format (A) and (B). Format (A) is more comprehensive and bigger than format (B) in terms of the number of questions and scope. I will specifically elaborate more on format (A) since it includes format (B) as well. For simplicity and statistical purposes, a set of questions was categorized under a predetermined aspect named by the work experience of the author. And each aspect may at least include one research item (a single question). The questionnaire is divided into three main parts. First part is the basic information about the work organization. Second part is the certification information, and the third part is concerned with the auditing process. The following is a full description for every aspect in the questionnaire starting from first question to the last one.

Part I. Basic information about the work organization

Question # 1

The respondent is requested to write one's job position in the work organization.

Question # 2

There are two parts herein. Question 2a is very much concerned with the global size of the organization. This part consists of 6 slots. Starting slot with a range of employee size between 50-249 and ending with a slot with range of employee size 3000 or more. There is also another slot of NA, meaning not applicable, if the organization does not have an international location worldwide. 2b part of the question is concerned with the size of employees locally. This question starts with a size of 1-9 employees and ends with 500 or more employees.

Question # 3

The respondent is asked to specify whether the organization is private or governmental in either one of the two slots.

Question # 4

Further to Question # 3, a respondent is asked to specify the nature of business or activities the organization is actually performing. A respondent has to decide between the 5 choices which are: manufacturing, services, building (constructions), trading, and education. If none of these choices are suitable, the respondent is asked to specify another branch of business. However, from all received surveys, respondents were able to find one of the five choices convenient to their organization's business activities.

Question # 5

A respondent is free to answer this question by describing in brief the nature of business of one's organization.

Part II. Certification information

Question # 6

The respondent is asked to determine how long the organization has been certified. Six slots of choices starting with a choice of less than a year and ending with 9 years and above are provided as an answer to this question. This question is useful for the author to value the benefit of certification if achieved with duration.

Question # 7

The respondent is asked to determine if the work organization is excluded from the standard requirement in clause 7 and specifically required to mention the excluded clause or sub-clause number. As stated by ISO 9001 standard document, only clause 7 and its sub-clauses are permitted to be excluded from the organization's quality management system.

Question # 8

The respondent is asked to answer the organization's motives behind seeking ISO 9001 certification. This is the first question in the survey where a 5-point likert scale is used. The scale is described from lowest end as 'Not important at all' to the highest end as 'Extremely important'. Basically the scale is weighted with each description as the following: (1) Not important at all, (2) Slightly important, (3) Fairly important, (4) Very important, and (5) Extremely important.

There are seven motives listed under this question and they are: (1) improvement of company image, (2) useful marketing tool, (3) Customer pressure and demand, (4) Improvement of product and service quality, (5) Improvement of organizational processes, (6) Improvement of work efficiency, and (7) Reduction of paper works. The respondent is to decide to weigh each motive by selecting the appropriate descriptive slot (e.g. a descriptive slot can be a "Very important").

Question # 9

The respondent is asked to describe the main function of the organization's quality management system. He or she will have to choose from 5-point likert scale. The scale has 5 descriptive slots which are: (1) Strongly disagree, (2) Disagree, (3) Neutral, (4) Agree, and (5) Strongly agree. From the questions, the respondent will indicate one's basic understanding for the present role and status of an organization's QMS. Through these questions, the author will be able to draw indirectly some pictures of the organization's compliance with ISO 9001 requirements There is a set of 11 research questions or criteria, founded by the author's work and auditing experience, to base an approximate QMS compliance with the general standard requirements. These criteria are enlisted in appendix A3.1 – Q#9 and are as follows:

(1) Our QMS helps organize business workflow

(2) Our QMS is a tool for handling documentation

(3) Our QMS is a tool for standardizing organizational processes

(4) Our QMS measures customer satisfaction level

(5) Our QMS takes into consideration internal customer needs (Staff need)

(6) Our QMS has full control and monitoring over our suppliers

(7) Our QMS is a tool to improve internal efficiency

(8) Our QMS is a tool for managing business processes effectively

(9) Our QMS is a tool to fulfill the customer's needs and requirements

(10) Our QMS is a tool for managing and improving quality of our products

(11) Our QMS is a tool for continual improvement of our organization

Question # 10

5 slots of choices are given to the respondent to decide which auditing body is the certifier of the organization. The well-known certification bodies in Kuwait are: BV, TUV Rheinland, TUV Nord, SGS, and Others. Others represent the auditing bodies which have little market share in providing QMS auditing in Kuwait.

Question # 11

The respondent is asked to provide the name of a previous certifier if the organization has changed to a new certifier recently. The reason behind asking such a question is to obtain some idea about organization's satisfaction with auditing bodies. If there was any change, the respondent is asked to mention the reasons for changing.

Question # 12

The respondent is asked to answer for which reason a certification body was chosen. 9 facts are given to the respondent. One will decide if one or a combination of two or more can be one's choice. One is also free to provide other reasons if none of the 9 facts gives the right response. These 9 facts are: (1) Has good reputation, (2) Cheaper than others, (3) Less demanding, (4) More expensive, (5) Recommended by a colleague, (6) Recommended by external consultant, (7) Known from other relationship, (8) Located close to the organization, (9) Only one possible in our business sector.

This is a two part question. In the first part, the respondent is asked to estimate the cost of audit according to 5 categories. The first category starts with less than 5000 KD and the last one ends with 20,000 KD and above. While in the second part, the respondent is asked to estimate the cost of surveillance or periodic audit according to 5 categories. The first category starts with less than 500 KD and the last one ends with 2,000 KD and above. All categories are mutually exclusive to avoid any misinterpretation by the respondent.

Question # 14

The respondent is allowed to explain one's expectation with respect to the auditing process and auditors. This is the first question in the survey where a respondent is asked to value the audit process and auditors for the purpose of obtaining reasonably good information about QMS performance. From the author's work experience, information about organization's QMS status is highly sensitive and sometimes classified if not obtained properly. Therefore, a method of having the end user (respondent) to evaluate their certifiers (auditors) is a fair indicator of QMS implementation. 7 criteria are given to the respondent to evaluate the audit process with 5 category slots (strongly agree, disagree, neutral, agree, and strongly agree). The 7 criteria are enlisted in appendix A3.1 – Q#14 and are as follows:

   (1) Auditor shall primarily assure whether the documented procedures comply with the standard's requirements.

   (2) Auditor shall evaluate whether actual quality management activities conform to the documented procedures.

   (3) Auditors shall stick to noting pure compliance with the standard. Going beyond this role is unwelcome.

(4) Auditor shall give an objective view on the quality management system effectiveness.

(5) Auditor shall assess whether the quality management system is suitable to achieve corporate objectives and improvement.

(6) Auditor shall share own experience and give suggestions for improvements.

(7) Auditor should do both: evaluate the compliance with the standard's requirements and organization's quality manual

Question # 15

The respondent is asked to evaluate auditor's performance with 5 category slots (strongly agree, disagree, neutral, agree, and strongly agree). The evaluation criteria for the auditor are based on the following: (1) Focus too much on documentation, (2) Highly demanding, (3) Help improve QMS, (4) Learn a lot from external audit, (5) Strongly improve motivation, (6) Able to obtain full picture of current QMS practices, and (7) They are competent. This question will explore the method of auditing whether it is positively or negatively accepted by the audited organization. These criteria are enlisted in appendix A3.1 – Q#15 and are as follows:

(1) Auditors focus far too much on documentation

(2) Auditors are highly demanding

(3) Audits help us very much to improve our QMS

(4) We learn a lot from external audits

(5) Auditors strongly improve motivation for quality work

(6) Auditors succeed to obtain a complete and true picture of the actual quality practices in our organisation

(7) Auditors are competent to do their jobs

Part III. Audit Process

Question # 16

Since ISO 9001 can be integrated with other ISO standards, the respondent is asked if ISO 14001 (i.e., Environmental management system standard) audit is integrated with ISO 9001 audit. Most of the other ISO standards are ISO 9001 embedded. Some organizations have various ISO 14001 and 18000 system standards further to the ISO 9001. Also, the respondent is given the choice to determine if other standards are being implemented by the organization.

Question # 17

The respondent is asked to determine the duration of the audit conducted by the external auditor. The slots of choices start with 4-8 hours and end with 20 hours and above. This question is essential in seeing any relationship with the enterprise or organization size.

Question # 18

The respondent is asked to mention the number of auditors who usually conduct the external audit. Either one auditor, two, three, four, or five or more auditors has to be chosen by the respondent. Again, the purpose of this question is to see any relationship with enterprise or organization size.

Question # 19

The respondent is asked to inform the author about the sources of information used by the auditor during the audit process. The author will also be able to observe the compliance efforts made by the organization with respect to documentation and records, and the adoption of any improvement program. The respondent will answer 15 criterion questions as sources of information based on 5-point likert scale. The 5-point likert

scale is described differently from the previous questions. The given descriptions with their ordinal weights are: (1) Never, (2) Seldom, (3) Sometimes, (4) Often, and (5) Always.

The 15 criteria are enlisted in appendix A3.1 – Q#19 and are as follows:

    (1) Interviews with quality manager

    (2) Interviews with top management

    (3) Interviews with process owners

    (4) Interviews with employees in non-managerial position

    (5) Observations of activities and the surrounding work environment

    (6) Quality manual

    (7) Documented procedures and instructions

    (8) Reports, minutes from internal audits

    (9) Reports from handling nonconformities as corrective action plans being taken

    (10) Reports of performance measurements etc.

    (11) Reports of management review meeting minutes

    (12) Definitions of customer requirements and expectations

    (13) Customer complaints and satisfaction measurements results

    (14) Improvement action plans

    (15) Evidence on progress of improvement projects

Question # 20

The respondent is asked to answer 10 questions in relation to the audit report as summarized by the auditor with respect to one's audit on the organization's QMS. The category or the response slots are the same as in question # 19. This type of measurement will indeed help author understand and learn more about the effectiveness of auditing process and explore more about indication of compliance with the standard

requirements. The criteria for this question are enlisted in the appendix A3.1 – Q#20 and s follows:

(1) Auditors assured whether the quality manual complies with the standard's requirements

(2) Auditors evaluated whether the documented procedures comply with the standard's requirements

(3) Auditors described the extent of conformity of the management system with the audit criteria

(4) Auditors provided information to top management regarding the organization's ability to meet quality objectives

(5) Auditors identified improvement opportunities and possible areas of risk

(6) Auditors provided valuable insights for the organisation into how the QMS could become more efficient and useful

(7) If nonconformities found, the auditors made suggestions for corrective actions

(8) Auditors identified problems, which, if resolved, will enhance the organization's performance

(9) Auditors emphasized the areas of the quality management system, which they found especially effectively or successfully working

(10) Auditors encouraged and stimulated the organization to go beyond the requirements of the standard

Question # 21

The respondent is asked to evaluate the auditor's performance and competence in general. This question will help author measure the customer satisfaction level with respect to the auditing body performing the audit. The scale is ordinal that starts from very bad as a score 1 and ends with highest value of score 10 as excellent.

Question # 22

The respondent is asked to mention if there are benefits besides having the organization certified. It is a Yes or No question. If the answer 'Yes' is selected the respondent is asked to kindly write the benefits.

Question # 23

This is one of the question that was not there when this questionnaire was originally developed. It was added by the author to learn more about respondent's awareness about ISO 9001 compliance and implementation. Also, this question will lead the author to observe the ISO effect and the level of organization commitment toward ISO quality implementation. The respondent is asked to answer this question based on 14 criteria with a 5-point likert scale (strongly disagree, disagree, neutral, agree, and strongly agree). The criteria are composed of whether ISO 9001 implementation has contributed a lot to the work organization and certificate should be renewed. These criteria are enlisted in A3.1 – Q#23 and are as follows:

(1) ISO 9001 standard implementation has improved our business performance

(2) ISO 9001 standard implementation has improved organization's financial performance

(3) ISO 9001 standard implementation has reduced paper works and documentations

(4) ISO 9001 standard implementation has helped organization meet its objectives effectively

(5) ISO 9001 standard has helped the organization control its outsourced processes

(6) Employees do their tasks efficiently with ISO 9001 implementation

(7) Customer requirements are fulfilled and controlled effectively with ISO 9001 standard implementation

(8) Top management is very much involved and committed in the ISO 9001 standard implementation

(9) Continual improvement programs are always adopted by our organization

(10) Our organization provides proper work environment for its employees to perform their tasks efficiently

(11) ISO 9001 motivates employees to do their jobs efficiently

(12) Sufficient training program in ISO 9001 awareness and implementation was provided to all organization's staff

(13) The audit procedure for ISO 9001 prevents stagnation and promotes improvement of the QMS

(14) ISO 9001:2008 certificate should be renewed before it expires

All the above criteria are also used as sensors to ensure the reliability of respondent answers as compared with the previous ones, for instance in question # 20.

Question # 24

This is one question, where the respondent should inform the author if he or she can predict whether organization is willing to renew the ISO 9001 certificate. 3 slots of choices are given to the respondent; Either 'Yes', 'No', or 'I don't know'. A measurement of this parameter helps the author understand more about how much the top management quality policy is communicated and spread all over the work organization.

Question # 25

This is a question of general significance and consists of 4 questions. It was not there in the originally developed questionnaire. The author has added this Question for other research purposes that might be useful later in the research. The categories of the 4 questions are scaled by weights of percentages and an exceptional category where the

respondent may not give any specific answer and respond by 'I don't know'. The percentages of scale are: 0%, 1%-25%, 25%-50%, 50%-75%, 75%-100%, and possibly a loss with -1% – (-25%). The set of queries briefly are:

(1) Work organization has made financial progress with ISO 9001 by

(2) Work organization had improved management performance with ISO 9001 by

(3) Work organization has improved customer satisfaction with ISO 9001 by

(4) Top management commitment and involvement have been enhanced with ISO 9001 by

Question # 26

This is a two part essay question; it is optional for the respondent to complete. The respondent is asked to write one's comments on the questionnaire in two parts. In the 26a part, the respondent is asked to write one's opinions about the survey and mention which questions are difficult to answer. While in 26b part, the respondent is asked to write one's comments on the questionnaire.

3.3   Summary and Conclusion:

The whole purpose of this chapter is to provide the author with the most applicable tool which will help him meet the objectives of this research with minimum possible errors as usually expected during the completion of any survey. Completing surveys in Kuwait is not very much interesting to the public in general. Thus, a author may need to make sure that the content of the survey does not address sensitive issues about the work organization which in return makes the respondent provide passive or wrong answers. I have tried to the best of my ability to make the survey boredom free and encouraging for the respondent to complete. It was made sure intentionally to ask questions indirectly about a certain fact to obtain some reasonable and reliable responses. The survey was customized properly to make it more useful and understandable to the

respondents. After customizing the survey and prior to its use, it was handed for review and assessment to 10 certified lead auditors in the ISO 9001 quality management systems (QMS). As a result of the review, few and minor changes were made to the survey. The survey consists of various questions to measure different aspects of the ISO 9001 QMS performance and explore the demographic status of all types of ISO certified work organizations. Finally, in the next chapters, chapter 4, 5, and 6, descriptive, inferential and advanced statistical analyses are to be performed on both formats of the survey, where conveniently possible.

Chapter 4

Analysis and discussion of the findings

In this chapter I will address most of the objectives of this research except objective #8, as stated in chapter 1. Since objective #8 requires an advanced statistical technique, it is left for discussion in chapter 5 and 6. Most of the tables derived from the analysis of data are enlisted in appendix A4, but some key tables are presented in this chapter for their important roles in the coming discussions.

4.1   Demographic characteristics in brief

More focus will be on format (A) of the survey since it has all related demographic inquiries than Format (B) (see A(3.1), and A(3.2)) which is shorter and directed to non quality staff in the work organization. Of the 98 surveyed organizations, almost 32% are quality assurance or control managers who are directly responsible for maintaining the quality management systems of their organizations. That means that higher proportions of different job categories are delegated to the maintenance of quality management system. Only 12% of the organizations have worldwide branches. 35% of the local organizations have manpower size between 50 – 250 employees. Only 7% has manpower of 1 – 9 employees. 18% of those surveyed were government and 82% were private. The manufacturing sector has a higher certification rate than services sector, 38% as compared to 33% to the services sector. It was also revealed that 46.9% of the certified organizations have permissible exclusion from clause 7 in the ISO 9001 QMS standard (International Organization for Standardization, ISO 9001:2008(E)). The most well-known certification bodies in Kuwait are BV and SGS. These two certification bodies have certified different organizations with 38% and 20% respectively. 60% of the organizations have reported a cost of certification less than 5000 KD and 40% of them have reported a surveillance audit cost between 500 – 1000

KD. 33% of the certified organizations have experienced single audit duration between 4 – 8 hours with a minimum of one auditor to conduct the auditing process. The below given figures (4.1-4.5) represent some graphical presentations in a form of pie charts for essential demographic variables used in the survey. Other pie charts as in figures (4.6) – (4.19) for the remaining demographic variables are enlisted in appendix A(4.2) under the titled section list of figures for demographic variables.
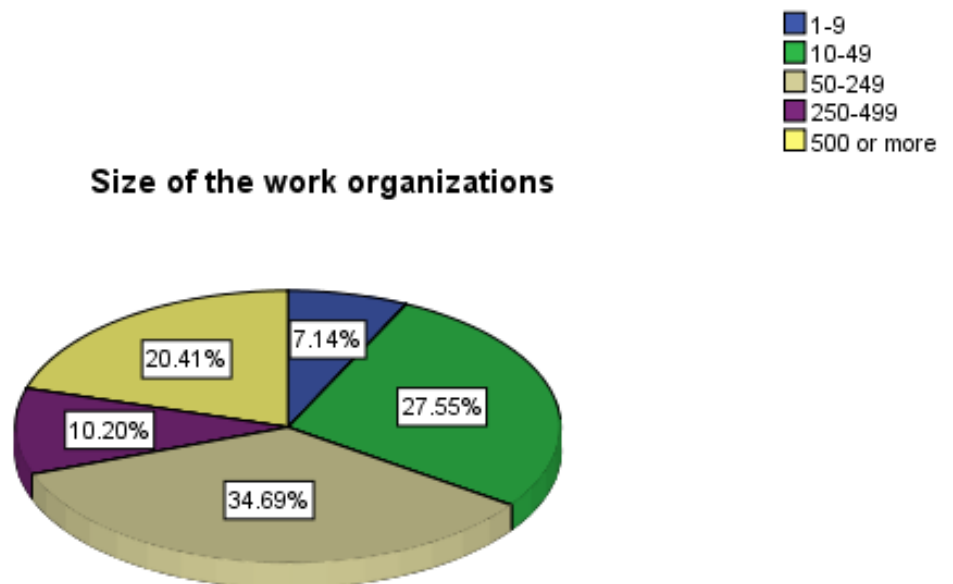
Figure (4.1) Number of employees in percentages
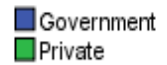
Work Organization sector
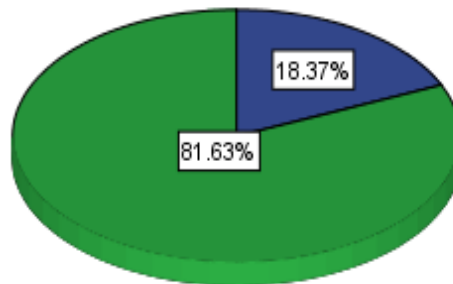
Figure (4.2) Percentage of work organizations sector

Manufacturing
Services
Building
Trading
Education

Work Organization business types
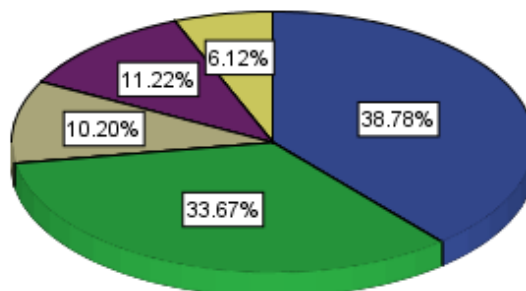
Figure (4.3) Percentages of organization types

Less than 1 year
1-3 years
3-5 years
5-7 years
7-9 years
9 years and above

How long has the work organization been ISO 9001 certified

Figure (4.4) length of certification

BV
TUV Rheinland
SGS
TUV Nord
Others

Market share for the certification bodies
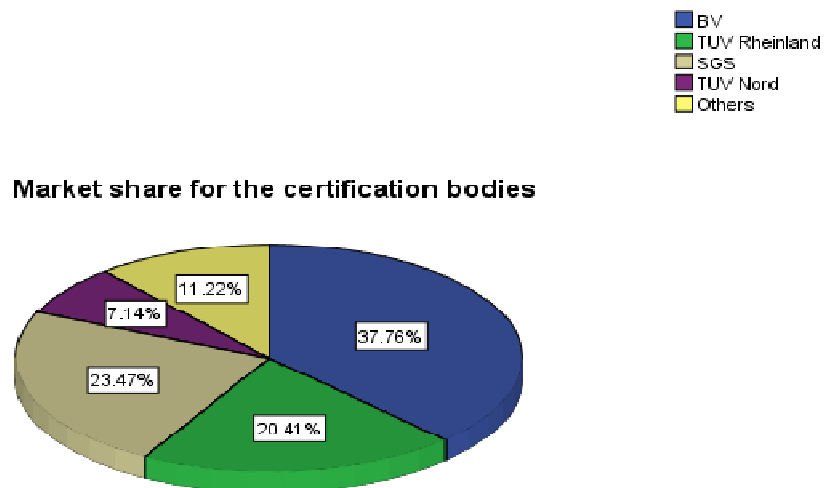
Figure (4.5) Percentage of certifications for work organizations

4.2   Descriptive and inferential analysis with statistical comparisons:

As mentioned earlier, all categorized questions of the survey are grouped according to the purpose of its intended measurements. Each group of questions is classified under one main title. 11 possible aspects are presented, discussed, and possibly compared against similar research items previously performed in Sweden by Poksinska et al. (2007). Research items are meant to be the questions in the survey.

4.2.1   Motives for seeking ISO 9001 certification

Table (4.1) lists the 7 research items, agreed by the author to measure the element, motive. Taylor (1995) has shown that 4 main reasons for an organization to seek certification, which are:

1. customer pressure;
2. improved work efficiency;
3. image/marketing improvement; and
4. Improvement of products.

Further to the above reasons, 3 more reasons were added to enhance the concept of motives. Of the 98 survey respondents (format (A)), means, standard deviations, and the percentage of frequency with responses scaling from very important to extremely important are tabulated for illustrations.

Table (4.1) also presents the perception of the respondents toward the 7 listed variables of motives. It is clear that improvement of organization image takes the highest priority to the organization and goes down to the lowest priority as reduction of paper works. Poksinska et al. (2002) have reached almost the same figures as in my result particularly for the research item "customer pressure/demand". It was valued as 54%.

Table (4.1) *Motives for seeking certification with means and standard deviations (SD).*

Research item	Mean	SD	Percentage of frequency as extremely important and very important
Improvement of organization image	4.29	.689	92.9
Improvement of organizational processes	4.35	.748	88
Improvement of product/service quality	4.28	.847	84
Improvement of work efficiency	4.18	.878	81
Useful marketing tool	3.89	.848	71.5
Customer pressure/demand	3.36	1.160	49.0
Reduction of paper works	3.08	1.282	39

Note : mean and standard deviation are calculated based on the nominal 5-point likert scale, such as 1 : not important at all, 2 : Slightly important, 3 : Fairly important, 4 : very Important, and 5 : Extremely Important.

Thus, 5% difference from my result is quite small. However, the standard deviation seems to be quite high with respect to the other variables' results. This could be accounted for by the respondent's misunderstanding of the question. For instance, the definition of a customer has most probably made the respondent think that customer can only be patients and not the powerful ones that can put pressure on the suppliers (Groocock , 2000). The research item, reduction of paper works, has been ranked the lowest since various organizations seem to have differences about the size of documentation that have to be controlled. In addition to that, Poksinska et al. (2002) have shown that documentation scored a mean value (4.02) on the 5-point likert scale. A mean value of 4.02, signified the highest implementation factor for ISO 9001 QMS. Furthermore, a Mann-Whitney U test was performed on this variable to see if there is any significant difference in attitude or perception between the two independent variables, government versus private sector. The result showed that p-value > .05, indicating there is no significant difference in the mean of the ranked scores for private and government sectors with respect to reduction of paper works. Thus, it is reasonable to notice a low ranked percentage for the research item "reduction of paper works ".

The following are the results of testing motives against demographic characteristics:

1- There were no statistically significant differences in motives between respondents of the government and private sectors. A Mann-Whitney U test was performed on each variable of the motives dimension and a p-value > .05 for every single variable indicated the failure of rejecting the null hypothesis (i.e., Ho: No differences between government and private sectors).

2- There were no statistically significant differences in motives between the respondents of the 5 various business sectors. The counterpart of ANOVA in non-parametric analysis, Kruskal-Wallis test, was used instead since the normality assumption was not justified for the motives variables. The results showed no single p-value < .05, which concluded the failure to reject the hypothesis of no differences. These results did not agree with Castka et al. (2007) who have studied 472 New Zealand organizations and have concluded motivations were different and dependent on the organization type.

3- There were no statistically significant differences in motives between the respondents with 7 different job positions. Kruskal-Wallis test was performed and concluded the failure to reject the null hypothesis since p-values > .05 for all motives variables. The seven different job positions categorized in this survey are: management representatives; quality control and assurance managers; business or operations manager; plant or general managers; administrative officers; technical officers or engineers; and administrative officers or supervisors.

4- There were only two statistically significant differences in the motives variables between the respondents of quality and non-quality related employees. The differences occurred in the research items "useful marketing tool" and "improvement of work efficiency". The useful marketing tool variable resulted with a p-value = .029, and the improvement of work efficiency variable resulted with a p-value = .052, that is on the

border of the significance level. The result can be explained since non quality employees may not be aware of the marketing advantage for an organization with certification. Though the other variable, improvement of work efficiency, did not show a much statistically significant difference, it would then be appropriate to conclude that non-quality related employees find an ISO implementation as a barrier to perform their tasks efficiently. Most probably the documentation requirement could be considered another job burden on the non-quality people; mainly those who work in factories and are already preoccupied doing their main tasks. This conclusion would line up with Mc Lachlan (2006) who stated that ISO 9000 is nothing just a paper driven process for bureaucrats to approve.

Table (4.2) summarizes the calculated p-values for all differences studied above from (1-4) which have shown least 95% of the time insignificant differences are a dominant case in the research items for motives.

Table (4.2) *Calculated p-values for motives based on 4 categories: organization types, 5 business sectors, 7 job positions, and quality and quality positions*

Research item	P-value (1)	P-value (2)	P-value (3)	P-value (4)
Improvement of organization image	0.682	0.185	0.233	0.485
Improvement of organizational processes	0.152	0.461	0.49	0.16
Improvement of product/service quality	0.279	0.803	0.691	0.372
Improvement of work efficiency	0.89	0.605	0.804	**0.052**
Useful marketing tool	0.953	0.831	0.108	**0.029**
Customer pressure/demand	0.104	0.306	0.961	0.699
Reduction of paper works	0.803	0.75	0.997	0.429

Note :

P-value (1): P-values for differences in motives between government and private sectors.

P-value (2): P-values for differences in motives among five different business sectors.

P-value (3): P-values for differences in motives among seven job positions.

P-value (4): P-values for differences in motives between quality and non-quality job positions.

4.2.2 Motives for the choice of certification bodies:

PAFI for the state of Kuwait has provided me with 4 main certification bodies responsible for issuing ISO 9001 certificates. These are BV, SGS, TUV Rheinland, and TUV Nord. There are others such as Intertek, RIMA, DNV and others that have minimum market share in the ISO 9001 certification business as well. Table (4.3) (refer to appendix A4) describes the reason for choosing a specific certification body. For comparison purposes, tables from Poksinska et al. (2007) were included to see the differences in attitude for such a dimension. A selection compatibility between Swedish and Kuwaiti organizations can be seen in choosing a reputational certification body as a first priority. Also, a compatibility of selection is obvious with certification body being the least expensive among other certification bodies.

4.2.3 Organizations with permissible exclusion:

ISO 9001 standard permits organizations seeking certifications to have exclusion from the standard requirements and only in clause 7.0 and its sub clauses if a seeking organization can justify the need for this exclusion (International Organization for Standardization, ISO 9001:2008(E)). From the survey, it was found that 46.9% of the certified organizations have been excluded from clause 7.0 or its sub clauses (7.3, 7.5.1, 7.6, etc.). For further investigation, several hypothesis tests were conducted and results showed the following:

1. There is an association between the cost of the audit and whether the organization is excluded from clause 7.0. This was done using the non-parametric chi square test. The p-value = .030 < .05, indicates enough evidence of statistical significance to reject the null hypothesis that there is no association between the cost and exclusion.

2. There is no association between the length of audit and organization with exclusion since the p-value = .102 > .05, almost twice the significance level. This was also done using the chi square non parametric test. Therefore, the proposed hypothesis had failed to be true.

Another hypothesis test was performed on whether two proportions for the organizations with exclusion and ones without are equal. The result revealed a p-value = .544 > .05, statistically insignificant differences. This would be an indication that the half numbers of the certified organizations have permissible exclusion from the standard requirement in clause 7.0 of ISO 9001.

4.2.4 Role of External Auditors

Table (4.4) combines the results of Swedish survey and Kuwaiti survey in regard to the audit process and auditor's role as they are perceived by the certified organization. The comparison was done against results of Kuwaiti survey in format (A) only. As mentioned earlier the scaling used by Poksinska et al. (2007) was categorized from an ordinal value = 1 to a value = 7. Therefore, a caution of conversion must be taken. Colman et al. (1997) suggested a conversion method that yields a higher R squared value, which is the linear regression method. Colman et al. (1997) preferred this method to the simple proportional transformation (either multiplying by 5/7 or 7/5) because it is empirically improved and has an error term as a constant. The derived linear equation for converting data from 7 to 5 likert scale is:

$X_5 = \frac{2}{3} X_7 + \frac{1}{3}$; Where X_7 is the calculated value on 7 point likert scale and can take any ordinal value of 1,2,3,4,5,6,7.

However, the above equation will not be used here since my interest is to check for any significant differences in the attitudes between the quality related employees in two

different cultures, Kuwait and Sweden. The statistical method that would be most appropriate and robust for comparison is to use the t-test of the differences between two population means. Before the t-test was applied for means differences of the percentages using Minitab software package (ver.16), a conversion to percentages for the means and standard deviations was made to table (4.4).

Table (4.4) *The Role of ISO 9001 auditor as perceived by Swedish and Kuwaiti organizations*

Research items	Sweden			Kuwait			P-values	
	N	Mean	SD	N	Mean	SD	PV1	PV2
Auditor shall share own experience and give suggestions for Improvements.	269	6.14	1.29	98	4.38	0.78	0.96	0.96
Auditor shall give an objective view on the QMS Effectiveness	269	5.9	1.23	98	4.44	0.66	0.02	0.01
Auditor shall evaluate whether actual quality management activities conform to the documented procedures	269	5.55	1.52	98	3.56	1.08	0	0
Auditor shall assess whether the QMS is suitable to achieve corporate objectives and improvement	269	5.43	1.62	98	4.23	0.8	0.01	0
Auditor should do both: evaluate the compliance with the standard's requirements and work as an improvement consultant	266	5.29	1.91	98	4.13	0.77	0.02	0
Auditor shall primarily check whether the documented procedures comply with the standard's requirements	269	4.54	2.05	98	4.04	0.9	0	0
Auditors shall stick to noting pure compliance with the standard. Going beyond this role is unwelcome	266	2.12	1.43	98	4.34	0.73	0	0

N : Total Surveyed, SD : Standard Deviation.

Used Scaling :

Sweden : 1 – 7 point likert Scale , 1. Strongly Disagree 7. Strongly Agree

Kuwait : 1 – 5 point Likert Scale, 1. Strongly Disagree, 2. Disagree, 3. Neutral, 4. Agree, and 5. Strongly Agree.

PV1 : P-value calculated when both variances are assumed equal.

PV2 : P-value calculated when both variances are assumed unequal.

The conversion was done by dividing each research items' parameters (mean and standard deviation) by 7 and 5 to Sweden and Kuwait variables respectively. After performing the t-test of means differences for all research items in table (4.4) that the two means are equal, surprisingly the result came out to be that means were different for all items except for the research item with regard to the sharing of auditor's experience in which the p-value resulted to be > .05. The remaining research items have shown significant differences between the two work organization cultures. This result of significant differences in perceptions can be explained most probably due to the respondent of Kuwait survey having stronger attitude toward agreeing with the importance of auditors' role and audit process than respondents of the Swedish surveys. The test of significances was performed on the assumption of both variances being equal or not equal.

The same principle was applied to investigate the attitudes of employees in the same organization. Table (4.5) (refer to appendix A4) describes the outcomes of survey for format (A) and format (B). This test of hypothesis was not done by Poksinska et al. (2007). However, it is justifiable to perform such a test since auditing is carried out on different functions of the organization. Therefore, a hypothesis test was conducted to see if quality related employees have different views from non-quality related employees with respect to auditors' role and audit process. Using Mann-Whitney U non parametric test, there was only one research item "Auditor shall share own experience and give suggestions for improvements" that was statistically significant with p-value = .014. This indicates that quality and non-quality staff disagree on whether the auditor shall provide improvement ideas to the existing QMS. However, according to ISO 19011 auditing guidelines document (International Organization for Standardization, ISO 19011:2002(E)), the auditor's job is not necessarily to offer the audited organizations business improvement ideas; it is the role of a consultant.

4.2.5. Auditor's performance as perceived by the audited organizations:

Table (4.6) presents how auditors' performances are seen by the respondents according to 7 criteria in the two countries, Sweden and Kuwait. The research item "Auditors make too little demand" was omitted from the research to avoid redundant questions". The response of such a question can be the complement of the research item "Auditors are highly demanding". A t-test of means differences for percentages was performed and the result showed differences are statistically significant except for the last research item mentioned in table (4.6), "Auditors are competent to do their jobs". It showed that Kuwaiti and Swedish respondents at least agree positively on the competence of auditors since the p-value > .05.

The comparison was also performed between two job categories in table (4.7) (refer to appendix A4). The two job categories are the quality and non-quality employees. This was again addressed to study the differences in results between the two formats, format (A) and format (B). Using Mann-Whitney U nonparametric test, it was found that p-value in only one research item to be < .05. The respondents differ in views of "auditors that focus far too much on documentation". The other research items resulted with no differences in attitudes between the two job categories. The respondents almost differed on the research item "We learn a lot from external audits", since p-value = .058 almost = .05. A t-test of means of percentage differences was also performed and resulted in a p-value = .057, almost close to make a decision toward the attitude differences that may exist.

When applying Kruskal-Wallis test on format (A), results have shown that auditors failed to perform differently from one certification body to another. However, the differences were statistically significant with p-values < .05 when auditing took place in the government and private sectors. The two indicators which exhibit differences are the research items in table (4.8) (refer to appendix A4):

1- We learn from external audits and;

2- Auditors are competent to do their jobs.

Table (4.6) *Auditors' performances as perceived by Swedish and Kuwaiti organizations*

Research items	Sweden			Kuwait			P-values	
	N	Mean	SD	N	Mean	SD	PV1	PV2
Auditors focus far too much on documentation	264	3.14	1.57	98	3.5	0.83	0	0
Auditors are highly demanding	264	2.83	1.48	98	3.22	0.81	0	0
Auditors make too low demands	264	2.79	1.63	NI	NI	NI	NI	NI
Audits help us very much to improve our QMS	268	5.1	1.6	98	4.23	0.69	0	0
We learn a lot from external audits.	268	5.09	1.6	98	4.07	0.75	0	0
Auditors strongly improve motivation for quality work	268	4.61	1.57	98	3.97	0.68	0	0
Auditors succeed to obtain a complete and true picture of the actual quality practices in our organisation.	265	4.34	1.49	98	3.87	0.76	0	0
Auditors are competent to do their jobs	268	5.61	1.29	98	4.14	0.73	0.19	0.15

N : Total Surveyed, SD : Standard Deviation, NI : Not investigated.
Used Scaling :
Sweden : 1 – 7 point Likert Scale, 1. Not At All, and 7. Very Much.
Kuwait : 1 – 5 point Likert Scale, 1. Never, 2. Seldom, 3. Sometimes, 4. Often, and 5. Always
PV1 : P-value calculated when both variances are assumed equal.
PV2 : P-value calculated when both variances are assumed unequal.

Correlation was statistically significant between the choice of certification bodies and what these certification bodies can offer to their customers or how they are described by their customers (business characteristics of the certification bodies). SPSS has calculated Lambda value to be 26.2%. This means that 26.2% improvement of the prediction for which the certification body was selected by the work organization that can be made, depending on the business characteristics of the certification bodies.

4.2.6   Sources of information used by the auditors:

Table (4.9) (refer to appendix A4) illustrates the sources of information collected by the auditors of Swedish and Kuwaiti work organizations during their review on the organization's quality management system. From practical experience and the understanding of the ISO 19011:2002 guidelines standard document (International Organization for Standardization, ISO 19011:2002(E)), the 15 listed items in table (4.9) can provide and guide toward the conclusion of organization's compliance with the standard requirements. Using the t-test of means differences for the percentages as done in the previous sections, the only research item that showed no statistically significant difference was the "interview with top management". The p-value under both assumption of the homogeneity and heterogeneity of the variances was very much greater than the significance level (p-value > .90). Therefore, the conclusion to reject the null hypothesis that Swedish and Kuwaiti respondents feel the same about this research item is unjustifiable. In other words, the importance of the research item "meeting with top management during audit" is very much the same in the two cultures while the differences were significant in the remaining research items.

This aspect was not performed on the non-quality employees (i.e., in format (B)) since it would not be reasonable to ask respondents about tasks for which they are not responsible.

4.2.7   Audit conclusions and reports:

Table (4.10) (refer to appendix A4) illustrates the content of audit reports submitted by the auditors of Swedish and Kuwaiti work organizations to the work organization. By performing the t-test of means differences on the percentages, differences were found to be statistically significant for all research items. The respondents were only quality related employees in Swedish and Kuwaiti work

organizations. Another test was performed to see if the content of the audit reports, submitted to Kuwaiti organizations, differ with respect to the type of business sector. Using Kruskal-Wallis test, the results revealed no statistically significant differences in the audit reports submitted to various business sectors. Using Mann-Whitney U test to see if differences exist between private and government sectors, the research item " if non conformities were found, the auditor make suggestions for corrective actions" has shown a statistically significant difference with a p-value = .030 < .05. This result suggests that maybe the audit report content is presented differently, depending on whether the organization is private or governmental.

4.2.8 QMS functions:

The research items for this section are described in table (4.11) (refer to appendix A4) for formats (A) and (B) with their respective means and standard deviations. Inferential assessment is conducted in the following sub sections as per single independent variables such as Auditors' view, and customers' view.

4.2.8.1 Auditors' view

Poksinska et al. (2007) have tested the QMS functions relative to multiple certification bodies. The results revealed that differences were only significant in two research items, such as that QMS is a tool to improve internal efficiency and the QMS has great importance in how an organization works. The tested hypothesis was to study if the auditors may influence the view of QMS functions in the audited organizations. In Poksinska et al. (2007), the certification bodies, Sigma, Delta, and Gamma, have shown statistically significant differences for the QMS functions in the audited organizations.

However, in Kuwait, similar survey questions were asked and only few significant differences were shown for the following research items:

1. Our QMS helps organize business work flow. The resulted p-value < .05. This research item is similar to the question that Our QMS has great importance for how organization works in Poksinska et al. (2007). This question was just rephrased to make it understandable for the respondents. By calculating the eta-squared, $\eta = \dfrac{Chi - sqaure}{n-1}$, it was found the certification bodies, BV and SGS, were mainly responsible for causing the differences since the value of eta-squared came out to be the highest. $\eta = 13.7\%$ means that with 13.7% of the variability in rank scores of this research item is accounted for by which certification body is conducting the audit.

2. Our QMS is a tool for standardizing organizational processes. The resulted p-value = .008 < .05. However, it was not shown statistically significant in Sweden. The eta- squared is calculated to be $\eta = 9.6\%$ for this research item.

3. Our QMS is a tool to improve internal efficiency. The resulted p-value = .027 < .05. That has also shown a statistical significance in Sweden. In other words, differences were statistically significant between the way auditing is conducted and the view of QMS functions to the audited organizations. The eta-squared was calculated to be $\eta = 8.3\%$.

As indicated earlier, the ANOVA method was not used here since Data was not statistically significant to show convergence to Normality. The counterpart method to ANOVA is the nonparametric test, so called Kruskal-Wallis test, was used instead. Thus, Kruskal-Wallis test is the only valid statistical tool to be used in the above discussions.

4.2.8.2. Customers' view

Customers' attitudes are measured for three categories: the government and private sectors; five various business sectors (manufacturing, services, and etc...); and quality and non-quality employees. Using Mann-Whitney U non parametric method to test for differences in QMS functions as perceived by private and government sectors, and as perceived by quality and non-quality employees, there were no significant differences for any research item in this aspect (p-value > .05). A krsukal-Wallis test was performed to test for differences among the organization's business sectors and found only one significant difference in the research item "Our QMS is a tool for managing and improving quality of our products". The resulted p-value = .025 < .05 and the calculated eta-squared η = 13.42%.

4.2.9. ISO QMS Awareness level among employees of the organizations:

Measurement of ISO awareness is an essential need to sense and verify the compliance with the ISO 9001 standard requirements and implementation. This aspect of investigation consists of 10 research items. This aspect was not addressed or at least categorized as such by Poksinska et al. (2007). Thus, a comparison with Swedish organizations is not possible.

Table (4.12) (refer to appendix A4) lists these 10 items with the results of a significant difference as SIG or no significant difference as NSIG. Three hypothesis tests were performed for three independent variables: organization type; business sectors; and job positions (quality and non-quality employees). Using Mann-Whitney U and Kruskal-Wallis tests, the results revealed almost a statistically significant difference between government and private organizations for the research item "ISO 9001 standard has helped organization meet its objectives effectively", and a statistically significant difference among business sectors and between two job positions (quality and non-quality) for the same research item "Our organization provides proper work

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environment for its employees to perform their tasks efficiently". Its eta squared value was calculated to be $\eta = 39.4\%$ with respect to the business sectors. The big difference was found between the training and education sectors. While comparing differences between the two organization types, the eta squared was calculated to be $\eta = 8.10\%$. Also, using the Kruskal-Wallis test on the 7 different job positions, it resulted with no statistical significant difference among these job positions.

Another interesting fact of my concern is to investigate whether the enhancement of top management and involvement in the implementation of ISO 9001 standard requirements will improve ISO 9001 implementation, organization's business performance, financial performance, and other variables listed in table (4.12). Using spearman correlation non parametric test, it was found that top management and involvement have shown highly moderate association with correlation coefficients (r-value) that are statistically significant, corresponding to the following research items:

1. ISO 9001 standard implementation has improved our business performance (r = .30, p-value = .003).

2. ISO 9001 standard implementation has improved organization's financial performance (r = .312, p-value = .002).

3. ISO 9001 standard implementation has helped organization meet its objectives effectively (r = .482, p-value = 0.000).

4. ISO 9001 standard has helped the organization control its outsourced processes (r = .297, p-value = .003).

5. Employees do their tasks efficiently with ISO 9001 implementation (r = .530, p-value = 0.000)

6. Customer requirements are fulfilled and controlled effectively with ISO 9001 standard implementation (r = .539, p-value = 0.000).

7. Continual improvement programs are always adopted by our organization ($r = .764$, p-value = 0.000).

8. Our organization provides proper work environment for its employees to perform their tasks efficiently ($r = .533$, p-value = 0.000)

9. Employees get motivated to do their jobs efficiently ($r = .488$, p-value = 0.000)

10. Sufficient training program in ISO 9001 awareness and implementation was provided to all organization's staff ($r = .501$, p-value = 0.000)

11. The audit procedure for ISO 9001 prevents stagnation and promotes improvement of the QMS ($r = .488$, p-value = 0.000)

All the above results are attributed to the commitment and involvement level of top management which will eventually lead to effectiveness and efficiency of quality management systems in the organization.

4.2.10. Organization's satisfaction with audits

Respondents were asked to evaluate the auditor's performance on scale 1 – 10. Table (4.13) summarizes the results and shows the results of Sweden (Poksinska et al., 2007) and Kuwait as well. The mean and standard deviation values of satisfaction in Kuwaiti organizations were 7.84 and 1.497 respectively.

Table (4.13) *Auditors evaluated by Kuwaiti and Swedish organizations (Satisfaction level)*

Country	Given Score	Percentages of Respondents
Kuwait	9 & 10	38.8
	2 & 3	4
Sweden	6 & 7	57
	2 & 3	8

Used Scaling :

In Sweden, Lowest = 1 and Highest = 7

In Kuwait, Lowest = 1 and Highest = 10

Three hypothesis tests were performed for three independent variables: organization type; business sectors; and job positions (quality and non-quality employees). Using Mann-Whitney U and Kruskal-Wallis tests, the results showed: a statistically significant difference in the satisfaction level between government and private organizations; no statistically significant difference in the satisfaction level among various business sectors; and no statistically significant differences in the satisfaction level between quality and non-quality employees.

4.2.11. Benefits besides certificate

In this section, respondents of various categories were asked if benefits are perceived from auditing besides the certificate. Results of the conducted hypotheses were as follows:

1. Using the Chi square proportion test, it was concluded that proportion of respondents in favor of perceived benefits was higher than those not in favor.

2. Using Mann-Whitney U non parametric test, no statistically significant difference was found in the perceived benefits of auditing between quality and non-quality related employees (p-value > .05).

3. Using Kruskal-Wallis non parametric test, no statistical differences was found in the perceived benefits among business sectors, and among certification bodies (p-values > .05). This result suggests that benefits of audits exist besides the certificate.

Table (4.14) describes the percentages of respondents who claimed benefits of auditing besides certificates, and a certificate benefit only in the two countries (two cultures), Kuwait and Sweden. Using the Minitab software (ver. 16) to test proportion differences between Swedish and Kuwaiti organizations, it was found that both Swedish and Kuwaiti organizations have agreed on the benefits of auditing besides certificate at the

same level (p-value = .197 > .05). These benefits agreed with Sissell (1996) findings. He found about 95% of work organizations that have shown internal benefits with respect to better documentations, increased awareness, and enhanced internal efficiency.

Table (4.14) *Percentages of claimed benefits with ISO 9001 certificates in the Kuwaiti and Swedish organizations*

Country	Benefits besides certificate in %	Certificate is the only benefit in %
Kuwait	80	20
Sweden	87	13

Reading the comment box (from the survey), about the benefits perceived by respondents, a classification can be made to these comments into four categories with their corresponding percentages and they are as follows:

1. 55.7% responded with perceived process, product, and continual improvement in the QMS of the organization.

2. 11.5% responded that commitment of implementation and awareness has been enhanced with auditing.

3. 13.1% responded that ISO 9001 reflects good image for the outsiders of the organization.

4. 19.7% responded that customer requirements and satisfaction have been improved and enhanced with auditing.

4.3.   Summary and Conclusion

In this chapter, an overview of indicators for the quality management systems as per ISO 9001 standard was presented with care and understanding of variables which compose and construct the quality management system for any ISO 9001 certified

organization. These variables were the research items for which author of this topic finds appealing to study before any conclusion that can be drawn about the ISO 9001 QMS certified organizations. Thus, for the purpose of meeting research objectives, the author has taken the burden of customizing an already used survey by deleting , adding, and amending some research items which will eventually help to draw a clear picture of the current QMS practices and implementation in the work organization. This survey was used as one but not necessarily the only one instrument, for this research. The results of this research were taking the part of comparison between Swedish and Kuwaiti ISO certified organizations. Another part was studying all aspects of ISO certified work organizations in Kuwait and learning more about all possible QMS performances indicators. It was indeed not possible to address actual parameters of the QMS, unless data collections from the certified organization show some objectivity. Differences in responses between Swedish and Kuwaiti organizations were statistically significant in most of the variables (almost 95% of the compared research items) under study. The reason for this persisting difference could be attributed to the wide scaling used in the Swedish survey or the existing cultural differences between the two countries. Unfortunately, a 7 point scale would not be appropriate for the respondents of Kuwaiti surveys as explained earlier. From literature review in chapter 2, this would be the first research done about ISO 9001:2008 certified work organizations in Kuwait for which many indicators and comparisons at various levels are studied and analyzed. Similar studies have been done before in many countries but not in Kuwait with this multi purposed questionnaire (instrument). Just to make the reader aware that 80% of the analysis was limited to the use of non-parametric methods since the validity of necessary assumptions were not justifiable. The analysis was performed by using most of the time SPSS ver. 21 on 96 survey questions in format (A) and 55 questions in format (B). The responses for these questions were the leads to understand QMS

indicators. The research initially focuses on the performance of the auditor from the view point of the beneficiaries or otherwise called the end user which is the certified organization. Besides the brief demographic presentation in section 4.1, at least 11 possible aspects can be addressed from the survey. Each of these dimensions consists of at least one variable or research item. These aspects are described by:

1- Motives for seeking certification.

2- Motives for the choice of a specific certification body.

3- Organizations with permissible exclusion.

4- Role of external auditors.

5- Auditors' performance.

6- Sources of information used by the auditors.

7- Audit conclusions and reports.

8- QMS functions from auditors' and customers' perspectives.

9- ISO level of awareness and top management commitment and involvement.

10- Organizations' satisfactions with audits.

11- Benefits besides certificates.

One interesting finding in this chapter was the fairly strong correlation coefficient found between the top management commitment and the adoption of continual improvement programs in the work organization. Thus, it was concluded that no indication of top management commitment and involvement means no or little indication of QMS effectiveness and efficiency.

The objectives stated in chapter 1, except objective #8, were descriptively and inferentially covered and analyzed in this chapter. These objectives, being treated and addressed for analysis, are shown in the table (4.15) given below with their corresponding section location in this chapter.

Table (4.15) Summary of numbered objectives with the section locations

Objective No.	Section Location	Objective No.	Section Location
1	4.2.1	4	4.2.4, 4.2.5, 4.2.6, 4.2.7, 4.2.11
2	4.2.8.2, 4.2.9	5	4.2.11
3	4.1	6	4.2.3, 4.2.3.1,4.2.3.2
7	Left for later chapters		

Finally, from the results obtained in this chapter, a one publication paper was published on March 2013 under the title "An empirical evaluation of the ISO 9001 quality management systems for certified work organizations in Kuwait as benchmarked against analogous Swedish organizations". The paper is published online with a reference number: doi:10.4236/jssm.2013.61009.

Chapter 5

Factor analysis for data reduction

In the previous chapters, a complete analysis was made, based on all survey questions (all research items) in formats (A) and (B). All research items were described by their means, variances, standard deviations, and other statistical parameters depending on what sort of stated hypotheses were to be tested. As mentioned in the previous chapters, the survey used for this research was reliable and valid enough to meet its purpose in different countries and cultures. After basic inferential analysis was performed in chapter 4, the purpose of this research continues to go further than simple inferential statistics and conclude with a statistical model, represented by a set of reduced variables. The method of reduced variables can be referred by a data reduction technique, the so called factor analysis. Basically, factor analysis is a technique used for four different purposes:

1. Data reduction;

2. Scale development;

3. The evaluation of psychometric quality of a measure and;

4. The assessment of a dimensionality for a set of variables.

In this research, the first, second, and fourth purposes are considered to be the main reasons behind the analysis in this chapter. As mentioned in the previous chapters, the research items are the variables or indicators of the research. Various groups of questions were then categorized based on the perception measurements taken from survey respondents. These categories are known to be the crucial features of the survey and are as follows:

1. Motives

2. QMS functions

3. Auditor's role or function

4. Auditor's performance

5. Sources of information collected by auditors pertinent to ISO 9001 QMS

6. Audit Report

7. Internal customer awareness level

The application of a factor analysis on each of the above features explains how much each question in the survey contributes to an extracted common or latent factor. All data results (tables (5.3) – tables (5.17)) obtained from the analysis in this chapter are tabulated and enlisted in appendix A5, except for the two key tables (5.1) and (5.2) are presented in this chapter with regards to their importance.

5.1   Method approach

For the sake of method stability and a model building, the sample size was increased from 98 to at least 150. I also requested for more surveys to be completed by the same organizations which had previously submitted surveys. Of course, different respondents but from the same quality department or units in the work organizations have completed the format (A) survey. I was able to collect additional 72 surveys. The response rate was higher than previous time because the survey was very much shortened using the factor analysis method on the original sample as a data reduction technique.

**5.2	Theory of exploratory factor analysis**

Prior to conducting factor analysis, a correlation table was calculated among the indicators for a specific aspect to observe if significant correlations exist. This is a theoretical condition for the factor analysis to be conducted. Each latent factor is extracted by the method of exploratory factor analysis using the reliable data from the survey. The exploratory factor analysis is the first part of factor analysis to be used on the data. The method used is exploratory since it is data driven. Data driven means that the method will use the collected survey data to extract statistically multiple factors. The extraction method used by the author is called a varimax, which works under the assumption that factors are uncorrelated with one another and measurement errors are uncorrelated among themselves or with the extracted factors as well. The assumption here is quite necessary for building up the appropriate statistical model and conducting the correlation hypothesis testing for the extracted factors. The hypothesis testing for factors and the analysis of their correlations are to be addressed fully in the next chapter where the second part of factor analysis, confirmatory factor analysis, plays an important role in determining the significance of hypothesized model.

**5.3	Applying exploratory factor analysis**

Now, using the varimax exploratory factor analysis under the SPSS ver. 21, the listed aspects with their corresponding research items were also broken down into a set of extracted factors. Table (5.l) lists all non-demographic questions reduced by the method of factor analysis. Table (5.2) lists all sets of reduced questions with their corresponding extracted factors. The naming of these factors are determined by the author's experience in the ISO 9001 quality management systems auditing, and by investigating the common interpretations among the indicators reflected by their certain factors.

Table (5.1) *Reduced research items after using factor analysis*

Question number	Question title
Q8_1	Improvement of company image
Q8_2	Useful marketing tool
Q8_3	Customer pressure/demand
Q8_4	Improvement of product/service quality
Q8_5	Improvement of organizational processes
Q8_6	Improvement of work efficiency
Q9_2	Our QMS is a tool for handling documentation
Q9_9	Our QMS is a tool to fulfil the customer's needs and requirements
Q9_11	Our QMS is a tool for continual improvement of our organisation.
Q9_4	Our QMS measures customer satisfaction level
Q9_5	Our QMS takes into consideration internal customer needs (Staff needs)
Q9_6	Our QMS has full control and monitoring over our suppliers
Q14_1	Auditor shall primarily assure whether the documented procedures comply with the standard's requirements
Q14_2	Auditor shall evaluate whether actual quality management activities conform to the documented procedures
Q14_4	Auditor shall give an objective view on the quality management system effectiveness.
Q15_1	Auditors focus far too much on documentation
Q15_2	Auditors are highly demanding
Q15_3	Audits help us very much to improve our QMS
Q15_4	We learn a lot from external audits.
Q15_5	Auditors strongly improve motivation for quality work
Q19_13	Customer complaints and satisfaction measurements results
Q19_14	Improvement action plans
Q19_15	Evidence on progress of improvement projects
Q19_6	Quality manual
Q19_7	Documented procedures and instructions
Q19_8	Reports, minutes from internal audits
Q19_9	Reports from handling nonconformities as corrective action plans being taken
Q20_1	Auditors assured whether the quality manual complies with the standard's requirements.
Q20_2	Auditors evaluated whether the documented procedures comply with the standard's requirements.
Q20_3	Auditors described the extent of conformity of the management system with the audit criteria.
Q20_5	Auditors identified improvement opportunities and possible areas of risk
Q20_6	Auditors provided valuable insights for the organisation into how the QMS could become more efficient and useful
Q20_7	If nonconformities found, the auditors made suggestions for corrective actions.
Q20_8	Auditors identified problems, which, if resolved, will enhance the organization's performance.
Q20_9	Auditors emphasized the areas of the quality management system, which they found especially effectively or successfully working.
Q23_1	ISO 9001 standard implementation has improved our business performance
Q23_4	ISO 9001 standard implementation has helped organization meet its objectives effectively
Q23_5	ISO 9001 standard has helped the organization control its outsourced processes
Q23_8	Top management is very much involved and committed in the ISO 9001 standard implementation
Q23_9	Continual improvement programs are always adopted by our organization
Q23_10	Our organization provides proper work environment for its employees to perform their tasks efficiently

Table (5.2) *Extracted factors including their own indicators or questions*

Extracted Factors	Explained variance (%)	α of Cronbach	Factor loadings	Mean	STDV
External Motives (EXM)	72.935	.805		3.9215	.73132
Q8_1 (EXM1)			.825	4.14	.779
Q8_2 (EXM2)			.925	3.89	.824
Q8_3 (EXM3)			.808	3.74	.970
Internal Motives (INM)	81.975	.888		4.2628	.77171
Q8_4 (INM1)			.892	4.28	.877
Q8_5 (INM2)			.919	4.35	.779
Q8_6 (INM3)			.914	4.16	.902
Customer-Supplier Focus (CSF)	73.865	.816		3.9728	.67633
Q9_4 (CSF1)			.861	4.22	.711
Q9_5 (CSF2)			.867	3.85	.751
Q9_6 (CSF3)			.850	3.84	.899
QMS main function (QMF)	68.178	.766		4.3181	.51443
Q9_2 (QMF1)			.790	4.3	.614
Q9_9 (QMF2)			.842	4.25	.653
Q9_11 (QMF3)			.844	4.4	.600
Compliance assessment (CAS)	77.718	.855		4.3825	.62800
Q14_1 (CAS1)			.924	4.39	.747
Q14_2 (CAS2)			.828	4.46	.607
Q14_4 (CAS3)			.891	4.31	.762
Negative approach of auditing (NAA)	67.774	.552		3.0393	.66829
Q15_1 (NAA1)			.823	.803	.814
Q15_2 (NAA2)			.823	.833	.809
Positive approach of auditing (PAA)	66.003	.741		4.0663	.56440
Q15_3 (PAA1)			.770	.783	.682
Q15_4 (PAA2)			.826	.816	.731
Q15_5 (PAA3)			.839	.836	.670
Control of Documents & Records (DOCR)	73.623	.879		4.7599	.45229
Q19_6 (DOCR1)			.839	4.78	.527
Q19_7 (DOCR2)			.834	4.78	.468
Q19_8 (DOCR3)			.862	4.72	.565
Q19_9 (DOCR4)			.896	4.75	.542
Continual Improvement (CONTIMP)	72.201	.805		4.4182	.64271
Q19_13 (CONTIMP1)			.778	4.6	.691
Q19_14 (CONTIMP2)			.918	4.41	.758
Q19_15 (CONTIMP3)			.848	4.26	.803
General ISO report (GISOREP)	73.063	.797		4.7015	.47946
Q20_1 (GISOREP1)			.863	4.74	.550
Q20_2 (GISOREP2)			.911	4.78	.492
Q20_3 (GISOREP3)			.785	4.57	.660
Special ISO report (SPISOREP)	64.201	.852		4.0318	.81396
Q20_5 (SPISOREP1)			.729	4.22	.921
Q20_6 (SPISOREP2)			.828	4.15	.868
Q20_7 (SPISOREP3)			.790	3.95	1.291
Q20_8 (SPISOREP4)			.855	3.81	1.026
Q20_9 (SPISOREP5)			.805	4.06	.930
Top management Commitment (TMC)	73.799	.812		4.0070	.68971
Q23_8 (TMC1)			.859	3.98	.873
Q23_9 (TMC2)			.912	4.00	.784
Q23_10 (TMC3)			.803	4.04	.741
ISO Impact (ISOIMP)	67.119	.748		3.8910	.55826
Q23_1 (ISOIMP1)			.806	4.08	.674
Q23_4 (ISOIMP2)			.844	3.95	.608
Q23_5 (ISOIMP3)			.807	3.64	.766

For instance, the naming of motives for questions: Q8_1, Q8_2, and Q8_3 was "External" since all the three indicators (questions) are pertinent to requests coming from outside the organization. Table (5.2) includes various statistical quantities of interest, worth analyzing. Referring back to table (5.2), these quantities can be explained as follows:

5.3.1 Extracted factors:

As per the method of exploratory factor analysis, the factors or so called latent variables are extracted using the SPSS (ver. 21). Thirteen factors were extracted from analyzing the above mentioned seven aspects.

5.3.2 Explained variance:

This quantity accounts for the maximum amount of information that the extracted factor shares in common with its corresponding reduced variables. The higher the quantity, the better the estimation becomes. The highest explained variance among all other factors is for the "Internal Motives", which is 81.975%. This figure means that 81.975% of information or variability for the three variables (Q8_3, Q8_4, and Q8_5) is explained by the common factor. All explained variances have shown values > 67% which are also consistent with literature.

5.3.3 α of the Cronbach:

This quantity is recommended to be greater than 0.70. It measures the consistency of responses among the variables within the factor.

5.3.4 Factor loadings:

This quantity measures the effect of each latent factor on its variables. Again, the higher the value, the better the estimation is. It just works like the regression weights of the factor on the variable. A quantity value of .70 and greater is recommended.

5.3.5 Means and standard deviations:

These quantities are not calculated in the same manner as in chapter 4. The difference is that these quantities are weighted based on the factor loadings. For instance, the weighted mean for the "External Motives" is calculated as below

Let EM be weighted mean for external motives per single response (i),

Such that $EM_i = \frac{(.825Q8_1 + .925Q8_2 + .808Q8_3)}{.825 + .925 + .808}$

Then the weighted mean of the "External Motives" for all responses is

$WEM = \frac{\sum EM_i}{170}$, where the sample size is n = 170.

The standard deviations are calculated using the unbiased standard deviation formula after the weighted factor value per single response is calculated.

5.4 Inferential analysis on the weighted factors

In chapter 4, hypothesis testing was conducted on single variables. However, this section will consider the extracted factors with their weighted means for comparative assessments. In other words, hypothesis testing is to be conducted for every single weighted mean of the factor. The analysis will continue to use the same non-parametric statistical approach as it was done in the previous chapter. Mann Whitney U and Kruskal-Wallis tests are the most reliable and candidate methods for my

data. Demographic variables of the survey will be used for conducting the hypotheses. The following sections will illustrate the points of discussion.

5.4.1 Descriptive statistics for the extracted factors

Table (5.3) lists the major descriptive statistics for all extracted factors. The factor with highest value of means is "Control of Documents and Records (DOCR)", while the factor with lowest value is with the "Negative approach of auditing (NAA)".

5.4.2 Hypothesis testing on weighted factors

A Mann Whitney U or a Kruskal-Wallis test will be used in the following subsections depending on how the hypotheses are setup. In other words, if a hypothesis entails a test between two factors or factors for a single demographic variable, then a Mann Whitney U test is used. However, if a hypothesis entails a test among several factors (more than two), then a Kruskal-Wallis is used.

5.4.2.1 Effect of an organization type or sector

The test showed that significant differences with the three factors: "Control of Documents & Records (DOCR)", "Top management commitment (TMC)", and " Positive approach of auditing (PAA)". P-values < .05 are shown on table (5.4).

5.4.2.2 Effect of nature of businesses practiced by the organization

The test was performed among several business sectors and showed a significant difference with the factor "Top management commitment (TMC)". The p-value .009 is shown in table (5.5).

5.4.2.3 Effect of organization sizes

The test was performed among several business sectors and showed significant differences for the two factors: "Top management commitment (TMC)", and "Specific ISO report (SPISOREP)". The p-values < .05 are shown in table (5.6).

5.4.2.4 Effect of organizations' global sizes

The test was performed among several global organization sizes and showed significant differences for the factors: "External Motives (EXM)", and "Specific ISO report (SPISOREP)". The p-values < .05 are shown in table (5.7).

5.4.2.5 Effect of a certification length

This effect appears when the organization maintains the certificates for longer periods than the normal three year period. Table (5.8) shows p-values < .05 with significant differences for the three factors: "Internal Motives", "Top management commitment", and "ISO Impact".

5.4.2.6 Effect of different job positions

The test shows four significant differences with p-values < .05 as shown in table (5.9) for the four factors: "Compliance assessment (CAS)", "Negative auditing approach (NAA)", "Specific ISO report (SPISOREP)", and "Top management commitment (TMC)". The test was only conducted among 4 types of job positions: QC/QA managers, business/operations managers, plant or general manager, and management representatives for the quality unit.

5.4.2.7 Effect of clause 7.0 exclusion

The test reveals three significant differences with p-values < .05 as shown in table (5.10) for the factors: "External Motives (EXM)", "QMS main functions (QMF)", and "General ISO assessment report (GISOREP)".

5.4.2.8 Effect of certification body choice

The test shows four significant differences with p-values < .05 as shown in table (5.11) for the four factors: "Internal Motives (INM)", "Control of Documents & Records (DOCR)", "Negative auditing approach (NAA)", and "Specific ISO report (SPISOREP)".

5.4.2.9 Effect of certification cost

The test shows that the effect of cost ranges, imposes three significant differences for the factors. Table (5.12) shows the factors with p-values < .05 and these are: "QMS main functions (QMF)", "Control of Documents & Records (DOCR)", and "Continual Improvement (CONTIMP)".

5.4.2.10 Effect of surveillance cost

The test only shows two significant differences for the factors: "External motives (EXM)", and "Specific ISO report (SPISOREP)" with p-values < .05 as shown in table (5.13).

5.4.2.11 Effect of integrated audits

This test investigates whether integrated audit with ISO 14000 will make any significant differences for the factors. The test showed only one significant difference, as shown in table (5.14), for the factor "Compliance assessment (CAS)" with a p-value = .022.

5.4.2.12 Effect of Audit duration

The test shows four significant differences with p-values < .05, as shown in table (5.15), for the factors: "Internal Motives (INM)", "Control of Documents & Records (DOCR)", "General ISO report (GISOREP)", and "ISO impact (ISOIMP)".

5.4.2.13 Effect of number of auditors

The test shows six significant differences with p-values < .05, as shown in table (5.16), for the factors: "Internal Motives (INM)", "Compliance assessment (CAS)", "Control of Documents & Records (DOCR)", "General ISO report (GISOREP)", "Positive auditing approach (PAA)", and "Top management commitment (TMC)".

5.4.2.14 Effect of perceived benefits from External Audits

This test determines whether there are benefits from auditing besides obtaining the certificate only. Table (5.17) showed all factors, except "Negative auditing approach (NAA), which revealed significant differences with p-values < .05.

5.5   Analysis of the significant differences

After conducting the hypothesis tests, and if the differences were significant for most of the factors as shown in the previous tables, it is then logically acceptable for the author to further analyze which factor of a demographic variable is responsible for causing the difference. A Duncan test would be a valid statistical tool to learn more about that difference. However, this tool would require a large sample size for each demographic variable in order to have the data converge to Normality. This means that the sample size (N = 170) would be divided among the number of factors for each demographic variable. However, this disadvantage would not hinder the author from observing more into the tabulated results (i.e., table (5.4) – table (5.17)). I have observed the latent variable (extracted factor), "TMC", showed a significant difference

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in about 8 out of 14 tables. Also, I have observed both latent variables "EXM", and "INM" occurred to be significantly different in 8 out of 14 tables. The benefit of this observation helps the author consider to build a model with a pre-understanding of which factor affects more on which all other factors.

5.6   Summary and conclusion

Results from table (5.2) indicate that not all extracted factors would be valid for further statistical analysis. This is very clear for the factors named, "Negative approach for auditing (NAA)", "Positive approach for auditing (PAA)", and "Special ISO report (SPISOREP)". "NAA" and "PAA" factors were derived originally from one whole aspect. Since the factor, "Negative approach for auditing" has shown a low value in α of cronbach < .70, it is then appropriate statistically, to delete the set of questions reflected by this factor. While the factor "SPISOREP" has shown a moderately low value in the amount of explained variance, it is then again valid not to consider this factor for further analysis such as modeling. Deletion of factors means to ignore only the factor and its variables from further statistical analysis. Thus, it is then suggested not to include at least these three factors in the next chapter for confirmatory factor analysis and model building. Since the method of factor analysis implied the reduction of data, about 43% of the non-demographic questions were deleted and not going to be included in further analysis. Another issue of concern is to stress on the way factors were titled or named. It is best to seek the guidance of the experts in the field of research and the help of the literature review as well. Being a certified lead auditor and an internal auditor in my work organization, it enhances my chance for choosing the proper terminology or label for the extracted factor.

Chapter 6

Causal effects of the ISO 9001 registration on the organizations' QMS performance using the Structural Equation Modeling and Confirmatory Factor Analysis

In this chapter, I will eventually explore the essence from the first instrument (first survey), where I start modeling the factors already extracted in chapter 5. All data resulted from modeling is tabulated, exhibited, and enlisted in Appendix A6. Since the method used in chapter 5 was purposed for data reduction, now there comes the need to confirm the validity of data reduction technique applied to the sample data. In other words, a confirmation of the latent variables (factors or constructs) with their corresponding indicators must be statistically verified. This will take me to the application of what is so called, confirmatory factor analysis. The method of a confirmatory factor analysis (CFA) is a theory driven rather than a data driven technique as in exploratory factor analysis (EFA). In CFA, a hypothesis test is conducted to verify the factor reliability and validity. Rather than testing a factor with its indicators one at a time, a test of a whole model will be applied. In exploratory factor analysis the structure and the underlying theory are not known a priori, rather data are used to uncover the structure of the factors. In confirmatory factor analysis on the other hand, the precise structure of the factor model is well known and the objective is to empirically test the model structure as hypothesized by the author. Therefore, the primary objective of a CFA is to determine the ability of a predefined factor model to fit an observed set of data (Sharma, 1996). Other common uses of CFA are to:

1) Establish the validity of a single factor model.

2) Compare the ability of two different models to account for the same set of data.

3) Test the significance of a specific factor loading.

4) Test the relationship between two or more factor loadings.

5) Test whether a set of factors are correlated or uncorrelated.

6) Assess the convergent and discriminant validity of a set of measures.

In order to Perform CFA, six essential steps are required and are as follows:

1. Define the factor model that a researcher wishes to test. This requires from the researcher to select the number of factors, and define the nature of the loadings between the factors and the measures. These loadings can be fixed at zero, fixed at another constant value, allowed to vary freely, or be allowed to vary under specified constraints (such as being equal to another loading in the model).

2. Collect measurements. Variables must be measured on the same (or matched) experimental units.

3. Obtain the correlation or covariance matrix for all variables or indicators.

4. Fit the model to the data to estimate factor loadings. The most common model-fitting procedure is *Maximum likelihood* estimation, which should probably be used unless the measures seriously lack of multivariate normality.

5. Evaluate model adequacy. When the factor model is fit to the data, the factor loadings are chosen to minimize the discrepancy between the correlation matrix implied by the model and the actual observed matrix. The amount of discrepancy after the best parameters are chosen can be used as a measure of how consistent the model is with the data. The most commonly used test of model adequacy is the *$\chi 2$ goodness-of-fit* test (i.e., chi-square goodness of fit test).

6. Compare with other models of which is a reduced form of the other and examine the difference between their *$\chi 2$* statistics, which will also have an approximately *$\chi 2$* distribution. Almost all tests of individual factor loadings can be made as comparisons of full and reduced factor models. In cases where you are not examining full and

reduced models you can compare the ***Root mean square error of approximation*** (RMSEA), which is an estimate of discrepancy per degree of freedom in the model. Basically, testing the whole model is associated with testing the linear correlations among all factors for the hypothesized model. The analysis of the whole model brings the concept of structural equation modeling (SEM). SEM is a combination of factor analysis and regression technique. Other terms are also used for SEM such as, covariance structure analysis, covariance structural modeling, or analysis of covariance structures, and causal modeling, which is used mainly in association with the technique of path analysis. Thus, SEM is a macroscopic view and analysis of the hypothesized model which consists of a set of interrelated CFA models. In this research, SEM was carried out following the six stages recommended by Hair et al. (2006). Figure (6.1) depicts the process map of testing the hypothesized model in theory (Hair et al., 2006).
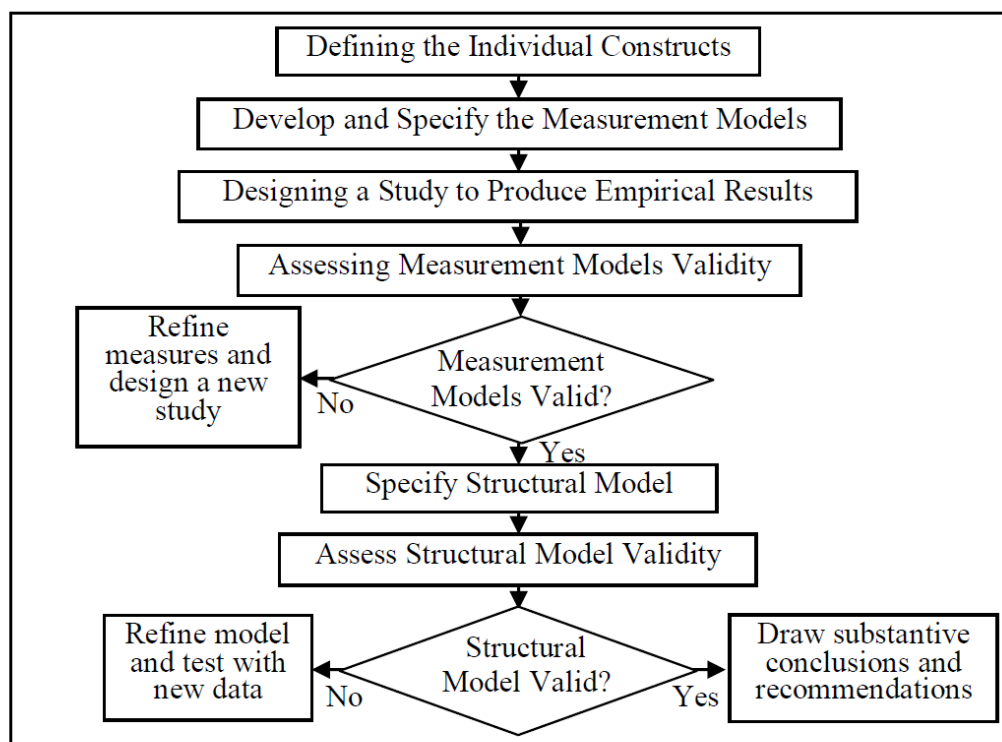
(Source: Hair *et al.*, 2006, p. 759)

Figure 6.1 Process map for testing a hypothesized structural model

6.1   Conceptual and hypothesized models (General)

Prior to the analysis, a model for study must be predefined based on the literature review or at least on the experience of the author in the field of ISO 9001 quality management systems. And, before proceeding further with models development and analysis, several mathematical terms must be clarified. The term "exogenous variable" is defined to indicate the predictability of a variable on other variables in the model. Just like regression analysis, the independent variables are the exogenous ones in SEM, while the dependent variables are called endogenous in SEM. In the following subsections, two general models (conceptual and hypothesized) with as many derived factors as conveniently possible are considered for validation and statistical significance. The word "General" means that the whole sample size of 170 is taken for model analysis.

Before building up the model, I suggest 3 factors for elimination from the hypothesized model. These are "NAA", "PAA", and "SPISOREP" (refer to chapter 5). The consideration of elimination of "NAA" and "PAA" are reasonable since they both address the behavior of auditors rather than ISO 9001 performance with ISO 9001 implementation. Moreover, the "SPISOREP" factor can also be considered for elimination since it is a special case of the "GISOREP". The model would then remain with 10 factors out of total (13) factors, originally extracted from main aspects of the research by the data driven method (i.e., EFA).

My hypothesized model is built to answer the following 40 essential questions:

1. Do external motives for seeking ISO 9001 put influence on work organization's commitment toward the implementation of ISO 9001 quality management system?
2. Do external motives affect organization's internal motives?
3. Do external motives enhance organization's customer and supplier relations?
4. Is the performance of quality management system affected by the external motives?

5. Do external motives improve organization's compliance with ISO 9001 quality management systems?

6. Is the control of documents and records influenced by the external motives?

7. Is the continual improvement culture affected by the external motives?

8. Do external motives improve the organization's overall performance?

9. Does top management commitment affect the organization's internal motives?

10. Does top management commitment enhance organization's customer and supplier relations?

11. Does top management commitment enhance quality management functionality?

12. Does top management commitment improve organization's compliance assessment with ISO 9001 quality management systems?

13. Is control of documents and records influenced by top management commitment?

14. Are continual improvement programs improved by top management commitment?

15. Is the general ISO report issued by the auditor affected by the level of top management commitment?

16. Is the overall performance of the organization (ISO Impact) affected by the level of top management commitment?

17. Do internal motives influence on the customer-supplier focus principle adopted by the organization?

18. Do internal motives affect the functionality of the organization's quality management system?

19. Is compliance assessment improved by the continuous internal motives of the organization?

20. Is General ISO report improved by the presence of internal motives?

21. Is overall performance of the organization affected by internal motives?

22. Is main quality function affected by an organization with a work environment of a customer-supplier focus?

23. Is compliance assessment improved by an organization with a work environment of a customer supplier focus?

24. Is control of documents and records improved by an organization with a work environment of a customer-supplier focus?

25. Are continual improvement programs enhanced with a work environment of a customer-supplier focus?

26. Does customer-supplier focus of a work environment affect the content of the general report issued by the auditor?

27. Does customer-supplier focus of a work environment affect overall performance of the organization's quality management system?

28. Does quality main function improve compliance assessment?

29. Is control of documents and records enhanced by the main quality function?

30. Are continual improvements affected by the main quality function?

31. Is the general ISO report affected by the main quality function?

32. Does main quality function affect the overall performance of the organization's quality management system (ISO Impact)?

33. Does compliance assessment affect general ISO report issued by the auditor?

34. Does compliance assessment affect overall organization's performance of the quality management system?

35. Are continual improvement programs affected by control of documents and records?

36. Is the general ISO report affected by the control of documents and records?

37. Does the control of documents and records affect the overall organization's performance of the quality management system (ISO Impact)?

38. Does the implementation of continual improvement programs affect the general ISO report issued by the auditor?

39. Does the implementation of continual improvement programs affect the overall organization's performance of the quality management system (ISO Impact)?

40. Is the organization's overall performance (ISO Impact) influenced by the general ISO report issued by the auditor?

A statistical analysis of correlations to uncover the causality between the factors of the model is presented in the following subsections:

6.1.1   General model with external motive as the leading exogenous variable

In this model, the only exogenous variable, preset by the author, is the External Motive (EXM).The choice of having the EXM factor as the initiator for the model is reasonably justifiable because any work organization seems to seek ISO certification for some specific reasons. Figure (6.2) depicts initially the conceptual model developed by the author, based on his practical experience in external auditing and ISO 9001 quality management system. Figure (6.2) only includes factors in relation to each other. The

confirmation of the relationship existence between these factors is presented in table (6.1) (refer to appendix A6). The author made sure that the initially suggested model in figure (6.2) to be consistent with the significant correlation between any two factors. In other words, the model was initially developed after testing the relationship statistically as shown in table (6.1) with significance level .05.Therefore, it can also be said that table (6.1) briefly presents whether any relationship exists significantly between any two extracted factors. Furthermore, these relationships among the weighted factors are also useful to indicate a cause and effect relationship among these weighed factors as well. The use of as many different factors as possible will not help ease the solution method obtained by CFA or SEM. Mathematically speaking, the covariance – variance matrix of the whole model will be quite large with various elements that need to be estimated.

The elements of the matrix are simply the variances and covariances of indicators. As mentioned earlier in the CFA method step (3), maximum likelihood estimation will be used to estimate these elements.
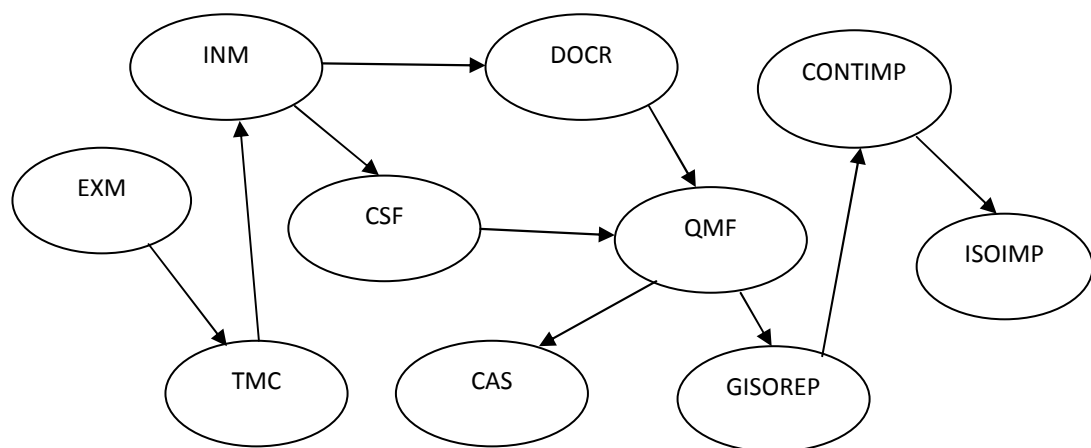
Figure (6.2) Initial hypothesized model suggested by the author

The conceptual model was then validated to be more hypothetical for testing using LISREL software (ver. 8.80) in order to explore the correlations among factors that may or may not exist significantly. The changes made to the conceptual model were necessary not only to improve the model significance but also to understand more about the nature of causality among factors that most probably exist. After several trials with model re-specifications, the hypothesized model has finally become significant with estimated parameters: a Chi-square Value, $\chi 2$ = 192.54, a P-Value = 1.000 (see figure 6.3), a Root Mean Square Residuals (RMSR) = .086, a Goodness of Fit index (GFI) = .93, and Adjusted Goodness of Fit Index (AGFI) = .910. These estimates are essential to account for the validity of the hypothesized model. Figure (6.3) depicts the graphical picture as obtained by the LISREL output. Summary results from LISREL outputs of the hypothesized model are printed in exhibit (6.1). Exhibit (6.1) also includes other parameters for assessing the significance of the model. However, the four suggested indices are highlighted and considered enough to assess the validity of the model. Unlike other models in literature, where some other researchers include assumptions of certain path coefficients' values (by fixing their values prior to analysis), the author did not assume any fixed parameters in the model since the randomness of perception inputs are very much expected in the survey model analysis. However, the author let LISREL software to assume by default any fixed parameter and perform the mathematical computation for the parameter estimations. It is also known from literature, that the bigger the model, slimmer is the chance for a model to converge.

Since the whole model has shown a statistical significance, further investigation must be pursued to explore more about which factor is significantly influencing on which factor. The answers to the 40 questions, listed above can be obtained by looking at the table (6.2) (see appendix A6), which shows the total effects and indirect effects among the factors. These tabulated results also show the test of significance for correlation among

factors and the strength of path coefficient between two factors. The results highlighted in yellow show significance of total and indirect effects between factors. Furthermore, table (6.3) (see appendix A6) provides the answer to the above listed 40 questions with total effects between a pair of factors. These findings help the author to depict a model with factors based on the total effects as shown in figure (6.4). This output file is shown in Exhibit (6.2) (see appendix A6) .

Exhibit (6.1) (LISREL'S MODEL FIT OUTPUT WITH ONE EXOGENOUS FACTOR (EXM))

```
                  Degrees of Freedom = 389
         Minimum Fit Function Chi-Square = 184.19 (P = 1.00)
Normal Theory Weighted Least Squares Chi-Square = 192.54 (P = 1.00)
            Estimated Non-centrality Parameter (NCP) = 0.0
        90 Percent Confidence Interval for NCP = (0.0 ; 0.0)
                 Minimum Fit Function Value = 1.09
         Population Discrepancy Function Value (F0) = 0.0
         90 Percent Confidence Interval for F0 = (0.0 ; 0.0)
        Root Mean Square Error of Approximation (RMSEA) = 0.0
       90 Percent Confidence Interval for RMSEA = (0.0 ; 0.0)
        P-Value for Test of Close Fit (RMSEA < 0.05) = 1.00
             Expected Cross-Validation Index (ECVI) = 3.57
        90 Percent Confidence Interval for ECVI = (3.57 ; 3.57)
                  ECVI for Saturated Model = 5.87
                 ECVI for Independence Model = 14.88
  Chi-Square for Independence Model with 465 Degrees of Freedom =
                            2452.60
                  Independence AIC = 2514.60
                      Model AIC = 406.54
                    Saturated AIC = 992.00
                 Independence CAIC = 2642.81
                    Model CAIC = 849.07
                   Saturated CAIC = 3043.36
                 Normed Fit Index (NFI) = 0.92
               Non-Normed Fit Index (NNFI) = 1.12
            Parsimony Normed Fit Index (PNFI) = 0.77
               Comparative Fit Index (CFI) = 1.00
               Incremental Fit Index (IFI) = 1.10
                Relative Fit Index (RFI) = 0.91
                    Critical N (CN) = 420.14
               Root Mean Square Residual (RMR) = 0.086
                     Standardized RMR = 0.043
                 Goodness of Fit Index (GFI) = 0.93
          Adjusted Goodness of Fit Index (AGFI) = 0.91
          Parsimony Goodness of Fit Index (PGFI) = 0.73
```

Explanation of similar Exhibit is presented in the next subsection for the second model.

The estimated multiple linear regression equation with one dependent variable "$ISOIMP$" and nine independent variables; and the R^2, coefficient of determination are shown in equation (3.1) and as below:

$$ISOIMP = 0.21\,TMC + 0.32\,INM + 0.45\,CSF - 0.23\,QMF + 0.11\,CAS +\ 0.13\,DOCR +$$
$$.0016\,CONTIMP + 0.024\,GISOREP + 0.12\,EXM \tag{3.1}$$

$$R^2 = 0.81$$

The above equation, estimated by the maximum likelihood approximation method using LISREL, explains how much the effect size would be on the variable ISOIMP if a one unit change occurs in any of the 9 independent variables. R^2 is quite high and acceptable since it is required to be at least above 0.50.
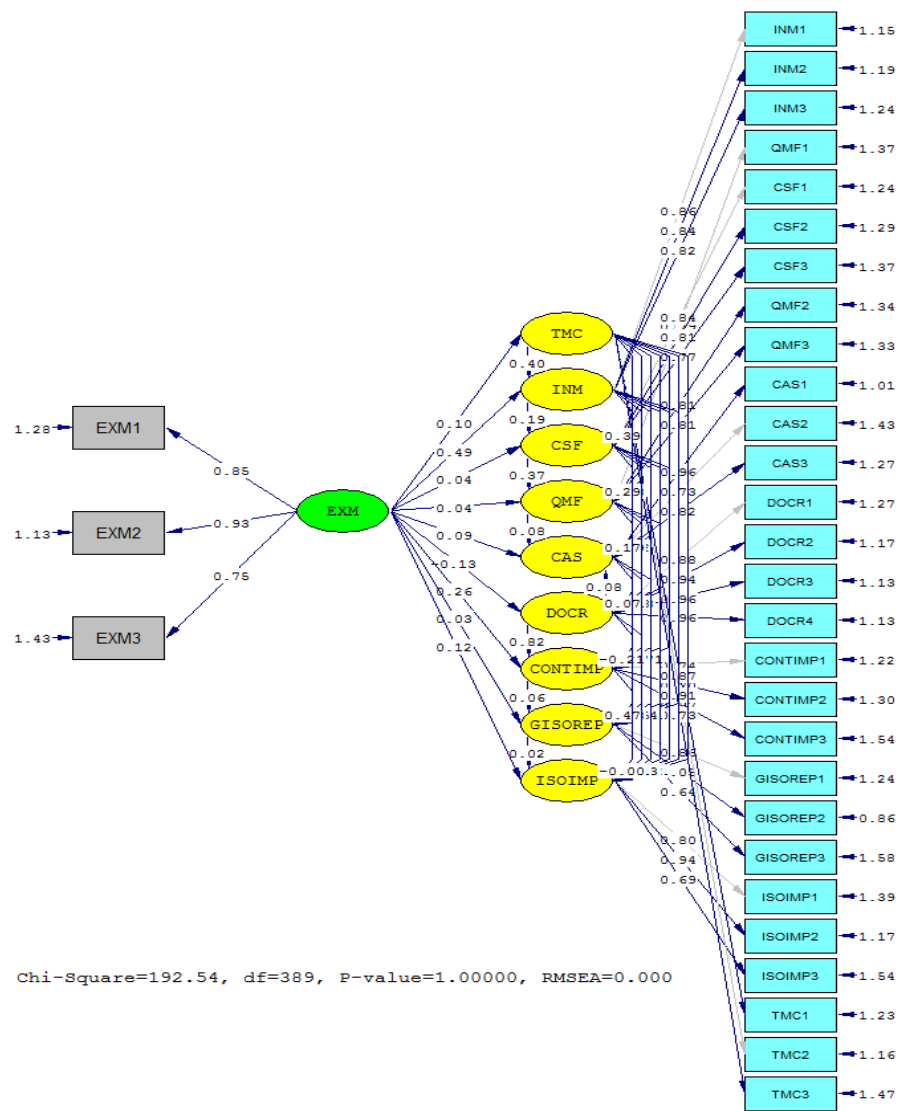
Figure (6.3) a final improved model with all tested links among factors
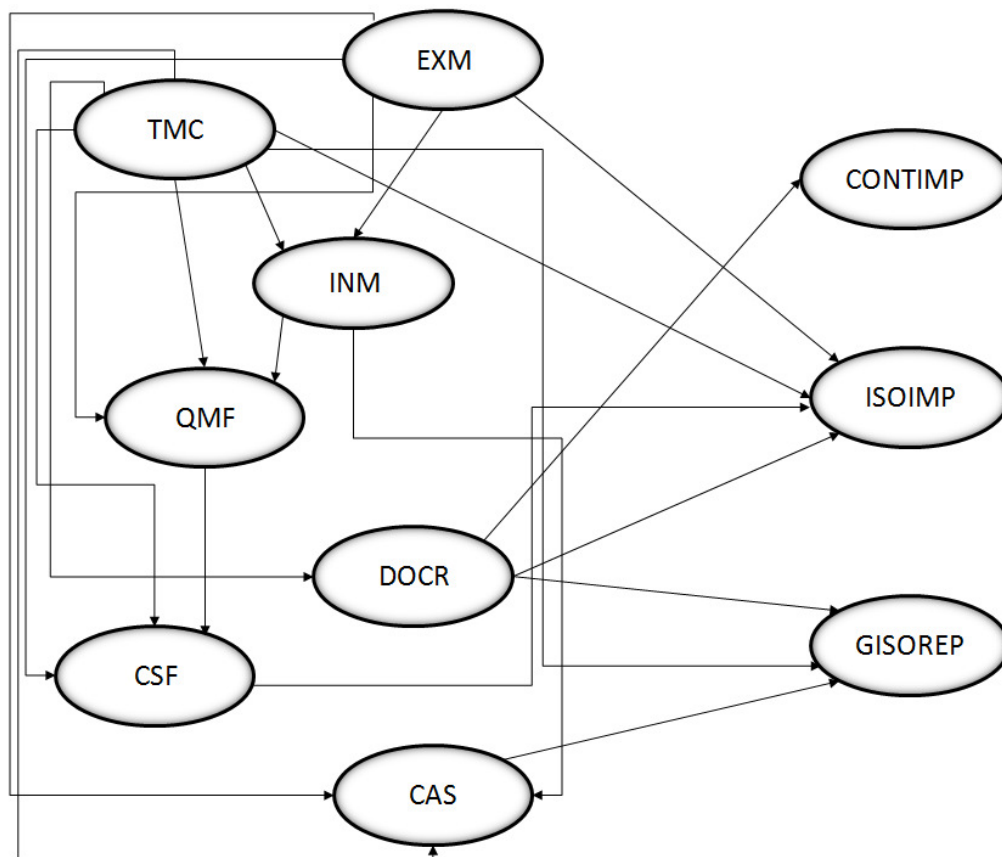
Figure (6.4) a final improved model with significant total effects among factors

6.1.2 General model with External motives and Top management commitment as leading exogenous variables:

In this model, two exogenous variables, preset by the author, are the External Motive (EXM) and Top management commitment (TMC).The same reasoning is explained in this model just as in the previous model for the choice of having the two factors : EXM and TMC as two leading exogenous variables. Further to the "EXM" as being the initiator for the model, "TMC" is also justifiable enough to become another initiating factor for this new hypothesized model. The choice of having "TMC" as another leading factor for the model was explained statistically in the previous chapter. "TMC" has shown its significant effect in most of the demographic variables (see chapter 5). This concludes for the author to consider such a model with two factors as being the start of the model. Therefore, it is better to consider initially the conceptual model as in figure (6.4). Again using LISREL software (ver 8.8) and considering the

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causal effects in figure (6.4) , the first run of the conceptual model came out to be a

good fit with significant Chi-square value, $\chi 2$ = 222.41 and a p-value = 1.000, as shown

in figure (6.5). Then the hypothesized model has been improved by creating other

correlation links between factors, which eventually reduced the Chi-square value, $\chi 2$ to

192.42 and Root mean square residuals (RMSR) to .0860. The new improved model is

depicted in figure (6.6).
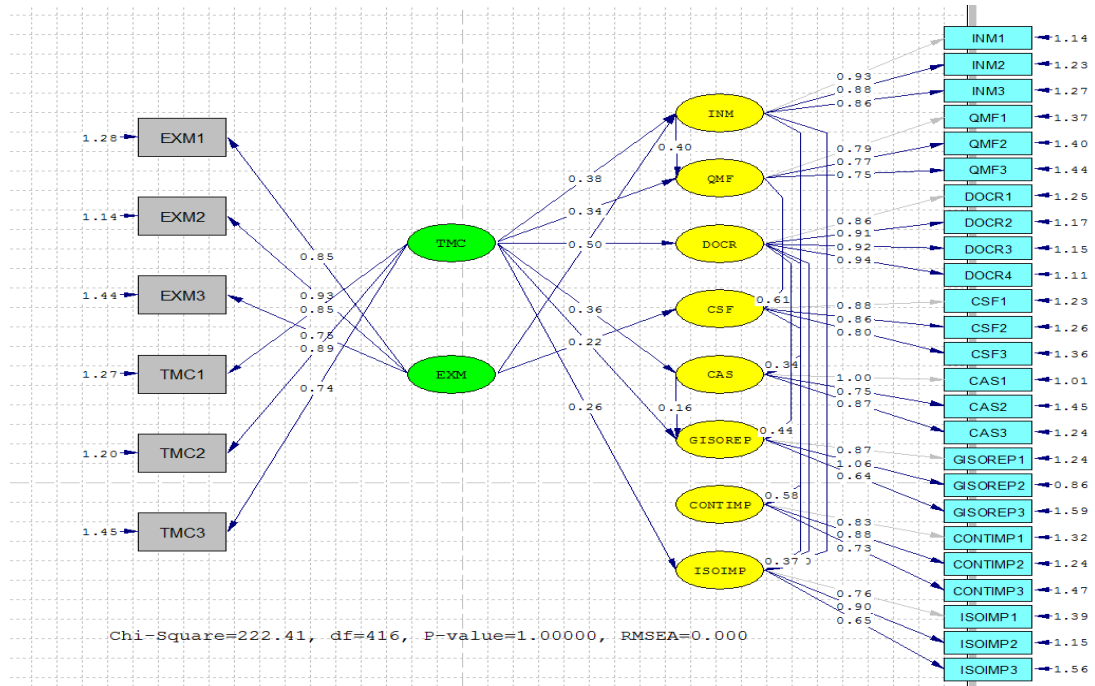
Figure (6.5) Initial model with data fit

The estimated multiple linear regression equation for this model with one dependent "

$ISOIMP$ " variable and nine independent variables, and the R^2 are shown in equation

(3.2) and as below:

$$ISOIMP = 0.23\,TMC + 0.36\,INM + 0.49\,CSF - 0.24\,QMF + 0.13\,CAS +\ 0.14\,DOCR + .00043\,CONTIMP + 0.020\,GISOREP + 0.13\,EXM$$

(3.2)

$$R^2 = 0.81$$

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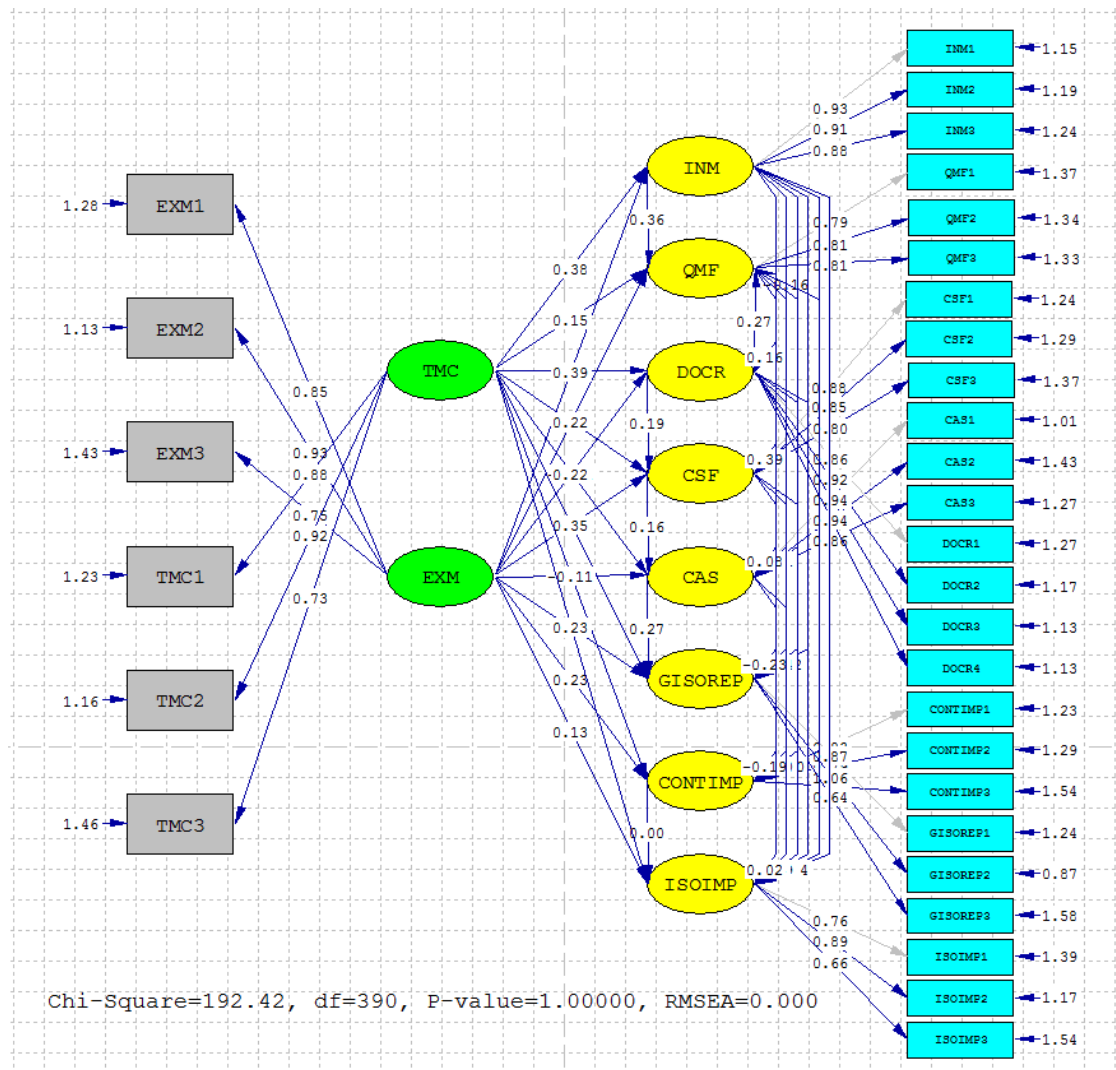
Figure (6.6) a final improved model with all tested links

Also, a summary of model fit results is represented in exhibit 6.3. Now, the same types of questions can be raised for this model, just like in the previous model, to explore and understand more about the significance of links and causal effects between factors. Exhibit (6.4) (refer to appendix A6) summarizes the total and indirect effects between the factors. For instance, the answer to the question #16 whether "Top management commitment" enhances significantly "ISO Impact" directly? The answer is "YES", since the path has shown a significant direct causal effect with a t-value = 4.52, with a p-value almost zero < .05.

Exhibit (6.3) (LISREL'S MODEL FIT OUTPUT FOR THE SECOND MODEL WITH TWO EXOGENOUS FACTORS (EXM AND TMC))

```
                     Degrees of Freedom = 391
            Minimum Fit Function Chi-Square = 184.35 (P = 1.00)
    Normal Theory Weighted Least Squares Chi-Square = 192.37 (P = 1.00)
               Estimated Non-centrality Parameter (NCP) = 0.0
          90 Percent Confidence Interval for NCP = (0.0 ; 0.0)
                    Minimum Fit Function Value = 1.09
           Population Discrepancy Function Value (F0) = 0.0
          90 Percent Confidence Interval for F0 = (0.0 ; 0.0)
          Root Mean Square Error of Approximation (RMSEA) = 0.0
         90 Percent Confidence Interval for RMSEA = (0.0 ; 0.0)
          P-Value for Test of Close Fit (RMSEA < 0.05) = 1.00
              Expected Cross-Validation Index (ECVI) = 3.56
          90 Percent Confidence Interval for ECVI = (3.56 ; 3.56)
                    ECVI for Saturated Model = 5.87
                    ECVI for Independence Model = 14.88
     Chi-Square for Independence Model with 465 Degrees of Freedom =
                              2452.60
                      Independence AIC = 2514.60
                         Model AIC = 402.37
                        Saturated AIC = 992.00
                      Independence CAIC = 2642.81
                         Model CAIC = 836.63
                        Saturated CAIC = 3043.36
                      Normed Fit Index (NFI) = 0.92
                   Non-Normed Fit Index (NNFI) = 1.12
              Parsimony Normed Fit Index (PNFI) = 0.78
                  Comparative Fit Index (CFI) = 1.00
                  Incremental Fit Index (IFI) = 1.10
                    Relative Fit Index (RFI) = 0.91
                        Critical N (CN) = 421.76
                 Root Mean Square Residual (RMR) = 0.086
                        Standardized RMR = 0.043
                     Goodness of Fit Index (GFI) = 0.93
              Adjusted Goodness of Fit Index (AGFI) = 0.91
              Parsimony Goodness of Fit Index (PGFI) = 0.73
```

The results in Exhibit (6.4) are obtained from LISREL output file. A simple explanation for the LISREL output file is also shown in the little drawings of arrows and boxes in some of the figures in exhibit (6.4). Three main results, which are important to determine the significance of causality between factors, are the path coefficients, standard errors of the sample means, and t-values. The p-value can simply be calculated either from looking at a t-table or using the Minitab (ver. 16) or any other statistical software. It is clearly understood if t-values > 1.645, then the causality is significant.

6.1.3 Analysis of the two derived equations from the two above models

The two equations in (3.1) and (3.2) derived for the two above mentioned models represent the final effect on the factor "ISOIMP". Thus, any unit change in either one of the nine factors will lead to a change in the factor "ISOIMP". Furthermore, the two models can be assumed to predict the change in effects (direct and total effects) on the outcomes if the model can be extrapolated to a dynamic one where a policy making, scenario analysis, and cause and effect are applied to study the change in the input on the final outcome. Moreover, having reached the weighted average factors (refer to table (5.2)) for those organizations participated in the survey, equations (3.1) and (3.2) can be used to predict the total effect of one factor on another. In general principle, the two equations (3.1) and (3.2) should be applicable for prediction to a case study under similar environment and conditions to Kuwaiti work organizations. Besides using the two equations for predictions, the two models can reveal the nature of relationship between different factors and their mutual effects on each other and eventually on the outcomes through a set of statistical hypotheses as stated in the 40 questions for investigations.

6.1.4 Analytical comparison between the two models

The two models described above have both shown validity in terms of their null hypotheses such as that, the implied estimated covariance matrix is not significantly different from the sample covariance matrix. In other words, the hypothesized models represent a good fit for the sample data. Statistically speaking, the structure of hypothesis to be tested for the two models is called the Chi-square Test and described as below

$$H_0 : S = \hat{\Sigma}(\theta) \quad \text{vs.} \quad H_1 : S \neq \hat{\Sigma}(\theta) \qquad at \ \alpha = .05$$

Where $\hat{\Sigma}(\theta)$ and S are the estimate of the population covariance matrix $\sum(\theta)$ and sample covariance matrix, respectively (Sharma, 1996).

Thus, further investigation needs to be conducted in order to decide which model is better, more preferable, and more efficient than the other. Table (6.3) (refer to appendix A6) illustrates all the links among all 10 factors and determines whether these links are significant in terms of their total effects from one on another. In table (6.3), the question numbers refer to questions already addressed in a subsection 6.1.1. Both models show same number of significant total effects. The $\chi2$ value is almost the same for both models, where it was only reduced by less than .007% in the second model, while the RMSR is .086 and remains the same for both models. If the effect of "TMC" factor was focused more on the other factors, the same number of significant effects was found with similar significant links on both models. What can also be said from the second model is that the top management commitment did not contribute much difference in terms of effect to the whole hypothesized model. In other words, initiating the model with two independent factors "EXM" and "TMC" as both being the drivers to the final destination to observe an ISO impact, did not improve and make much difference from the first model. Thus, model 2 is not much better than model 1. I expected the influence of top management commitment on other factors to add some value to the whole model; however, this did not happen. The reason could be due to the missing role of top management in the ISO 9001 certified work organizations. It could also be concluded that top management is motivated by ISO 9001 QMS certificate rather than quality work practices implementation in the work organizations. This finding makes the author believe that external motives puts pressure on the top management of every organization to seek certification. This can also explain that top management must show their commitments towards the implementation of ISO 9001 with stringent efforts in order to make the second model more highly significant than the first model. This finding would

lead the author in the next sections to consider including the "TMC" factor as one of the endogenous variables rather than a leading exogenous variable.

6.2   Other hypothesized models (Specific)

Two models for comparison would be of interest to present in the following subsections. The two models are the same as in section 6.1.1., except the first model is specifically targeted to manufacturing sector. While the second model, is targeted to the service sector. Since the sample size is certainly less than 170 for each business sector, the scientific approach of analysis would be different from previous sections. Instead of using LISREL software for statistical analysis, the partial least squares method such as PLS-SEM would rather be more appropriate for my next models. The reason for that is the PLS-SEM method is more robust than LISREL-SEM with small sample sizes. Besides, this is the joy in scientific research that one can use whatever resources as are available that will first meet certain conditions and assumptions. The robustness of PLS-SEM is more flexible to a certain extent with the violation of normality assumption. However, this does not make the LISREL-SEM approach less attractive for the research. It is just the sample size that forces the author to seek alternatively other scientific approach for application. In PLS-SEM method, certain parameters will be the main concern of the author. As it is in the LISREL-SEM method, the following process map in figure (6.7), defines the role of the author when using such a method.

Stage 1	Specifying the Structural Model
Stage 2	Specifying the Measurement Models
Stage 3	Data Collection and Examination
Stage 4	PLS-SEM Model Estimation
Stage 5	Assessing PLS-SEM Results for the Measurement Models
Stage 6	Assessing PLS-SEM Results for the Structural Model
Stage 7	Interpretation of Results and Drawing Conclusions
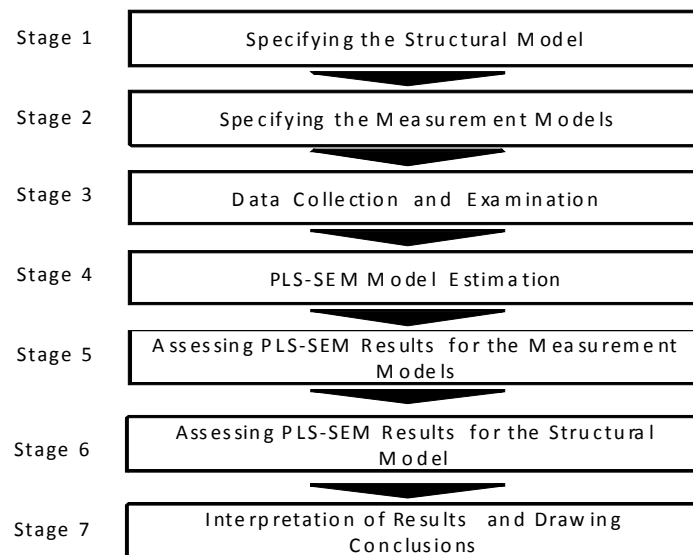
Figure (6.7) Process map for conducting PLS-SEM method

Looking at the figure (6.7), stage 1 through stage 7 will be assessed in the same manner as in LISREL by looking at the t-value ≥ 1.645 where the established links between the manifest variables (indicators) and their corresponding factors; and the exogenous factors and endogenous factors are significant. From literature, the researcher must evaluate the reliability and validity of the hypothesized structural model based on the following parametric measurements with their corresponding rules of thumb :

1. Outer loadings (indicator's reliability) should be higher than 0.708. Indicators with outer loadings between 0.40 and 0.70 should be considered for removal only if the deletion leads to an increase in composite reliability and the average variance explained (AVE) above the suggested threshold value.

2. Composite reliability (internal consistency reliability) should be higher than 0.708 (in exploratory research, 0.60 to 0.70 is considered acceptable).

3. Convergent validity (AVE) should be higher than 0.50.

4. Discriminant validity:

a) An indicator's outer loadings on a factor should be higher than all its cross loadings with other factors.

b) The square root of the AVE of each factor should be higher than its highest correlation with any other factor.

6.2.1 Manufacturing firms model with an external motive as a leading exogenous factor

From the total sample size of 170, the data collected from only a sample of 69 survey respondents from the manufacturing firms was used for the analysis. The graph of this model is depicted in figures (6.8) and (6.9). Figure (6.8) shows the model with t-values on the links between factor to factor and factor to their corresponding indicators. While Figure 6.8 shows the model with factor loadings from the indicators to their factors, path coefficients between factors, and the R^2 values (i.e., inside each circle).
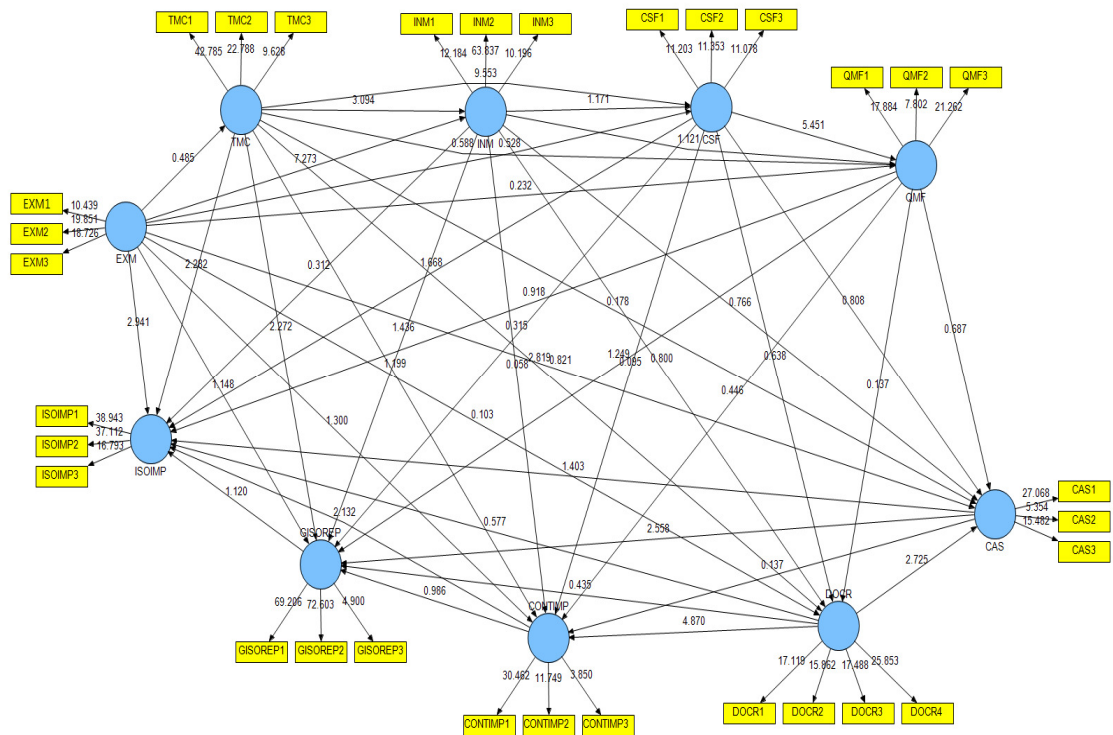
Figure (6.8) Manufacturing firms model with t-values on the links
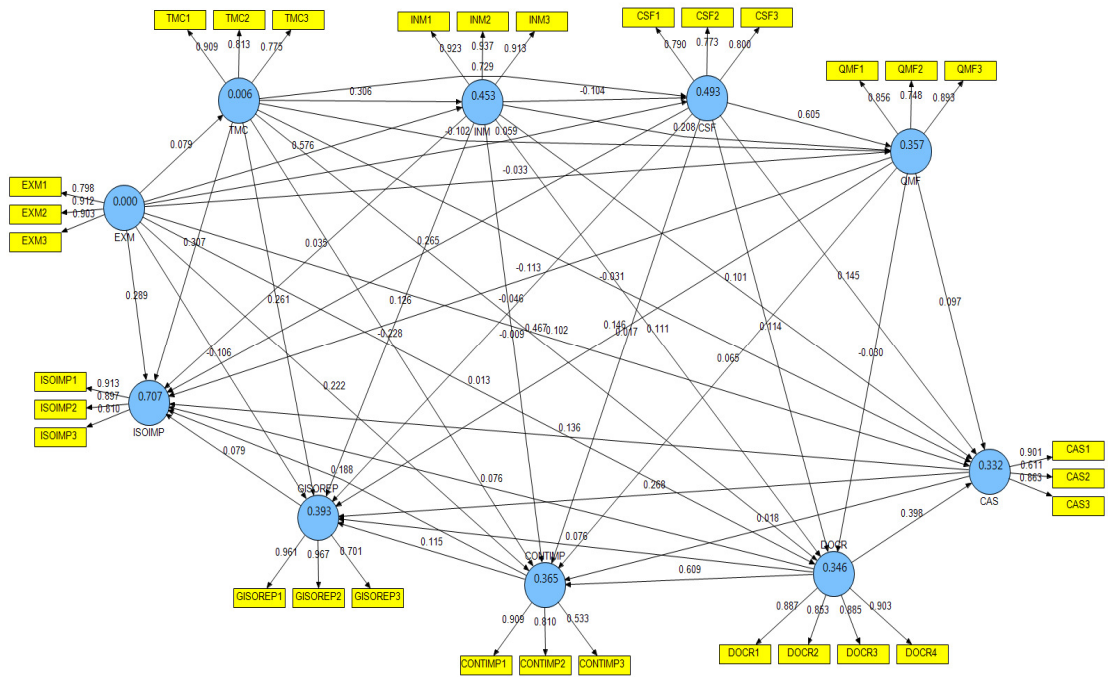
Figure (6.9) Manufacturing firms model with factor loadings and R^2 values

As shown in figure (6.8) not all links among factors are significant (i.e., t < 1.645). Similar analytical approach to the general model, table 6.4 (refer to appendix A6), obtained from bootstrapping method in PLS software, describes the total effect from one factor to another and show significant effects only in highlighted cells.

From the same table, it is concluded that 20 significant links that exist between each pair of factors (i.e., t-value ≥ 1.645) with respect to the 40 proposed questions in section 6.1. It is only different by one significant link from the general model. The differences are found in the question numbers: 3, 7, 18, 23, 24, 34, 36, 37, and 39. Answers that show significant effects are for questions 7,23,34,37, and 39, while answers for questions 3, 18, 24, and 36 show insignificant effects. The remaining questions show equivalent answers for both general and manufacturing models.

In reference to the criteria for evaluating a PLS-SEM model and the rules of thumb presented in section 6.2, table (6.5) (refer to appendix A6) lists the outer measurement and cross loadings as it is obtained from the output of the Smart PLS software in which

the average loadings for the highlighted indicators as per factor are seen to be above the required criterion. That is if I start comparing loadings across the columns for each factor in table (6.5) (refer to appendix A6) I find that an indicator's loadings on its own factor are in all cases, higher than all its cross loadings with other factors. All indicators' loadings on its factor are highlighted in pink.

Other criteria for assessing the hypothesized models are also shown in table (6.6) and (6.7) (refer to appendix A6). Table (6.6) shows the AVE values which are greater than .50 and composite reliability for each factor which are all greater than .708 as well. Testing for discriminant validity is confirmed by two criteria. First criteria: it can be shown in table (6.5), which lists all indicators' loadings with respect to other factors as well, where all outer loadings on a specific factor are always higher than all its cross loadings with other factors. Second criteria: it is shown in table (6.7) in which the square root of the AVE of each factor is always greater than its highest correlation with any other factor, or equivalently it can be said that when AVE is greater than the square of the correlations among factors (latent variables).

6.2.2 Services firms model with an external motive as a leading exogenous factor

From the total sample size of 170, data from only a sample of 55 survey respondents from services firms was used for the analysis. The graph of this model is depicted in figures (6.10) and (6.11). Figure (6.10) shows the model with t-values on the links between factor to factor and factor to their corresponding indicators. While Figure (6.11) shows the model with factor loadings from the indicators to their factors, path coefficients between factors, and the R^2 values (i.e., inside each circle).

Table (6.8) (refer to appendix A6) describes the total effect from one factor to another and shows whether the effect is significant or not (i.e., highlighted cells are significant). Similar investigation is carried out to assess the reliability and validity of this

hypothesized model. The results of this investigation are printed in tables (6.9), (6.10), and (6.11) (refer to appendix A6), where they have shown acceptable figures, as per the rules of thumb suggested in section 6.2. Thus, it can be said that this model is statistically acceptable as well just like the manufacturing model.
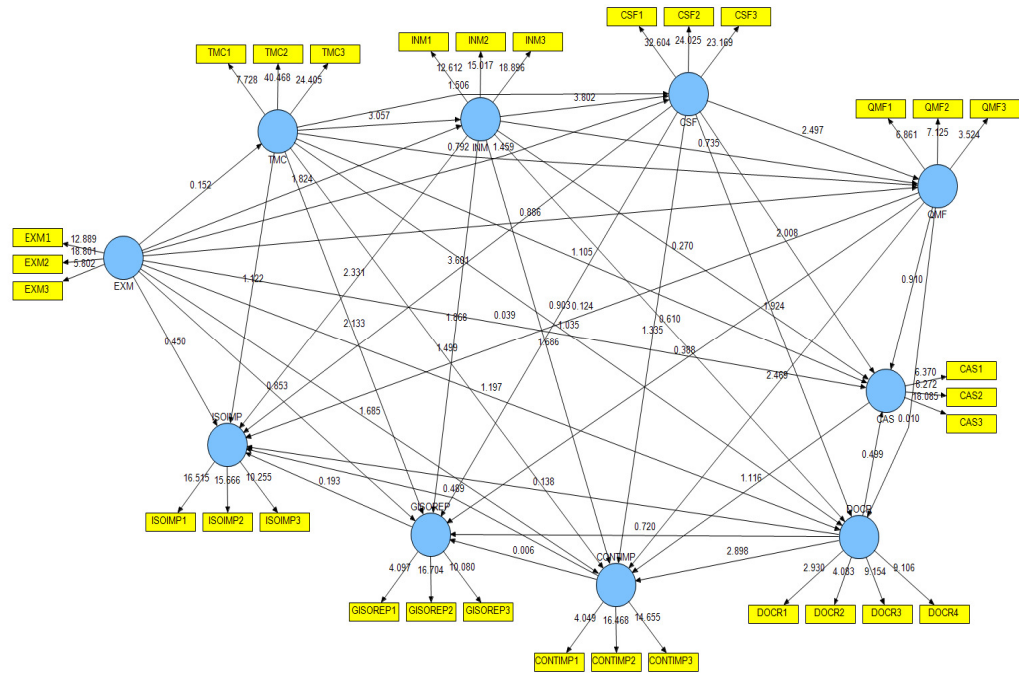
Figure (6.10) Services firms model with t-values on the links

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Figure (6.11) Services firms model with factor loadings and R^2 values

6.3 Analytical comparison between manufacturing and services models

The two models described in section 6.2 have both shown, reliability and validity in terms of their hypothesized model structure. Unfortunately, the two models cannot be tested for model fitting since the sample sizes are not large enough (i.e., N > 150) in order to make the other available software such as AMOS, LISREL, AND MPLUS applicable for use. Thus, PLS-SEM method, using a Smart PLS software, is more appropriate for ensuring the reliability and validity of the hypothesized models. Nevertheless, it is reasonable to say that even with a small sample size the two models would still fit the hypothesized structure since the large size of sample for all observed data has shown a good fit with RMSR < .10.

Looking back at the two tables (6.4) and (6.8), it can be said that the manufacturing firms model has outperformed the services firm model by one more significant link, if the number of significant links (i.e., t-value > 1.645) among the factors for

the two models is counted. Another way of seeing which model outperforms better than the other models in the ISO implementation is to look at the R-square value (R^2). Basically R^2 is similar to the determination coefficient in the regression analysis. It is evidently obvious that the manufacturing model is represented statistically better than the services model since the $R^2 = .707$ in the manufacturing model and the $R^2 = .581$ in the services model. This result can be explained very much due to the level of awareness toward ISO 9001 implementation and quality practices among the organization employees. It is then clearly concluded that manufacturing firms are more oriented toward the ISO 9001 quality practices and keen to benefit from the quality practices they adopt for their manufacturing firms. It is also noted that Top Management Commitment (TMC) is not very much influenced by the external pressure or motives (EXM) which eventually make firms seek ISO 9001 certificate. However, TMC significantly affected the functionality of quality management system (QMF) in the manufacturing firms but did not do the same in the services firms. It is then clear that TMC in services firms are weaker than in manufacturing firms. It can also be said that TMC in the manufacturing firms is more influential and effective on other factors and have shown 7 out of 8 significant links with other factors than in the services forms.

6.4   Summary and Conclusion

In this chapter, modeling was based on the maximum possible number of factors (factors) extracted from the original survey as it is a format (A). Only 10 factors were only used out of the 13 factors, and analyzed by the factor analysis method (i.e., already illustrated in chapter 5). The logic of not considering the other 3 factors and take them off the modeling picture, as depicted in figure (6.3), was attributed to the experience of the author in the field of ISO 9001 QMS implementation. Furthermore, the proposed

model of 10 factors is not necessarily required to be considered as a general model that can be applicable in any geographical region. In other words, it may be applicable in Kuwait but not necessarily in different countries. The model was then subjectively considered for evaluation since high correlation among the 10 factors was statistically significant; this made me think that some multiple regressions analysis, path analysis, or even the multivariate analysis is more appropriate for modeling. For a sample of $N = 170$, I used the multivariate analysis using the LISREL software to obtain a whole picture of cause and effect among the 10 factors. I could have used partial least square using PLS-SEM method with the original sample ($N = 98$) but that would be useless if the author is after a model fit. The general model has shown reasonably statistically significant links with regard to the suggested 40 questions. I was not as much interested in observing model fitting as in studying the correlation between the 10 factors. Studying the correlations among factors has helped the author to understand more about which factor affects more or puts more weights of effects on which factor. Two general models were presented. One general model with an EXM is a leading factor. Another general model considers both EXM and TMC as the leading factors. The results have shown that TMC did not contribute much as being the leading factors with EXM. This result has made the author consider the first general model as a criterion to build the manufacturing and services models. When comparing the manufacturing model against the services model, it was evident that the manufacturing firms outperformed the services firms from the perspective of the hypothesized general model. The manufacturing model has shown higher AVE's, alpha of cronbach, composite reliability values than it has shown for the services model. This indicates more stability, consistency, and higher awareness level in the manufacturing sector than in the services sector. With the analysis and outcomes of this chapter, I believe my findings are worth publishing.

Finally, in this chapter, modeling was supposedly to be the final goal of this research. Nevertheless, I find it imperative to investigate further and microscopically into the manufacturing firms' performance and explore their understanding of quality and practices with respect to the implementation of ISO 9001 standard systems. Therefore, chapter 7 was added to study the impact of ISO 9001 QMS implementation on the performance of manufacturing firms through different perspective and criteria.

Chapter 7

Impact of ISO Certification on Kuwaiti manufacturing firms

In this chapter, the effect of ISO 9001 certification on the Kuwaiti manufacturing firms' performances is investigated. Five scale measures of firm's performance were considered. These measures are: 1) Raw materials; 2) Equipment and Machinery; 3) Top management involvement and commitment; 4) Effectiveness and efficiency of the quality management system (QMS); and 5) ISO certification. Therefore, I have designed a new survey (see appendix A(7.1)) as the only instrument, which includes nine demographic questions, plus the five scale measures. Each of the five measures represents a single scale measure. Each measure is based on a set of at least four criteria or questions. The survey was carefully designed and developed by the experts in the field of quality management systems as per ISO 9001 and TQM. A list of ISO 9001 certified manufacturing firms were prepared in addition to the previous list I have had since year 2011. I was able to sum about 60 certified manufacturing firms. All these firms were contacted by phone calls and distributed the surveys by emails. The response rate is 0.80, which is much higher than the first survey. 48 surveys from 60 various firms were collected. More surveys from different respondents, working in the quality, were requested in order to increase the sample size. I was then able to have 75 surveys, which is a minimum, to build a model with 6 measure scales. The additional surveys were conducted in firms which have a quality department with at least two employees. The terminology "scale measure" is used very often in social science and it has an equivalent meaning to "factor or construct" used in advanced statistics. Thus, the term "scale measure" will be used in this chapter.

In the following sections, a full description of the survey content, statistical results and analysis, and a model building are presented.

7.1 Survey Description

Unlike the first survey, this survey is very much targeted at the manufacturing sector. It only includes 36 questions (36 criteria for measurements), whereas the first which had included 96 questions. Enough experience has been gained from respondents of the first survey, that lengthy surveys would increase the chances of questions not being completed by respondents which will eventually reduce the response rate. Moreover, lengthy surveys have also created erroneously provided answers to the questions by the respondents. This was clearly seen in chapter 5 when data reduction method was performed on a set of many questions, where some questions had to be deleted from a certain measurement. Therefore, a shorter survey with a maximum of 6 clearly understandable criteria for measurements per question is more preferred and significant to the researcher and respondents of the survey. A brief description of the survey questions and what they are supposed to measure are as follows:

7.1.1 Demographic questions

Question #1 (Q.1)

This is a single question where the respondent is requested to write one's job position in the work organization.

Question # 2 (Q.2)

This is also a single scale measuring question where the respondent has to determine the size of one's organization. This question consists of five slots, which starts with a range of employee size between 1-9 and ends with a range of employee size 500 or more.

Question # 3 (Q.3)

The respondent is asked to specify whether the organization is private, governmental, or jointly owned by government and private.

Question # 4 (Q.4)

A respondent is free to specify the nature of business for one's organization whether it is manufacturing, services, or both. This question was intentionally included just to make sure that the respondent is reporting information about manufacturing.

Question # 5 (Q.5)

The respondent is asked to determine how long the organization has been certified. Six slots of choices staring with a choice of less than a year and ending with 9 years and above are provided as an answer to this question. This question is useful for the author to value the benefit of certification if achieved with duration.

Question # 6 (Q.6)

The respondent is asked to determine if the work organization is excluded from the standard requirement in clause 7 and specifically required to mention the excluded clause or sub-clause number. As stated by ISO 9001 standard document, only clause 7 and its sub-clauses are permitted to be excluded from the organization's quality management system.

Question # 7 (Q.7)

The respondent is asked to specify which certification bodies have issued an ISO certificate to one's organization. Five slots of choices are given to the respondent to decide which auditing body is the certifier of the organization. The well-known certification bodies in Kuwait are: BV, TUV Rheinland, TUV Nord, SGS, and Others.

Others represent the auditing bodies which have little market share in providing QMS auditing in Kuwait.

<u>Question # 8 (Q.8)</u>

The respondent is asked to mention if there are benefits besides having the organization certified. It is a Yes or No question. If answer is 'Yes' is selected the respondent is asked to kindly write the benefits.

<u>Question #9 (Q.9)</u>

This is a newly introduced question, not enlisted in the previous survey, to understand more if the work organization has its own quality unit or division and the size of its employees.

7.1.2 Performance questions

In the following questions: Q.10 - Q.14, The respondents are asked to provide their responses according to a five point likert scale. This five point likert scale is : Never True, Rarely True, Neutral, Usually True, and Always True.

<u>Question #10 (Raw Materials status, Q.10)</u>

This question consists of a set of four criteria for measurements that reflects the importance of raw materials as they are being controlled and monitored by the organization. The importance of suggesting such questions in the survey comes from the supplier's role and contribution in the effectiveness and efficiency of quality management systems. The criteria used or the set of sub questions for this measurement are as follows:

1. Raw materials are delivered on time by suppliers
2. Sample of raw materials are inspected periodically

3. Rejected materials are quarantined and disposed of in timely manner

4. Rejected materials are disposed of by the suppliers

Question #11 (Equipment and Machinery, Q.11)

A set of five criteria is suggested to obtain some perception measurements about the quality control and assurance with respect to equipment and machinery. These criteria are as follows:

1. Corrective measures are taken if machines break down

2. Preventive measures are taken prior to machines break down

3. Machines and equipment are maintained and calibrated periodically

4. Sufficient staff to run and control the machines

5. Adequate trainings are provided for staff to run these machines and handle equipment

The first three criteria directly address clause #8 in the ISO 9001 standard. Corrective and preventive measures procedure is a must to exist in any ISO 9001 certified firms. Without it, the auditing body will issue a noncompliance to the ISO 9001 QMS standard. Therefore, it is necessary to include these three criteria for measurements in the survey. The last two criteria are complementary to the first two since training is needed for enhancing the corrective and preventive action procedure.

Question #12 (Top management involvement, Q.12)

A set of five criteria is suggested to obtain some perception measurements about top management involvement and commitment. These criteria are as follows:

1. Top managers attend management review meetings.

2. Organization objectives are reviewed on timely manner by top managers to assess achievements.

3. Top managers are actively involved in affecting improvement in production planning and execution.

4. Top management is very much involved and committed in the ISO 9001 implementation.

5. Organization provides sufficient training programs for its production and manufacturing employees in relation to ISO 9001 implementation.

From Literature, top management commitment has always been the main key for driving the firm to the achievement of its goals and strategy. And, from chapter 4 it has also been shown that there exists a relation of top management commitment with other research items. Thus, I find it necessary to include this scale measure again in this survey.

Question #13 (Effectiveness and Efficiency of QMS, Q.13)

A set of six criteria are included in this scale measure to express the effectiveness and efficiency of the implemented QMS in the firm. I have six criteria more than any other scale measure in the survey since this is a new scale measure to be analyzed, and has not been addressed directly in the first survey. It is expected when using factor analysis, that some criteria may need to be removed. That is why, sometimes, some researchers use lengthy surveys. The criteria for this scale measure are as follows:

1. Our QMS satisfies customer needs and meets his full requirements.

2. Our QMS takes into consideration staff needs, mainly production employees.

3. Our QMS has improved work efficiency

4. Our QMS has improved manufacturing processes effectively.

5. Our QMS has reduced wastes and controlled defects and non-conformed raw materials.

6. Our QMS achieves the production and manufacturing targets.

The first two criteria are mainly concerned with the internal and external customer needs, which are part of effectiveness and efficiency processes. Satisfying customers originally comes from the effective production processes used for meeting their requirements. The same concept applies with the employees of the firm (internal customers). Internal customer needs have to be met by the firm to ensure an effective and efficient production. The last three criteria are clearly stated about efficiency of work and the effectiveness of processes implemented for production.

Question #14 (ISO Certification, Q.14)

A set of four criteria are included in this scale measure to help the author understand more about the level of ISO certification and implementation. These criteria are as follows:

1. Our Quality manual is compliant with the ISO 9001 standard requirements
2. Operations staff perform their tasks according to the documented procedures as per ISO 9001
3. Work Records are documented and maintained for review and further action
4. Internal audits are performed periodically for our quality management system

Those above criteria for this scale measure are initially necessary to include since there will be no certification if: no quality manual is compliant with the standard, no work records are present for the evidence of QMS implementation, and no audits are performed to assure compliance and quality implementation. This scale measure will be established as the initiator for the suggested model which will be constructed in the model building section.

7.2   Basic demographic statistical analysis

From the original sample size of n = 48, some descriptive statistics were found and worth to be mentioned. These findings are calculated using the SPSS software (ver. 21) and are as follows:

1. No governmental firms which are practicing manufacturing and services operations are found in the surveyed sample. However, there is only one government and private firm (jointly owned) that practice both manufacturing and services operations.

2. 3.1% of the manufacturing firms are governmental, while 96.9% of the firms are private.

3. 67.4% of the private firms practice only manufacturing operations and 32.6% private firms include service operations into their businesses.

4. 2/3 of the firms only practice manufacturing while 1/3 practice both manufacturing and services.

5. BV and SGS are the certification bodies which have the highest certification rates in the manufacturing industry.

6. More than one half of the firms have been certified for 9 years and more.

7. More than one half of the firms have a labor size between 50 to 249 employees.

8. 37.5% of the firms have a justifiable exclusion from clause 7.0 and its sub clauses in the ISO 9001 standard. This is a good indication that majority of manufacturing sector implements the standard in full.

9. One half of the firms have adopted only the ISO 9001 standard system.

10. 91.7% of the firms have a quality unit or department in their organization chart.

11. 70.8% of the firms have a quality unit with a size of 1 to 10 employees and only 8.3% of the firms have 51 to 100 employees in their quality department.

12. Only 8.3% of the firms delegate QMS tasks to a management representative from the same firm to perform the role of a quality unit in regard to the adopted QMS. This

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was very much obvious from the respondent feedback on question #9, where he or she provided the response with a NA (not available).

All the above points are results obtained from table (7.1) to table (7.7) as listed in the appendix A7. For further clarifications, some key pie charts are shown below for the above discussed points.
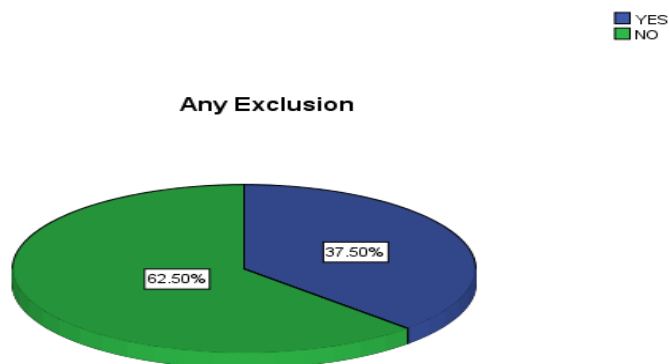
Figure (7.1) Proportion of manufacturing firms with a standard exclusion
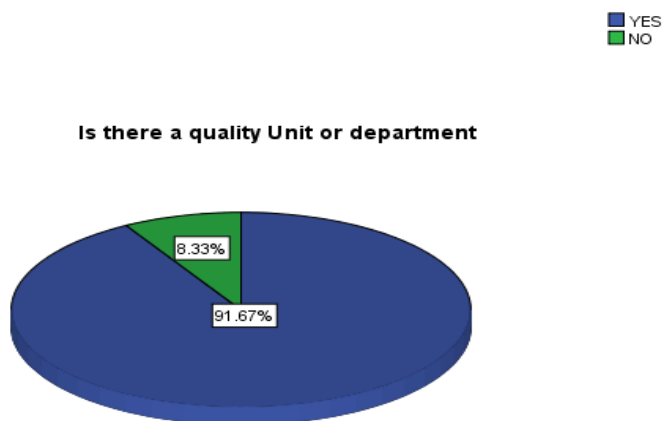
Figure (7.2) Proportion of manufacturing firms with a quality department

Number of employees in the quality unit
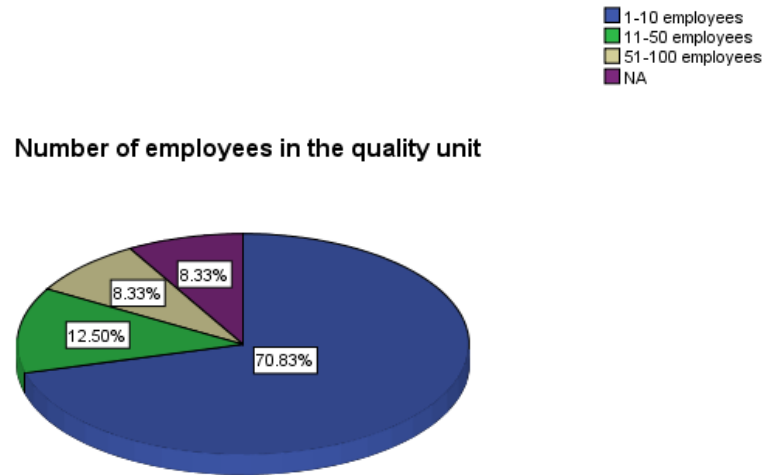
Figure (7.3) Proportion of the number of employees in the quality department

7.3   Descriptive statistics for the five scale measures

Tables (7.8) - (7.12) (refer to appendix A7) list all the descriptive scores for scale measures 10 to 14. All scores are calculated based on an increased sample size of n = 75. Brief summary of the results are shown with highest averages obtained and they are as follows:

1. Highest average in the scale measure "raw materials status" was obtained with research item "rejected items are quarantines and disposed in a timely manner" and that is 4.67.

2. Highest average in the scale measure "Equipment and Machinery" was obtained with the research item "Machines and equipment are maintained and calibrated periodically" and that is 4.80.

3. Highest average in the scale measure "Top management Involvement" was obtained with the research item "Top managers are actively involved in affecting improvement in production planning and execution" and that is 4.68.

4. Highest average in the scale measure "Effectiveness and Efficiency of QMS" was obtained with the research item "Our QMS has reduced wastes and controlled defects and non-conformed raw materials" and that is 4.63.

5. Highest average in the scale measure "ISO Certification" was obtained with research item "Internal audits are performed periodically for our quality management system" and that is 4.76.

7.4 Reliability and validity of the survey responses

Using the cronbach alpha test for the reliability measure of the research items from scale measure #10 to #14 (Q.10-Q.14), alpha value was found to be .949 which is relatively considered an excellent value to explain the strength for the internal consistency of responses among all collected surveys. Table (7.13) given below lists alpha values for all research items and each of the 5 scale measures separately.

Table (7.13) *Alpha values*

Question No.	Question Title	Value of cronbach α
10	Raw Materials Status	0.887
11	Equipment and Machinery	0.828
12	Top Management Involvement	0.857
13	Effectiveness and Efficiency of QMS	0.898
14	ISO Certification	0.836
10-14	All five scale measures together	0.949

The validity of the survey responses can be determined the same way as in chapter 5. Also, it can be determined using the factor analysis method with the Smart PLS software as it was already explained in chapter 6. However, the second method requires the author to hypothesize a model with the connection links between the five scale

measures. Links of connection between the five scale measures were suggested then to obtain values of factor loadings. The resulted factor loadings for the research items appeared to average a value of .70 and above within each dimension. This is very much clear from the graphical output of the Smart PLS software as shown in figure (7.4) and the printed factor loading scores in table (7.14) (see appendix A7). Not only have all factor loadings shown satisfactory values in correspondence to their factors, but they have also shown statistical significant t-values. Figure (7.5) depicts the printed t-values on all suggested links between the factor and its corresponding variables.
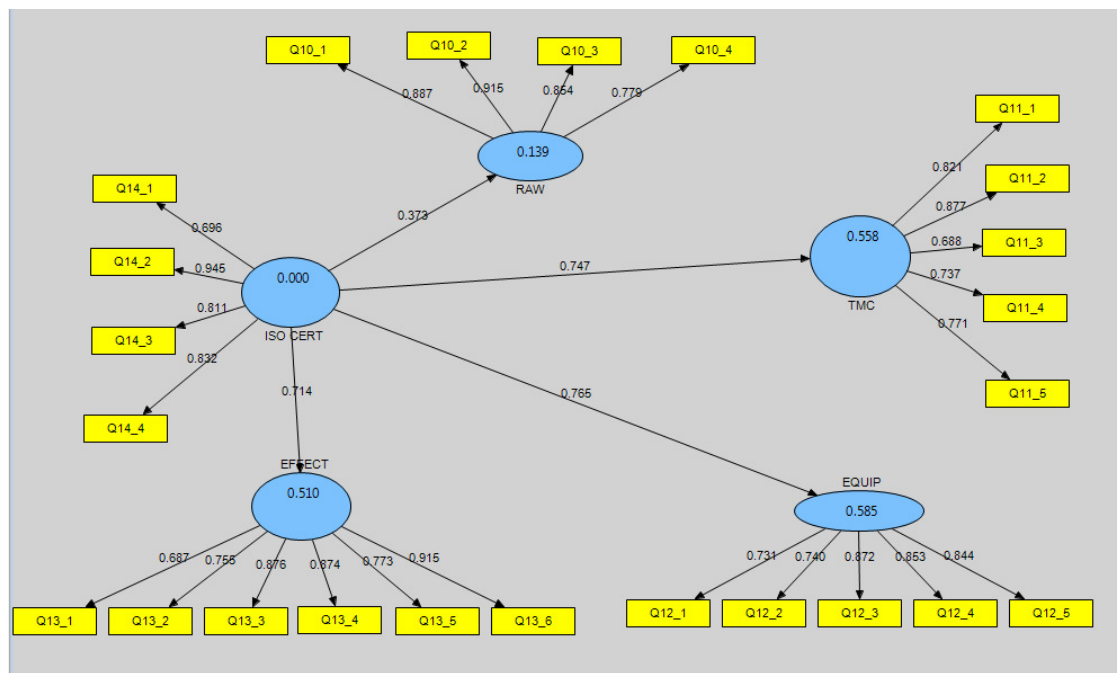
Figure (7.4) Smart PLS view for the factor correlations with factor loading and R^2 values
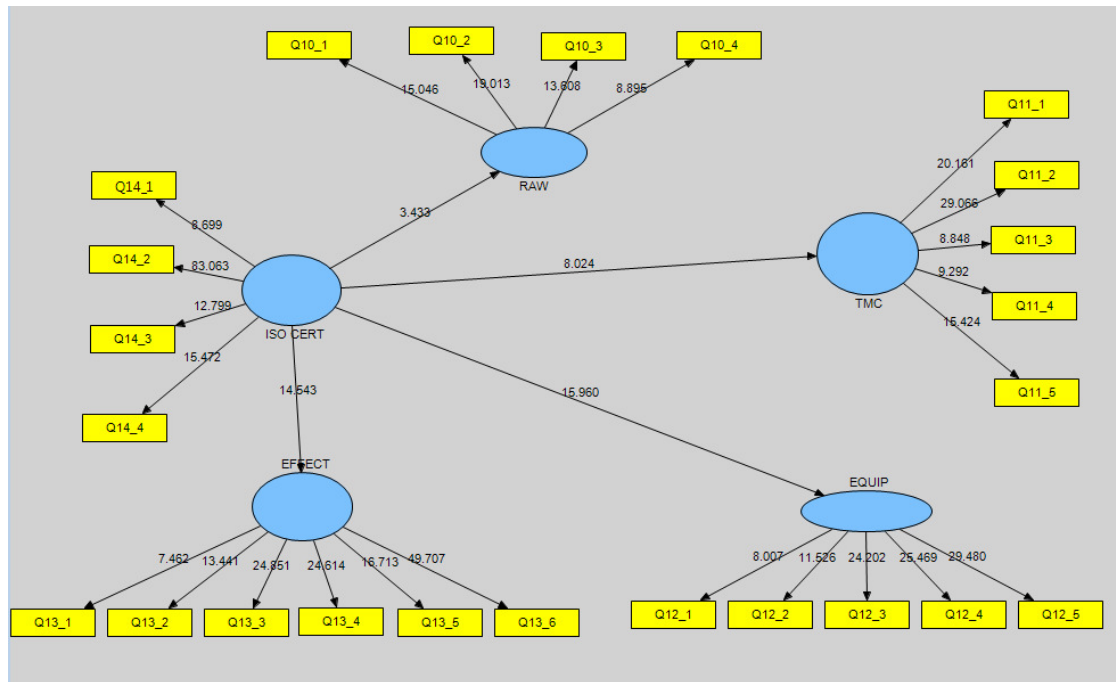
Figure (7.5) Smart PLS view for the factor correlations with significant t-values

7.5 Model Building for the five scale measures

It would be statistically appropriate to check for correlation among the variables for each scale measure prior to building the model. Table (7.15) - table (7.19) (refer to A7) show the strength of correlations for the variables within a certain factor. It is clear that correlations exist among the variables. This will allow the author to proceed with further analysis in building a conceptual model. It can be seen from figure (7.4) a conceptual model was already hypothesized by the author and checked for reliability and validity of its factors. In this section, I look forward to building a model and see how much fit it is to the theory. Of course, this model would not be generalized to all ISO 9001 QMS certified manufacturing firms, but it will be a good representative model for the survey conducted on the manufacturing firms in Kuwait. Again LISREL and AMOS are best software candidates for performing the tasks of model fitting. Though the sample size of n = 75 is not large enough, however, with few number of

factors (i.e., scale measures), the chance of a model convergence is moderately high. When using LISREL and without any data reduction performed on the research items of the survey, the results revealed that all links are significant just like in figure (7.5). Figure (7.6) depicts the model fit for our data as obtained from LISREL.
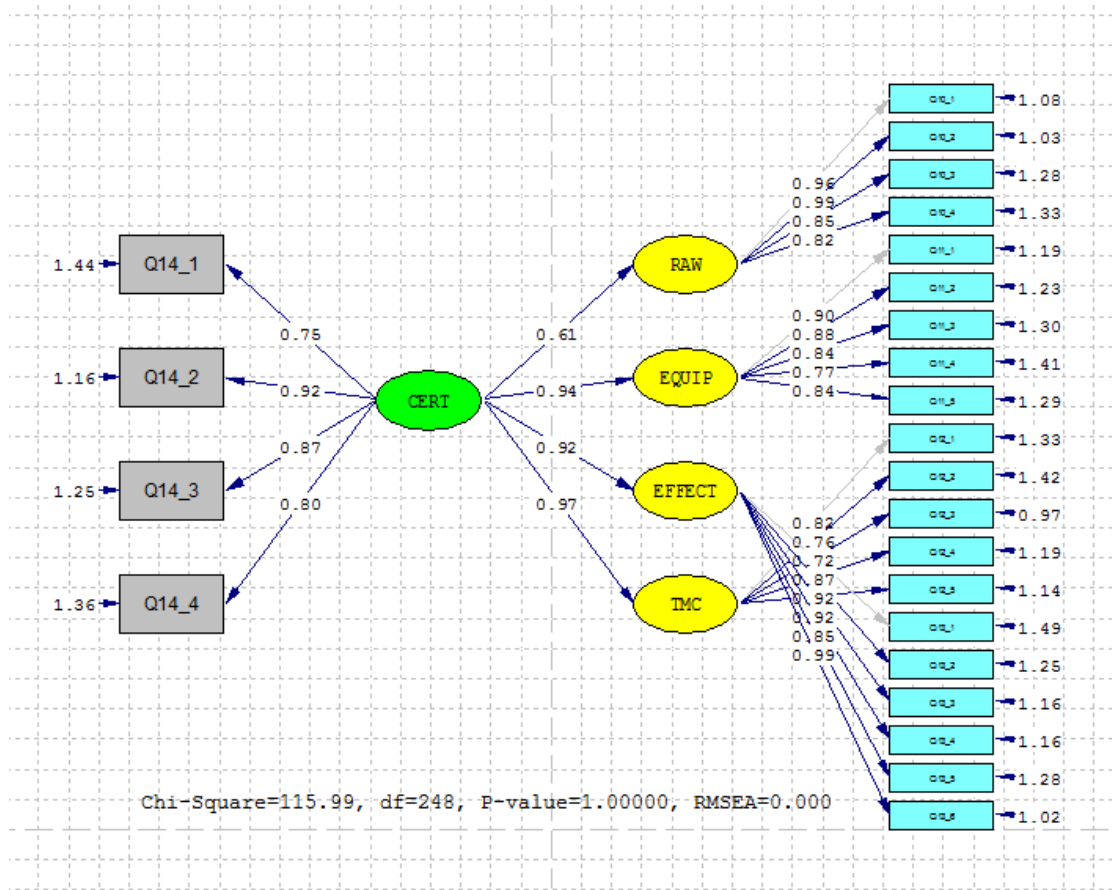
Figure (7.6) Initial model of ISO certification on manufacturing firms

The GFI, AGFI, and RMSR are 0.88, 0.86, and 0.11, respectively. The results of such values are stored in appendix A(7.2). Nevertheless, the model has converged with a p-value = 1, a $\chi2= 115.99,$ and all links are significant as it has already been found in figure (7.6). For a better model fitting, it is recommended for a GFI to be at least 0.90 in order to conclude any model fitness. Thus, it is better to increase the amount of variance explained for each factor. This may require removing some of the research items from the survey. Using the data reduction technique (factor analysis) in SPSS, I had to drop 6 criteria for measurements from the survey analysis and was left with 18 criteria for

building the model. The target was to increase the explained variance for each scale measure to at least 70%. Below table (7.20) lists the amount of variance explained for each main question (scale measure) with its reduced criteria for measurements or sub questions.

Table (7.20) *Variance explained after data reduction*

Question No.	Removed sub-questions or criteria	Amount of variance explained
10	None	74.792%
11	C3, and C4	79.106%
12	C2	70.716%
13	C1, and C2	80.204%
14	C1	79.062%

Note: C1, C2, C3, and C4 are the first, second, third, and fourth criteria measured for a specific question, respectively.

With data reduction, I was then able to run the model again and finally obtain higher values of GFI and AGFI and a lower value less than 1.0 for a RMSR. The model remains stable and convergent with GFI = 0.93, AGFI = 0.91, and RMSR = .095. The model fit output is enlisted in appendix A(7.3). Figure (7.7) depicts the hypothesized model with lower Chi-square value than the previous model with full data. The Chi-square value, $\chi 2 = \mathbf{49.03}$ with p-value = 1.0.
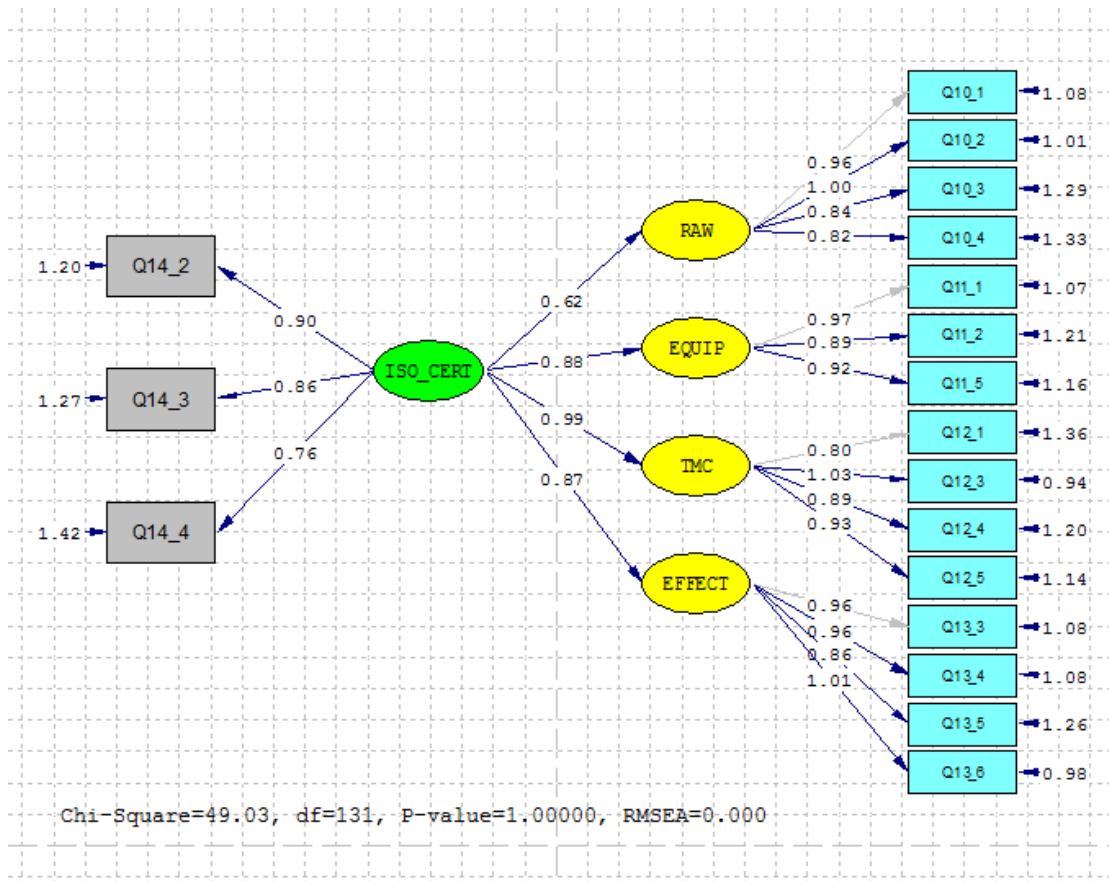
Figure (7.7) a final significant model with reduced data

7.6   Model analysis for the reduced data

As seen from the model in figure (7.7) that ISO certification influences on the other four factors, is different from what was hypothesized in chapter 6. I will see the magnitude of the effect of the ISO certified manufacturing firm on the other four factors (four scale measures). From LISREL output in A(7.4), it can be seen that all effects emerged from ISO certification are significant with t-values > 1.645. Thus, if any hypothesis of relation between ISO certification with the rest of four scale measures tested, as shown in figures (7.5), (7.6), and (7.7), will be significant at the α = .05. All effects are direct, since the hypothesized model has a one leading factor "ISO_CERT" as an initiator and the only independent variable. The highest effect value obtained was on the factor "TMC" (i.e., total effect = 0.99) and the lowest effect value obtained was

on the factor "RAW" (i.e., total effect = 0.62). The estimated derived regression

equations extracted for the hypothesized model are as follows:

$$RAW = 0.62 * ISO\_CERT \qquad (1)$$

$$EQUIP = 0.88 * ISO\_CERT \qquad (2)$$

$$TMC = 0.99 * ISO\_CERT \qquad (3)$$

$$EFFECT = 0.87 * ISO\_CERT \qquad (4)$$

All R^2 values are above 0.50 except for the RAW equation with $R^2 = 0.38$. However,

the regression weight for the RAW equation is 0.62 and that is quite high. A list of these

equations with their R^2 values is enlisted in A(7.5). It can be analyzed from equation (3)

that a one unit change in the ISO_CERT factor is almost equivalent to a one unit change

in the TMC factor.

7.7 Summary and Conclusion

In this chapter, the analysis has only focused on the ISO 9001 certified

manufacturing firms based on five scale measures: 1)ISO certification, 2)Raw materials

status, 3)Equipment and machinery, 4)Top management involvement, and 5)QMS

effectiveness and efficiency. I have designed and developed a new survey using the

experience of people in the quality field. The survey was tested for reliability and

validity and has shown satisfactory results. I learned from experience with first survey,

the shorter the survey is, the better and more reliable feedback from respondents is

received. Definitely, the statistical results have shown an immediate stability even when

performing data analysis on the small original sample size of n = 48. I could have been

just satisfied with using the partial least square method (i,e., using Smart PLS software)

to check reliability and validity of the hypothesized model but the purpose was to go

beyond that and measure goodness of model fit and that was done using the maximum

likelihood estimation via LISREL software. I was able to show a different view of the model as to how certification has an impact on the other four scale measures. It was statistically shown that certification in the manufacturing sector enhances more of top management commitment and involvement than the remaining four factors in the ISO 9001 QMS working environment. The hypothesized model has performed well with full data used from the survey and has even been improved with data reduction technique. Dropping six research items from the survey was not harmful to the research analysis since my hypothesized model is based on reflective rather than formative structure. Thus, deleting any research item from its factor may improve the model to a certain extent. I have removed 25% of the research items to improve the most important indices: GFI, AGFI, and RMSR. This would have finally left me with 18 questions or criteria for measurements that would later on ease the job of research with the next researcher, interested in making further investigation in the same field of science. Finally, I do believe that a one publication paper can be drafted and prepared with the same title of this chapter.

Chapter 8

Conclusion

This research is one of its kinds conducted in Kuwait, particularly in the area of assessment for the ISO 9001 quality management systems. The author has taken the full responsibility and the appropriate scientific approach to assess the quality control and assurance programs as per ISO 9001 standard systems adopted by five various business types in Kuwait (i.e., manufacturing, services, construction, trading, and education). The author has used reliable and valid survey questionnaires to get the feedback as perceived from the ISO 9001 standard system implementers and users. The word perceived is the essential key of this research. In other words, employees' opinions, documented in well designed and customized survey questionnaires, in the work organizations are the key indicators for the level of ISO 9001 implementation and the auditing practices.

The main findings of this research are summarized as below:

1. The motives for seeking ISO 9001 certifications for the five business types and sectors of work organizations (government or private) were not different. The scale measure of motives also has shown to be the same regardless of its being broken down into two types of motives: (a) external and (b) internal as factorized in chapter 5. Such outcome was scientifically justified using the appropriate statistical tool and it is reasonable to say that most work organizations find the business and image improvements, meeting customer demands, and a way to improve the organization's marketing strategy to attract new customers and keep the old ones is a good reason for obtaining an ISO 9001 certificate. This outcome of no differences in the motives for the two business sectors (government and private) in particular indicates that government sector

feels strongly the same way as private sector toward the importance of certification. Thus, it can be said that ISO 9001is a belief that must exist within the work organizations to help them initially improve their business performances. Moreover, literature review has also revealed that ISO 9001 would help work organizations to be more prepared to adopt other quality concepts.

2. Manufacturing and services business types of sector both have highest certification rates among the other business types of sector. However, manufacturing sector has a higher certification rate (38%) than services sector (33%). This is quite expected since most of the manufacturing plants are required by law to obtain the ISO 9001 certificate. This lawful requirement is a must as issued by the public authority for industry in Kuwait (PAFI) in order for these manufacturing plants to participate in the government bids. Needless to say that the concept of a powerful customer drives the work organization toward ISO certification (Groocock , 2000).

3. About 50% of the work organizations do not implement the ISO 9001 standard in full. The ISO 9001 standard allows ISO adopting organizations to be exempted from applying the full eight standard requirements. The permissible exclusion can only be applicable in clause 7.0 or its sub clauses (7.3, 7.5.1, 7.6, and etc..). Clause 7 in the standard is a requirement with respect to the design and development. As being a lead auditor in the field of quality management systems, it would not be appropriate for an organization to claim for exclusion if the exclusion cannot be justified. The justifications must be clearly stated in the quality manual of the organization and proven by practice to the auditors. Thus, a need for professional auditors is necessary in such situations to verify a valid exclusion from the standard to the work organizations. The results about quality

management systems (QMS) function as perceived by the employees of the work organization showed that a moderately low percentage about 13.7% of the QMS evaluation is based on which auditing bodies are performing the audit. This concludes that justification for exclusion is reasonably valid.

4. Significant differences in responses between Swedish and Kuwaiti organizations were found in most of the survey's research items (almost 95% of the compared research items) under study. The reason for this persisting difference could be attributed to the wide scaling used in the Swedish survey or the existing cultural differences between the two countries. However, it was found that both Swedish and Kuwaiti organizations have agreed on the benefits of auditing besides obtaining certificates.

5. The understanding level of the work organization's employees toward the quality management systems implementation and the auditing practices as per the ISO 9001 standard requirements is almost completely different between the two countries (Sweden and Kuwait). From the 39 research items or questions placed for comparison between the Swedish and Kuwaiti work organizations, only 4 research questions from the survey questionnaire showed no significant differences, that is answers to about 95% of the research questions revealed differences. The many significant differences can be attributed to cultural factor between the two countries and to the wide scaling used in the Swedish survey questionnaire (i.e., using a 7 point likert scale not a 5 point likert scale). However, both types of cultural work organizations have agreed on the perceived benefits of conducting audits besides certification.

6. Using structural equation modelling in chapter 6, the extracted factor, external motives (EXM), has shown to drive the wheels of a derived 10-factor model with a better data fit values than any other hypothesized models. The derived

model may only be valid for Kuwait under the same resources, constraints, and conditions that was available for this research. It can also be said that the "EXM" factor drives and affects the whole quality management systems adopted by the work organizations. Moreover, the "EXM" factor has set the criteria for building up two specific models, one for manufacturing and another for services. When comparison was performed for the two specific models, it was shown that manufacturing model outperformed the services model with higher values of R^2. This result indicates that manufacturing sector has more stability toward ISO 9001 quality management systems implementation in Kuwait.

Further to the above main findings, I believe some essential contributions that have added values to the knowledge in the field of quality is listed as below:

1. Enhance the level of awareness in the public authority for industry (PAFI) about ISO 9001 auditing practices, auditors' performances, and quality management systems implementation. Since the PAFI is a government agency where its main responsibility is to control and monitor certification bodies for issuing certificates according to the ISO 9001 standard, the quality of auditing and QMS implementation would be enhanced and improved if the outcome of this research has been fully studied by the PAFI. Having the PAFI understand more about how auditing is being conducted and QMS implemented in the work organizations would most probably bring different solution approaches that may be enforced by the PAFI to eliminate all non-value added activities for auditing.

2. This is the first research in evaluating the ISO 9001 quality management systems implementation and auditing practices in the Kuwaiti work organizations. This new exploration of understanding how the ISO 9001 system

is being implemented will help ISO users understand the positive and negative aspects of the ISO standard system.

3. New research was conducted in understanding the impact of certification on the manufacturing work organizations only. The effect of certification has focused mainly on certain areas of the manufacturing and these are:

(a) Status of raw materials.

(b) Equipment and machinery.

(c) Top management commitment.

(d) Efficiency and effectiveness of the quality management system (QMS).

4. This research should also help top management department in every type of work organization understand its dominant role in leading the work organizations to a successful implementation of QMS. It was shown that if the top management is committed and involved enough, it would enhance the level of QMS implementation and increase awareness among employees about the importance of adopting continual improvement programs.

5. A new general hypothesized model with 10 factors was developed and tested for its validity to explain the correlation that exists among these factors. The factors are extracted from the survey questions to finally compose an ISO quality model. The model is useful to predict the effects of one factor on other factors.

Aside from contribution to knowledge, the research could have been performed better if certain obstacles were not encountered. Like any other research, limitations were unavoidable. The limitations of this research are summarized as below:

1. It was not possible to do benchmarking and comparison in quality management systems against other countries in the Arabian Gulf region. The author tried very hard and many times to contact various researchers in the same region to cooperate by obtaining some valid real data in order to establish some kind of

comparative assessment criteria. Unfortunately, the attempts did not succeed which eventually made the author contact researchers from different region.

2. Unfortunately, it was not an easy task to inspire work organizations in Kuwait to cooperate in filling out survey questionnaires. However, with the prevailing unwillingness to cooperate by survey respondents, who also sometimes provided wrong or fake responses, the process of collecting information took longer than it was expected. It was clearly then understood that the culture or habit of completing forms or surveys is not very much prevalent in Kuwait. Nevertheless, the reliability and validity of the survey responses have provided reasonable figures within an acceptable statistical range.

3. It was not possible to collect information from certification bodies in relation to the performances of ISO 9001 certified work organizations. Apparently, the auditing or certification bodies seemed to be over protective about their customers. The research could have also been enhanced if records of ISO compliance were provided by the certification bodies.

Finally, the research should not stop at this point. Nevertheless, it must continue with further studies to explore different scopes of ISO 9001 implementation. My suggestions for further research are given below:

1. A new research should be based on studying the effects of three scale measures such as top management commitment, incentives, and work environment on job satisfaction. The reason for conducting this research is to explore about the level of internal customer satisfaction prior to understanding the satisfaction level of the external customers. Satisfying the needs of internal customers is a requirement by the ISO 9001 standard documented in the resource management clause No. 6.

2. Study the impact of ISO 9001 certification on the financial performance of the work organization. This research should value the benefit of implementing ISO 9001 standard from the financial perspectives.

3. Study the effects of ISO 9001 certification on other quality practices already adopted by the work organizations. These quality practices could be TQM, lean manufacturing, six sigma and etc.

In conclusion, this research brings new information to all stakeholders involved in adopting ISO 9001 quality concepts or those who are affected by them. It also creates new opportunities for improvements in different types of business sector. Furthermore, it is always better to think that the purpose of this investigative research is to make work organizations understand how it would be best for them to achieve excellence in its performance when ISO 9001standard system is being adopted.

References

Aggelogiannopoulos, D., Drosinos, E. H., and Athanasopoulus, P. (2007). Implementation of a Quality Management System (QMS) According to the ISO 9000 Family in a Greek Small-Sized Winery: A case Study. *Food Control*. Vol 18 (9).

Ahire, S.L., Golear, D.Y. and Waller, M.W., (1996). Development and validation of TQM implementation constructs. *Decision Sciences*, 27(1), 23-56.

Al-Khadra, H., Barqawi, B., and Alramahi, N. (2012). Governance Using ISO 9001: 2000 Challenges and Barriers: Empirical Study Applied on the Jordanian Private Mobile Companies. *International Journal of Project Organization and Management*. Vol 4 (2)

Al-Rawahi, Abdullah., Hamdi, A. (2010), On the implementation of ISO 9001:2000: a comparative investigation. *The TQM Journal, 23 (6), 2011 pp. 673-687*

Al-Rawahi, A., and Bashir, H. A. (2011a). Investigating the Association between Organization Differences and the Implementation of ISO 9001: 2000. http://www.iieom.org/ieom2011/pdfs/IEOM167.pdf

Al-Rawahi, A. M., and Bashir, H. A. (2011b). On the Implementation of ISO 9001: 2000: A comparative Investigation. *The TQM Journal*. Vol 23 (6)

Allan, M.J. (1993). Implementation of ISO 9001/2 in large Australian manufactures. Unpublished Research Project, Melbourne Business School, University of Melbourne.

Amuragam, V., Ooi, K., and Fong, T. (2008). TQM Practices and Quality Management Performance: An investigation of their Relationship Using Data from ISO 9001: 2000 Firms in Malaysia. *The TQM Magazine*. Vol 20 (6)

Anvari, A., Ismail, Y., and Hojjati, S. (2011). A Study on Total Quality Management and Lean Manufacturing: Through Lean Thinking Approach. World Applied Sciences Journal 12 (9).

Ashrafi, R. (2008). A review of ISO 9001:2000 quality management practices in Oman. *International Journal of Quality and Reliability Management,* 3 (1), pp. 74-105.

Askey, J.M., Dala, B.G., (1994), July. From ISO 9000 series registration to total quality management: an examination. Quality Management Journal 67–76.

Avery, S., (1995). Xerox winners exceed ISO 9000. Purchasing 118, 111–114.

Basil, M., (1994). Think hard about registration. Chemical Week 154, 66.

Basir, S. A., Davies, J., and Rudder, A. (2011). The Elements of Organizational Culture Which Influence the Maintenance of ISO 9001: A Theoretical Framework. *African Journal of Business Management*. Vol 5(15)

Batchelor, C., (1992). Badges of quality. Financial Times, 1 September

Bhuiyan, N., and Alam, N. (2005). "A case study of a quality system implementation in a small manufacturing firm", *International Journal of Productivity and Performance Management,* Vol. 54 (3).

Bearden, W.O., Netmeyer, R.G., and Mobley, M.F. "Hand- book of Marketing Scales: Multi-Item Measures for Mar- keting and Consumer Behavior Research," Sage, New- bury Park, (1993).

Beattie, K.R., Sohal, A.S., Implementing ISO 9000: a study of its benefits among Australian organizations, Total Qual. Manage. 10 (1) (1999) 95–106.

Bernardo, M. Casadeus, M. Karapetrovic, S. and Heras, I. 2009. An empirical study on the integration of management system audits. *Journal of Cleaner Production,* 18 (2010), pp. 486-495.

Bregman, B. and Klefsjo, B. (1994), "Quality, from Customer Needs to Customer Satisfaction", London: McGraw-Hill.

Briscoe, J. A., Fawcett, S. E., and Todd, R. H. (2005). The Implementation and Impact of ISO 9000 among Small Manufacturing Enterprises. Journal of Small Business Management. Vol 43 (3)

Brown, A., Wiele, T., and Loughton, K., Smaller enterprises' experiences with ISO 9000, Int. J. Qual. Reliability Manage. 15 (3) (1998) 273–282.

Brown, A. (1994). The quality management research unit industry experience with ISO 9000. Paper Presented at the Second National Research Conference on Quality Management. Monash Mt. Eliza Business School, Australia, February.

Carroll, G. and Blue, R. (1991). Measuring the success of total quality management. *IEEE,* 36 (2) pp. 1143-1147.

Casadesus, M., and Castro, R. (2005) How improving quality improves supply chain management: empirical study. *The TQM Magazine*, Vol. 17 (4).

Casadesus, M., and Karapetrovic, S. (2007). An Empirical Study of the Benefits and Costs of ISO 9001: Compared to ISO 9001/2/3: 1994. *Total Quality Management and Business Excellence.* Vol 16 (1)

Casadesus, M. Karapetrovic, S. and Heras, I.(2009). Synergies in standardized management systems: some empirical evidence. *The TQM Journal,* 23 (1), pp. 73-86.

Castka, P., and Balzarova, M. A., (2008). The Impact of ISO 9000 and ISO 14000 on Standardization of Social Responsibility-An Inside Perspective. *International Journal of Production Economics*. Vol 113 (1)

Castka, P., Balzarova, M., and Kenny, J., "Survey of ISO 9000 Users in New Zealand: Drivers and Benefits," QNEWZ, Professional Non-Refereed Paper Published in New Zealand, (2007), pp. 4-9.

Chiarini, A. (2011) "Integrating lean thinking into ISO 9001: a first guideline", *International Journal of Lean Six Sigma,* Vol. 2 (2)

Colman, M., Norris, E., and Preston, C. "Comparing Rating Scales of Different Lengths: Equivalence of Scores from 5-Point and 7-Point Scale," *Psychological Reports*, Vol. 80, No. 2, 1997, pp. 355-362.

Collis, D.J., Montgomery, C.A., (1997). Corporate Strategy: Resources and Scope of the Firm. Irwin, Chicago, IL.

Costa, M.M., and Lorente, A.R.M. Effects of ISO 9000 certification on firm's performance: a vision from the market, TQM, Business Excellence 14 (10) (2003) 1179–1191.

Costa, M. M., et al. (2009). ISO 9000/ 1994, ISO 9001/2000 and TQM: The Performance Debate Revisited. *Journal of Operations Management*. Vol 27 (6).

Craig, J. H. S. and Lemon, M. (2008). Perceptions and reality in quality and environmental management systems. *The TQM Journal,* 20 (3), pp. 196-208.

Crosby, P.B. (1996), "*Quality is Still Free: Making Quality Certain in Uncertain Times*", McGraw-Hill.

Curkovic, S., Handfield, R., (1996). Use of ISO 9000 and Baldrige award criteria in supplier evaluation. International Journal of Purchasing and Materials Management 32, 2–12.

Dale, B. G., R. J. Boaden and D. M. Lascelles (1994), *Total quality management: an overview*, in: B. G. Dale, ed., Managing quality, Prentice Hall International, 3-40.

David, M. and Idelmerfaa, Z. (2005). Methodological utilities for organizing cooperative work process according to ISO 9000 standard recommendations. *J. Intell. Manuf.* 17 (2006), pp. 703-713

Deming, W.E. (1982): *Out of the Crisis,* Cambridge University Press.

Deming, W. Edwards. *Out of the Crisis*. Cambridge, MA: MIT Center for Advanced Engineering Studies, (1986).

Dick, P. M., Heras, I., and Casadesus, M. (2008). Shedding Light on Causation between ISO 9001 and Improvement Business Performance. *International Journal of Operations and Production Management*. Vol 28 (7)

Drew, E. and Healy, C. (2006). Quality management approaches in Irish organizations. *The TQM Magazine,* 18 (4), pp. 358-371.

Donna, F. (1995) "The inside advantage." Inc. Boston, 17: 102.

Douglas, A., Coleman, S., and Oddy, R. (2003). Perspective: The Case for ISO 9000. *The TQM Magazine*. Vol 15 (5)

Dov, M., (1998). Choosing a consultant for your ISO 9000 implementation. Industrial Management 40, 29–31.

Ebrahimpour, M., Withers, B.E, Hikmet, N., Experiences of US- and foreign owned firms: A new perspective on ISO 9000 implementation, Int. J. Prod. Res. 35 (2) (1997) 569–576.

Edmunds, T., (1996). Smooth out the road to ISO 9000 implementation. Quality 35, 48–53.

Elmuti, D., Kathawala, Y., (1997). An investigation into the effect of ISO 9000 on participants' attitudes and job performance. *Production and Inventory Management Journal* 38, 52–55.

Eugenia, B.K., (1996). The marriage of quality and records management. ARMA Records Management Quarterly 30, 3–11.

Escanciano, C., E. Fernández, C. Vázquez (2001): "Influence of ISO 9000 certification on the progress of Spanish industry towards TQM", *International Journal of Quality and Reliability Management*, Vol. 18, No. 5, pp. 481-494.

Feigenbaum, A. (1991), "Total Quality Control", *3rd Ed. McGraw-Hill, Inc.*

Flynn, B.B.; R.G. Schroeder, S. Sakakibara (1994): "A framework for quality management research and an associated measurement instrument", *Journal of Operations Management*, Vol. 11, p. 339-366.

Gamboa, A. J., and Melão, N. F. (2012) "The impacts and success factors of ISO 9001 in education: Experiences from Portuguese vocational schools", *International Journal of Quality & Reliability Management*, Vol. 29 (4)

Garvin, D.A. (1987), "Competing on the eight dimensions of quality", *Harvard Business Review*, Vol. 65 No. 6, pp. 101-109.

Gaunt, K. (2003). Generate Value, Not Paper. *Automotive Industries,* 183 (6), pp. 54-55.

Ghiselli, E.E., "The Measurement of Occupational Apti- tude," University of California, Berkeley, (1955).

Goffin K. and Szwejczewski, M. (1996). Is management commitment to quality just "a given"? *The TQM Magazine,* 8 (2), pp. 26-31.

Gotzamani, K.D., George D. Tsiotras (2001): "An empirical study of the ISO 9000 standards´contribution towards total quality management", *International Journal of Quality &Reliability Management,* Vol. 21, No. 10, pp. 1326-1342.

Grigoroundis, E., and Siskos, Y. (2010). Customer Satisfaction Evaluation: Methods for Measuring and Implementing Service Quality. New York: Springer.

Groocock, J. (2000). The impact of powerful and weak customers on quality assurance systems and quality improvement programs. *The TQM Magazine,* 12 (6), pp. 372-388.

Giuliano, R., and Moroncini, A. (2012). The Ability of ISO 9001 Certified Quality Management Systems to Detect Cases of Workplace Harassment. *International Journal of Business and Social Sciences.* Vol 3 (12).

Guimaraes, T. (1996). TQM's impact on employee attitudes. *The TQM Magazine,* 8 (1), pp. 20-25.

Hair, J. F. Jr. Black, W. C., Babin, B. J. Anderson, R. E. and Tatham, R. L. (2006). *Multivariate data analysis*. 6th ed. New Jersey: Prentice Hall.

Heras, I. Dick, Gavin. Casadesus, Marti (2002). ISO 9000 registration's impact on sales and profitability: A longitudinal analysis of performance before and after accreditation. *International Journal of Quality and Reliability Management,* 19 (6), pp. 774-791.

Hernandez, H. (2010). Quality audit as a driver for compliance to ISO 9001: 2008 standards. *The TQM Journal,* 22 (4), pp. 454-466.

Hong, J. W., and Phitayawejwiwat, S. (2005). The Impact of ISO 9000 Certification on Quality Management Practices in Thailand. *Journal of Industrial Technology*. Vol 21 (1)

Houten, V. G.(1994) "ISO9000 and beyond: a case study of BASF Inc." ARMA Records Management Quarterly, 28: 21-24.

Hunt, J., (1997). Evaluation the tradeoffs: ISO 9000 registration or compliance. Quality 36, 42–45.

IAEA (2006). Management of Continual Improvement for Facilities and Activities: A structured Approach. http://www.pub.iaea.org/MTCD/publications/PDF/te_1491_web.pdf

Ilkay, M. S., and Aslan, E. (2012). The effect of the ISO 9001 Quality management System on the Performance of SMEs. *International Journal of Quality and Reliability Management.* Vol 29 (7)

International Organization for standardization (2008b), "ISO –quality management principles", available at : www.iso.org/iso.

International Organization for Standardization, ISO 9001:2008(E)."Quality management systems requirements". This document is available at www.iso.org/iso.

International Organization for Standardization, ISO 19011:2002(E). Guidelines for quality and/or environmental management systems auditing. This document is available at www.iso.org/iso.

Ishikawa, K. (1989), "Introduction to Quality Control", JUSE Press, Tokyo.

Jiang, B. Baker, R. C. and Frazier, G. V. (2007). An analysis of job dissatisfaction and turnover to reduce global supply chain risk: Evidence from China. *Journal of Operations Management,* 27 (2009), pp. 169-184.

Jorgensen, T. H. Remmen, A. and Mellado, M. D. 2004. Integrated management systems – three different levels of integration. *Journal of Cleaner Production,* 14 (2006), pp. 713-722.

Juran, J. M. (1974), Quality control handbook, London: McGraw-Hill.

Karapetrovic, S. and Casadeus, M. 2008. Implementing environmental with other standardized management systems: Scope sequence time and integration. *Journal of Cleaner Production,* 17 (2009), pp. 533-540.

Karapetrovic, S. and Willborn, W. (1998). Integration of quality and environmental systems. *The TQM Magazine,* 10(3), pp. 204-213.

Kazan, H.; Ozer, G. ; and Cetin, A. (2006), "Insight from research: the effect of manufacturing strategies on financial performance", Measuring Business Excellence, Vol. 10 No. pp. 14-26.

Koc, Tufan. (2007). The impact of ISO 9000 quality management systems on manufacturing. *Journal of Material Processing Technology*. Vol 186, Issues 1–3, pp. 207–213

Kumar, S. and Harms, R. (2002). Improving business processes for increased operational efficiency: a case study. *Journal of Manufacturing Technology Management,* 15 (7), pp. 662-674.

Lai, K., and Cheng, T.C.E., Effects of quality management and marketing on organizational performance, J. Business Res. 58 (4) (2005) 446–456.

Laszlo, G. (1998). ISO 9000 or TQM: which to adopt – a Canadian case study. *The TQM Magazine,* 10 (5), pp. 362-366.

Lawrence, W.A., (1996). Eight steps process to successful ISO 9000 implementation: a quality management system approach. Quality Progress 29, 37–41.

Lee, T. Fawcett, S. and Briscoe, J. (2002). Benchmarking the challenge to quality program implementation. *Benchmarking: An International Journal,* 9 (4), pp. 374-387.

Lee, T.Y., Hareton K.N. Leung, Keith C.C. Chan (1999): "Improving quality management on the basis of ISO 9000", *The TQM Magazine*, Vol. 11, No. 2, pp. 88-94.

Lee, Y.S. and Lam, K. (1995). Managing quality at an engineering maintenance centre: from QCC to ISO 9001 and beyond. *International Journal of Quality and Reliability Management,* 14 (2), pp. 118-137.

Lee, C. Y. and Zhou, X. (2000),"Quality management and manufacturing strategies in China", International Journal of Quality and Reliability Management, Vol. 17 No. 8, pp. 876-898

Levine, D. I., and Toffel, M. W., (2010). Quality Management and Job Quality: How ISO 9001 Standard for Quality Management Systems Affects Employees and Employers. *Management Science*. Vol 56 (6).

Lewis, W. G., Pun, K. F., and Lalla, T. R. (2005). An AHP-based study of TQM benefits in ISO 9001 certified SMEs in Trinidad and Tobago. *The TQM Magazine*, Vol. 17 (6).

Lewis, W. G., Pun, K. F., and Lalla, T. R. (2006a) Exploring soft versus hard factors for TQM implementation in small and medium-sized enterprises. *International Journal of Productivity and Performance Management,* Vol. 55 (7).

Lewis, W. G., Pun, K. F., and Lalla, T. R., (2006b). Empirical investigation of the hard and soft criteria of TQM in ISO 9001 certified small and medium-sized enterprises", *International Journal of Quality & Reliability Management.* Vol. 23 (8),

Liao, H., Enke, D., Wiebe, H., An expert advisory system for the ISO 9001 quality system, Expert Syst. Appl. 27 (2) (2004) 313–322.

Liebesman, S. (2003). Continual Improvement Using ISO 9001. *Quality Progress,* 36 (1), pp. 62-63.

Lohrke, F. T., Bedeian, A. G., and Palmer, T. B. (2004). The Role of Top Management Teams in Formulating and Implementing Turnaround Strategies: A Review and Research Agenda. *IJMR*. Vol 5/6 (2)

London, C.(2005). Management effects on quality-policy implementation. *The TQM Magazine,* 17 (3), pp. 267-278.

Lopes, I. S., Nunes, E. P, D.Sousa, S., and Esteves D. (2011). Quality Improvement Practices Adopted by Industrial Companies in Portugal.
http://www.iaeng.org/publication/WCE2011/WCE2011_pp696-701.pdf

Mady, M. (2008). Quality management practices: An empirical investigation of associated constructs in two Kuwaiti industries. *International Journal of Quality and Reliability Management,* 26 (3), pp. 214-233.

Magd, H., and Curry, A. (2003). TQM in Egypt: A case study: An empirical Analysis of Management Attitudes towards ISO 9001: 2000 in Egypt. *The TQM Magazine*. Vol 15(6)

Magd, H. (2008). ISO 9001:2000 in the Egyptian manufacturing sector: perceptions and perspectives. *International Journal of Quality and Reliability Management,* 25 (2), pp. 173-200.

Malik, S.A. Li-bin, L. Ye-zhuang, T. and Xiao-lin, S. (2007). Continuous improvement practices in Asian developing countries: A comparative analyses between Chinese and Pakistani manufacturing industry. *14th International Conference on Management Science and Engineering,* 2007, pp. 692-697.

Marson, T., and Blodget, M. (2008). Can Middle Eastern Countries Fulfill the Eastern Promise? http://www.itida.gov.eg/Documents/Yankee%20Report%20Can%20Middle%20EasternCountries%20Fulfill%20the%20Eastern%20Promise.pdf

Martínez Lorente, A.R., F.W. Dewhurst, A. Gallego Rodríguez (2000): "Relating TQM, marketing and business performance: an exploratory study*", International Journal of Production Research*, Vol. 38, No. 14, pp. 3227-3246.

MARTÍNEZ-LORENTE, A.R.; MARTÍNEZ-COSTA, M. (2004). ISO9000 and TQM: Substitutes or complementaries? An empirical study in industrial companies. *International Journal of Quality and Reliability Management*, 21(3): 260-276.

Massoud, M. A., Fayad, R., El-Fadel, M., Kamleh, R. (2010) Drivers, Barriers and Incentives to Implementing Environmental Management Systems in the Food Industry: A case of Lebanon. *Journal of Cleaner Production*. Vol 18 (3)

Matsumura, M., and Kutotani, K. (2010). Current Status and Prospects of Automation Technology. http://www.fujielectric.com/company/tech/pdf/56-01/FER-56-1-002-2010.pdf

McCrosson, S., et al. (2013). ISO 9001 Certification in UK Organizations: A comparative Study of Motivations and Impacts. http://hal.archives-ouvertes.fr/docs/00/82/31/49/PDF/SM_MC_EO_paper_vs_7AK.pdf

Miguel, P. A., and Dias, J. C. (2009) "A proposed framework for combining ISO 9001 quality system and quality function deployment", *The TQM Journal*, Vol. 21 (6).

Miller, G.A., "The Magical Number Seven, Plus or Minus Two: Some Limits on Our Capacity for Processing In- formation," *Psychological Review*, Vol. 63, No. 2, (1956), pp. 81-97.

Mohammad Musli, Man Robin, Wagner Jurgen.(2010). The right improvement initiative for the right situation.

Naveh, E., Marcus A. (2005). Achieving competitive advantage through implementing a replicable management standard: Installing and using ISO 9000. *Journal of operations management.* 24, pp. 1–26

Nedelea, S., and Paun, L. A. (2009). The Importance of Strategic Management Process in the   Knowledge-Based Economy. *Review of International Comparative Management.* Vol 10 (1)

Novack, L.N., Bosheers,K.C. The QS 9000 Documentation Toolkit, Prentice Hall PTR, NJ, (1997).

Oakland, J. (2003), *Total Quality Management: Text with Cases. 3rd ed.* Butterworth Heinemann. Oxford.

Oskarsson, K., and Malmborg, F. (2005). Integrated Management Systems as a Corporate Response to Sustainable Development. *Corporate Social Responsibility and Environmental Management.* Vol 12 (3)

Otto, T., Riives, J., and Loun, K. (2007). Productivity Improvement through Monitoring of Human Resources Competence Level. http://www.innomet.ee/innomet/Reports/WP7%20annexe%20chapter%20in%20DAAAM%20Scientific%20Book%202007.pdf

Padma, P. Sai, L. P. and Rajendran, C. (2008). A Comprehensive Framework for Measuring Service Quality Perceptions of Patients: A Case of Indian Hospitals. *IEEE.*

Pfeifer, T, and Wunderlich, M. (1997). Establishing quality systems in research institutes: a progress report. *The TQM Magazine,* 9(3), pp. 221-227.

Pheng, L. S., and Teo, J. A. (2009). Implementing Total Quality Management in Construction Firms. http://castle.eiu.edu/~pingliu/tec5133/resources/spring_2009/tqm_and_org_chart_ref.pdf

Pitterman, B. (2000). Telcordia Technologies: A journey to high maturity. *IEEE Software,* pp. 89-96.

Poksinska, B. Dahlgaard, J. and Antoni, Marc, J. (2007). From Compliance to Value-Added Auditing – Experiences from Swedish ISO 9001: 2000 certified organizations. *Total Quality Management,* 17 (7), pp. 879-892.

Poksinska, B. Dahlgaard, J. and Eklund, J. (2002). The state of ISO 9000 certification: a study of Swedish organizations.. *Total Quality Management,* 14 (5), pp. 297-306.

Prajogo, D. (2011). "The roles of firms' motives in affecting the outcomes of ISO 9000 adoption", International Journal of Operations & Production Management, Vol. 31 (1).

Prajogo, D. (2007), "The relationship between competitive strategies and product quality", Industrial Management & Data Systems, Vol. 107 No. 1, pp. 69-83

Prajogo, D. I. and Cooper, B. K. (2008). The effect of people-related TQM practices on job satisfaction: a hierarchical model. *Production Planning and Control,* 21 (1), pp. 26-35.

Rad, A. (2006). The impact of organizational culture on the successful implementation of total quality management. *The TQM Magazine,* 18 (6), pp. 606-625

Reed, R., Lemak, D., and Montgomery, J.C. Beyond process: TQM content and firm performance, Acad. Manage. Rev. 1 (1996) 202–219.

Reeves, C. A. and Bednar, D. A. (1994), Defining quality: alternatives and implications", Academy of Management Review, Vol. 19 No. 3, pp. 419-445.

Robin, M. and Dennis, K. (1994). An evaluation of the effects of quality improvement activities on business performance. The International Journal of Quality and Reliability Management 11, 29– 45.

Russell, J.P. (2002). Auditing ISO 9001: 2000 for control and improvement. *Quality Progress,* 35 (2), pp. 95-96.

Robitaille, D. E. (2010). ISO 9001:2008 for Small and Medium-Sized Businesses. ASQ Quality Press.

Ruzevicius, J., Adomaitiene, R., and Sirvidaite, J. (2004). Motivation and Efficiency of Quality Management Systems Implementation: A study of Lithuanian Organizations. *Total Quality Management.* Vol 15 (2)

Sakthivel, P.B. and Rajendran, G. (2005). TQM implementation and students' satisfaction of academic performance.

Sakthivel, P. (2007). Top management commitment and overall engineering education excellence. *The TQM Magazine,* 19 (3), pp. 259-273.

Sampaio, P., Saraiva, P., and Rodrigues, A. G. (2009). ISO 9001 certification research: questions, answers and approaches. *International Journal of Quality & Reliability Management.* Vol. 26 (1).

Sampaio, P., Saraiva, P., and Rodriguez, A. G. (2010). A classification Model for the Prediction of Certification Motivation from the Contents of ISO 9001 Audit Reports. T*otal Quality Management.* Vol 21 (12).

Santos, G., and Millan, A. L. (2012). Motivation and Benefits of Implementation and Certification According ISO 9001-The Portuguese Experience. *International Journal for Quality Research*. Vol 7 (1).

Santouridis, I. and Trivellas, P. (2010). Investigating the impact of service quality and customer satisfaction on customer loyalty in mobile telephony in Greece. *The TQM Journal,* 22 (3), pp. 330-343.

Savanevicience, A., and Stankeviciute, Z. (2011). The Interaction Between Top Management and Line Managers Implementing Strategic Directions into Praxis. *Engineering Economics*. Vol 22 (4)

Sharma, S., (1996), "Applied Multivariate Techniques".

Shaw, M.E., and Wright, J.M *"Scales for the Measure- ment of Attitudes,"* McGraw-Hill, New York, (1967).

Sheskin, D., "Handbook of Parametric and Nonparametric Statistical," CRC Press, Boca Raton, (2004).

Shrestha, S. and Chalidabhongse, J. (2006). Improving Employee Satisfaction on Performance Appraisal: A Case Study on Thai Companies. *2006 IEEE International Conference on Management of Innovation and Technology,* pp. 106-110.

Symonds, P.M "On the Loss of Reliability in Ratings Due to Coarseness of the Scale," *Journal of Experimental Psychology*, Vol. 7, No. 6, (1924), pp. 456-461.

Simmons, B.L., and White, M.A., The relationship between ISO 9000 and business performance: does registration really matter? J. Managerial Issues (1999) 330–343.

Singh, P. J. (2008). Empirical Assessment of ISO 9000 Related Management Practices and Performance Relationships. *International Journal of Production Economics*. Vol 113 (1)

Singh, P. J., Power, D., and Chuong, S. C. (2011). A Resource Dependence Theory Perspective of ISO 9000 in Managing Organizational Environment. *Journal of Operations Management.* Vol 29 (1-2).

Sissel, K., "Survey Rates ISO 9000 Success," *Chemical Week*, Vol. 158, No. 13, (1996), p. 33.

Sitko-Lutek, A. Chuancharoen, S. Sukpitikul, A. and Phusavat, K. (2010). Applying social network analysis on customer complaint handling. *Industrial Management and Data Systems,* 110 (9), pp. 1402-1419.

Skrabec, Q. R. Jr. (1999): "Quality assurance revisited", *Industrial Management*, Noviembre-Diciembre, pp. 6-9.

Smith, B., (1994). A proven path to ISO 9000 registration. Industrial Distribution 83, 50.

Sroufe, R., and Curkovic, S., (2008). An Examination of ISO 9000: 2000 and Supply Chain Quality Assurance. *Journal of Operations Management*. Vol 26 (4)

Sun, H. (2000): "Total Quality Management, ISO 9000 Certification and Performance Improvement", *International Journal of Quality & Reliability Management*, Vol. 17, No. 2, pp. 168-179.

Takala, J. Bhufhai, A. and Phusavat, K. (2006). Proposed verification method for the content suitability of the customer satisfaction survey. *Industrial Management and Data Systems,* 106 (6), pp. 841-854.

Tang, J. and Wang, P. K. 2008. A Ubiquitous Customer Satisfaction Survey Model on Internet. *IEEE,* pp. 458-462.

Tannock, J., and Ahmed, K. S. (2008). Quality Management in the Arabic Speaking Countries. *Journal of Transnational Management*. Vol 13 (3).

Taylor, W.A. (1995): "Senior executives and ISO 9000: attitudes, behaviours and commitment", *International Journal of Quality & Reliability Management,* Vol. 12, No. 4, pp. 40-57.

Terziovski, M. Samson, D. and Dow, D. (1997). The business value of quality management system: Evidence from Australia and New Zealand. *Journal of Operations management,* 15, 1-18.

Terziovski, M. Power, D. and Sohal, A. S. 2001. The longitudinal effects of the ISO 9000 certification process on business performance. *European Journal of Operational Research,* 146 (2003), pp. 580-595.

To, W. M., Lee, Peter, and Yu, Billy. (2011). ISO 9001: 2000 Implementation in the Public Sector: A Survey in Macao SAR, the People's Republic of China. *The TQM Journal*. Vol 23 (1).

Tummala, V.M. Rao, C.L. Tang (1996): "Strategic quality management, Malcom Baldrige and European quality awards and ISO 9000 certification: Core concepts and comparative analysis*", International Journal of Quality &Reliability Management*, Vol. 13, No. 4, pp. 8-38.

Wade, F., (1996). Impact of the ISO 9000 series standards on industrial marketing. Industrial Marketing Management 25, 305–311.

Walker, A. (1997). Impact of an ISO 9001 compliant quality management system on a university research enterprise. *The TQM Magazine,* 9(6), pp. 397-402.

White, G. Samson, P. Rowland-Jones, R. and Thomas, A. (2009). The implementation of a quality management system in the not-for-profit sector. *The TQM Magazine,* 21 (3), pp. 273-283.

Wilkinson, G. and Dale, B.G. (2002). An examination of the ISO 9001: 2000 standard and its influence on the integration of management systems. *Production Planning & Control,* 13 (3), pp. 284-297.

Yang, J. –H. and Su, J. (2010). Creating customer loyalty for a service system. *IEEE,* pp. 47-51.

Yong-zhong, J. Miao, M. and Wei-de, C. (2009). How do service employee's attitudes influence customer perception of service quality? *IEEE,* pp. 815-820.

Zeng, S. X., Tian, P., and Shi, J. J. (2005). Implementing integration of ISO 9001 and ISO 14001 for construction", *Managerial Auditing Journal*, Vol. 20 (4),

Zeng, S. X., Tian, P., and Tam, C. M. (2007). Overcoming Barriers to Sustainable Implementation of the ISO 9001 Systems. *Managerial Auditing Journal*. Vol 22 (3)

Zhu, Z., L. Scheuermann (1999): "A comparison of quality programmes: Total quality management and ISO 9000", *Total Quality Management*, Vol. 10, No. 2, pp. 291-297.

Zuckerman, A., Hurwitz, A. How companies miss the beat on ISO 9000, Qual. Prog. (1996) 23–25.

Appendices

A(3.1) Format (A)

I. BASIC INFORMATION ABOUT AN ORGANIZATION

1. Please indicate your position at the organisation and name of the organization.

2. How many employees work at your organisation globally, counting all locations worldwide? How many employees work in the same location as you? Circle what applies.

2a) Globally:	50-249	250-499	500-999	1 000-2999	3 000 or more	NA
	1	2	3	4	5	6
2b) At your location::	1-9	10-49	50-249	250-499	500 or more	
	1	2	3	4	5	

3. Specify sector type of the organization?

Government	Private	Government – Private (Jointly owned)
1	2	3

4. Indicate which of the following branches your organisation belongs to. Circle what applies.

Manufacturing	Services	Building	Trade	Education
1	2	3	4	5
Another branch, please specify?				

5. Describe the nature of your organization business briefly (Optional).

II. CERTIFICATION INFORMATION

6. Please indicate for how long your organization it has been certified. Circle which applies:

Less than a Year	1 – 3 years	3 – 5 years	5 – 7 years	7 – 9 years	9 years and above
1	2	3	4	5	6

7. Please circle whether your organization has been excluded from any of the sub clauses in clause 7 for the ISO 9001:2008 or 2000 standards.

Yes	No
1	2
If Yes please indicate below which sub clause your organization is excluded from by (i.e. 7.3.6 or 7.5.5)	

8. How important each of the following reasons was for seeking ISO 9001 certification.

Motives	Not important at all	Slightly Important	Fairly Important	Very Important	Extremely Important
Improvement of company image	1	2	3	4	5
Useful marketing tool	1	2	3	4	5
Customer pressure/demand	1	2	3	4	5
Improvement of product/service quality	1	2	3	4	5
Improvement of organizational processes	1	2	3	4	5
Improvement of work efficiency	1	2	3	4	5
Reduction of paper works	1	2	3	4	5

9. To what extent do you agree that the following statements describe the **main** functions of the organization's quality management system (QMS)?

	Strongly disagree	Disagree	Neutral	Agree	Strongly Agree
Our QMS helps organize business workflow	1	2	3	4	5
Our QMS is a tool for handling documentation	1	2	3	4	5
Our QMS is a tool for standardizing organisational processes	1	2	3	4	5
Our QMS measures customer satisfaction level	1	2	3	4	5
Our QMS takes into consideration internal customer needs (Staff needs)	1	2	3	4	5
Our QMS has full control and monitoring over our suppliers	1	2	3	4	5
Our QMS is a tool to improve internal efficiency	1	2	3	4	5
Our QMS is a tool for managing business processes effectively	1	2	3	4	5
Our QMS is a tool to fulfil the customer's needs and requirements	1	2	3	4	5
Our QMS is a tool for managing and improving quality of our products	1	2	3	4	5
Our QMS is a tool for continual improvement of our organisation.	1	2	3	4	5

10. Which certification body is the certifier of your work organization?

BV	TUV Rheinland	SGS	TUV Nord	Others
1	2	3	4	5

11. If your work organization has changed the certification body please indicate what was the reason behind that.

Our previous certifier was:

BV	TUV Rheinland	SGS	TUV Nord	Others
1	2	3	4	5

We changed the certification body because:

12. Please indicate which of the following facts were guiding you in the choice of the certification body, circle all that apply.

The certification body was chosen because it								
has good reputation	is cheaper than the others	is less demanding than the others	is more demanding than the others	was recommended by a colleague	was recommended by external consultant	was known from other relationship	is located close to our organisation	is the only one possible in our business sector
1	2	3	4	5	6	7	8	9
Another fact, which?								

13. Please estimate how much your organisation has paid to the certification body for ISO 9001.

	Less than 5,000 KD	5,000 – 9,999 KD	10,000 – 14,999 KD	15,000 – 19,999 KD	20,000 KD and above
Costs of the initial/certification audit + costs of the certificate	1	2	3	4	5

	Less than 500 KD	500 – 1,000 KD	1000 – 1500 KD	1,500 – 2,000 KD	2,000 KD and above
Costs of periodic audits	1	2	3	4	5

14. Your expectation of the audit process and auditors are valuable. Please indicate to what extent do you agree with the following statements.

	Strongly disagree	Disagree	Neutral	Agree	Strongly Agree
Auditor shall primarily assure whether the documented procedures comply with the standard's requirements.	1	2	3	4	5
Auditor shall evaluate whether actual quality management activities conform to the documented procedures.	1	2	3	4	5
Auditors shall stick to noting pure compliance with the standard. Going beyond this role is unwelcome.	1	2	3	4	5
Auditor shall give an objective view on the quality management system effectiveness.	1	2	3	4	5
Auditor shall assess whether the quality management system is suitable to achieve corporate objectives and improvement.	1	2	3	4	5
Auditor shall share own experience and give suggestions for improvements.	1	2	3	4	5
Auditor should do both: evaluate the compliance with the standard's requirements and organization's quality manual	1	2	3	4	5

15. Please evaluate the auditor's performance from your current auditors and last audits.

	Strongly disagree	Disagree	Neutral	Agree	Strongly Agree
Auditors focus far too much on documentation	1	2	3	4	5
Auditors are highly demanding	1	2	3	4	5
Audits help us very much to improve our QMS	1	2	3	4	5
We learn a lot from external audits.	1	2	3	4	5
Auditors strongly improve motivation for quality work	1	2	3	4	5
Auditors succeed to obtain a complete and true picture of the actual quality practices in our organisation.	1	2	3	4	5
Auditors are competent to do their jobs	1	2	3	4	5

III. AUDIT PROCESS

16. Please indicate what type of external audits are carried out in your organisation.

Separate audit for ISO 9001	Integrated audit for ISO 9001with ISO 14001
1	2
Any other, please specify ?	

17. Please indicate how many hours/days take an external audit in your organisation.

4 – 8 hours	8 – 12 hours	12 – 16 hours	16 – 20 hours	20 hours and above
1	2	3	4	5

18. Please indicate how many auditors participate in an external audit in your organisation.

1 Auditor	2 Auditors	3 Auditors	4 Auditors	5 Auditors and more
1	2	3	4	5

19. Please indicate to what extent the following sources of information are used by your current auditors in performing an external audit?

	Never	Seldom	Sometimes	Often	Always
Interviews with quality manager	1	2	3	4	5
Interviews with top management	1	2	3	4	5
Interviews with process owners	1	2	3	4	5
Interviews with employees in non-managerial position	1	2	3	4	5
Observations of activities and the surrounding work environment	1	2	3	4	5
Quality manual	1	2	3	4	5
Documented procedures and instructions	1	2	3	4	5
Reports, minutes from internal audits	1	2	3	4	5
Reports from handling nonconformities as corrective action plans being taken	1	2	3	4	5
Reports of performance measurements etc.	1	2	3	4	5
Reports of management review meeting minutes	1	2	3	4	5

Definitions of customer requirements and expectations	1	2	3	4	5
Customer complaints and satisfaction measurements results	1	2	3	4	5
Improvement action plans	1	2	3	4	5
Evidence on progress of improvement projects	1	2	3	4	5

20. Please indicate to what extent the audit conclusions addressed the following issues.

	Never	Seldom	Sometimes	Often	Always
Auditors assured whether the quality manual complies with the standard's requirements.	1	2	3	4	5
Auditors evaluated whether the documented procedures comply with the standard's requirements.	1	2	3	4	5
Auditors described the extent of conformity of the management system with the audit criteria.	1	2	3	4	5
Auditors provided information to top management regarding the organization's ability to meet quality objectives	1	2	3	4	5
Auditors identified improvement opportunities and possible areas of risk	1	2	3	4	5
Auditors provided valuable insights for the organisation into how the QMS could become more efficient and useful.	1	2	3	4	5
If nonconformities found, the auditors made suggestions for corrective actions.	1	2	3	4	5
Auditors identified problems, which, if resolved, will enhance the organization's performance.	1	2	3	4	5
Auditors emphasized the areas of the quality management system, which they found especially effectively or successfully working.	1	2	3	4	5
Auditors encouraged and stimulated the organization to go beyond the requirements of the standard.	1	2	3	4	5

21. Please rate your external auditor's performance?

Very bad									Excellent
1	2	3	4	5	6	7	8	9	10

22. Do you think that there is another benefit from external audits besides the certificate?

No, there is no other benefit besides the certificate.	Yes, there are other benefits besides the certificate.
1	2

If you think that there are other benefits, please mention them below :

23. Please indicate to what extent you agree with the following statements.

	Strongly disagree	Disagree	Neutral	Agree	Strongly Agree
ISO 9001 standard implementation has improved our business performance	1	2	3	4	5
ISO 9001 standard implementation has improved organization's financial performance	1	2	3	4	5
ISO 9001 standard implementation has reduced paper works and documentations	1	2	3	4	5
ISO 9001 standard implementation has helped organization meet its objectives effectively	1	2	3	4	5
ISO 9001 standard has helped the organization control its outsourced processes	1	2	3	4	5
Employees do their tasks efficiently with ISO 9001 implementation	1	2	3	4	5
Customer requirements are fulfilled and controlled effectively with ISO 9001 standard implementation	1	2	3	4	5
Top management is very much involved and committed in the ISO 9001 standard implementation	1	2	3	4	5
Continual improvement programs are always adopted by our organization	1	2	3	4	5
Our organization provides proper work environment for its employees to perform their tasks efficiently	1	2	3	4	5
ISO 9001 motivates employees to do their jobs efficiently	1	2	3	4	5
Sufficient training program in ISO 9001 awareness and implementation was provided to all organization's staff	1	2	3	4	5
The audit procedure for ISO 9001 prevents stagnation and promotes improvement of the QMS,	1	2	3	4	5
ISO 9001:2008 certificate should be renewed before it expires	1	2	3	4	5

24. Is your work organization willing to renew the ISO 9001 certificate :

Yes	No	I don't know
1	2	3

25. General Questions

	0 %	1% - 25%	25% - 50%	50% - 75%	75% - 100%	-1% - (-25%)	I don't know
Our Organization has made a financial progress with the implementation of ISO 9001 QMS by	1	2	3	4	5	6	7
Our Organization has improved its management performance with the implementation of ISO 9001 QMS by	1	2	3	4	5	6	7
Our organization has improved customer satisfaction level with the implementation of ISO 9001 QMS by	1	2	3	4	5	6	7
Top management commitment and involvement has been enhanced with the implementation of ISO 9001 QMS by	1	2	3	4	5	6	7

26. <u>COMMENTS ON THE QUESTIONNAIRE</u>

26a) Do you think there were questions which were difficult to answer? Please mention them here
26b) Can you give us some spontaneous comments on the questionnaire?

Thank you for taking the time to complete the survey!

A(3.2) Format(B)

1- Please indicate your position at the organisation and name of the organization.

2- How important each of the following reasons was for seeking ISO 9001 certification.

Motives	Not important at all	Slightly Important	Fairly Important	Very Important	Extremely Important
Improvement of company image	1	2	3	4	5
Useful marketing tool	1	2	3	4	5
Customer pressure/demand	1	2	3	4	5
Improvement of product/service quality	1	2	3	4	5
Improvement of organizational processes	1	2	3	4	5
Improvement of work efficiency	1	2	3	4	5
Reduction of paper works	1	2	3	4	5

3- To what extent do you agree that the following statements describe the main functions of the organization's quality management system (QMS)?

	Strongly disagree	Disagree	Neutral	Agree	Strongly Agree
Our QMS helps organize business workflow	1	2	3	4	5
Our QMS is a tool for handling documentation	1	2	3	4	5
Our QMS is a tool for standardizing organisational processes	1	2	3	4	5
Our QMS measures customer satisfaction level	1	2	3	4	5
Our QMS takes into consideration internal customer needs (Staff needs)	1	2	3	4	5
Our QMS has full control and monitoring over our suppliers	1	2	3	4	5
Our QMS is a tool to improve internal efficiency	1	2	3	4	5
Our QMS is a tool for managing business processes effectively	1	2	3	4	5
Our QMS is a tool to fulfil the customer's needs and requirements	1	2	3	4	5
Our QMS is a tool for managing and improving quality of our products	1	2	3	4	5
Our QMS is a tool for continual improvement of our organization	1	2	3	4	5

4- Your expectation of the audit process and auditors are valuable. Please indicate to what extent do you agree with the following statements.

	Strongly disagree	Disagree	Neutral	Agree	Strongly Agree
Auditor shall primarily assure whether the documented procedures comply with the standard's requirements.	1	2	3	4	5
Auditor shall evaluate whether actual quality management activities conform to the documented procedures.	1	2	3	4	5
Auditors shall stick to noting pure compliance with the standard. Going beyond this role is unwelcome.	1	2	3	4	5
Auditor shall give an objective view on the quality management system effectiveness.	1	2	3	4	5
Auditor shall assess whether the quality management system is suitable to achieve corporate objectives and improvement.	1	2	3	4	5
Auditor shall share own experience and give suggestions for improvements.	1	2	3	4	5
Auditor should do both: evaluate the compliance with the standard's requirements and organization's quality manual	1	2	3	4	5

5- Please evaluate the auditor's performance from your current auditors and last audits.

	Strongly disagree	Disagree	Neutral	Agree	Strongly Agree
Auditors focus far too much on documentation	1	2	3	4	5
Auditors are highly demanding	1	2	3	4	5
Audits help us very much to improve our QMS	1	2	3	4	5
We learn a lot from external audits.	1	2	3	4	5
Auditors strongly improve motivation for quality work	1	2	3	4	5
Auditors succeed to obtain a complete and true picture of the actual quality practices in our organisation.	1	2	3	4	5
Auditors are competent to do their jobs	1	2	3	4	5

6- From last external audit, please rate your external auditor's performance?

Very bad									Excellent
1	2	3	4	5	6	7	8	9	10

7- Do you think that there is another benefit from external audits besides the certificate?

No, there is no other benefit besides the certificate.	Yes, there are other benefits besides the certificate.
1	2
If you think that there are other benefits, please mention them below :	

8- Please indicate to what extent you agree with the following statements :

	Strongly disagree	Disagree	Neutral	Agree	Strongly Agree
ISO 9001 standard implementation has improved our business performance	1	2	3	4	5
ISO 9001 standard implementation has improved organization's financial performance	1	2	3	4	5
ISO 9001 standard implementation has reduced paper works and documentations	1	2	3	4	5
ISO 9001 standard implementation has helped organization meet its objectives effectively	1	2	3	4	5
ISO 9001 standard has helped the organization control its outsourced processes	1	2	3	4	5
Employees do their tasks efficiently with ISO 9001 implementation	1	2	3	4	5
Customer requirements are fulfilled and controlled effectively with ISO 9001 standard implementation	1	2	3	4	5
Top management is very much involved and committed in the ISO 9001 standard implementation	1	2	3	4	5
Continual improvement programs are always adopted by our organization	1	2	3	4	5
Our organization provides proper work environment for its employees to perform their tasks efficiently	1	2	3	4	5
ISO 9001 motivates employees to do their jobs efficiently	1	2	3	4	5
Sufficient training program in ISO 9001 awareness and implementation was provided to all organization's staff	1	2	3	4	5
The audit procedure for ISO 9001 prevents stagnation and promotes improvement of the QMS,	1	2	3	4	5
ISO 9001:2008 certificate should be renewed before it expires	1	2	3	4	5

9- Is your work organization willing to renew the ISO 9001 certificate :

Yes	No	I don't know
1	2	3

10. General Questions

	0 %	1% - 25%	25% - 50%	50% - 75%	75% - 100%	-1% - (-25%)	I don't know
Our Organization has made a financial progress with the implementation of ISO 9001 QMS by	1	2	3	4	5	6	7
Our Organization has improved its management performance with the implementation of ISO 9001 QMS by	1	2	3	4	5	6	7
Our organization has improved customer satisfaction level with the implementation of ISO 9001 QMS by	1	2	3	4	5	6	7
Top management commitment and involvement has been enhanced with the implementation of ISO 9001 QMS by	1	2	3	4	5	6	7

11.COMMENTS ON THE QUESTIONNAIRE

11a) Do you think there were questions which were difficult to answer? Please mention them here
11b) Can you give us some spontaneous comments on the questionnaire?

Thank you for taking the time to complete the survey!

Appendix A4

A(4.1)

List of tables

Table (4.3) *Motives for the choice of certification bodies.*

Research items	Sweden		Kuwait	
The certification body was chosen because it	N	Percent of answers	N	Percent of answers
has good reputation	117	26.6	59	46.1
was known from other relationship	80	18.2	13	10.1
was recommended by external consultant	67	15.2	21	16.4
is cheaper than the others	47	10.7	15	11.7
was recommended by a colleague	45	10.2	5	3.9
is situated close to our organization	25	5.7	3	2.3
is more demanding than the others	14	3.2	8	6.2
is the only one possible in our business sector	5	1.1	0	0
is less demanding than the others	3	0.7	1	1
is international	17	3.9	3	2.3
Others	20	4.5	0	0
Total	440	100	128	100*

Note : * The total is greater than surveyed people (98 individuals) which it represents the total number of different selections made for a single case (a survey question), meaning that a surveyed individual could have answered the same question with multiple answers such as good reputation and was known from other relationship were both chosen.

Table (4.5) *The role of ISO 9001 auditor as perceived by quality and non-quality related employees in the Kuwaiti organizations*

Research items	Kuwait-format (A)			Kuwait-format (B)			P-values
	N	Mean	SD	N	Mean	SD	
Auditor shall share own experience and give suggestions for Improvements.	98	4.38	0.78	69	4.19	0.63	0.014
Auditor shall give an objective view on the QMS Effectiveness	98	4.44	0.66	69	4.38	0.69	0.15
Auditor shall evaluate whether actual quality management activities conform to the documented procedures	98	3.56	1.08	69	3.41	0.99	0.563
Auditor shall assess whether the QMS is suitable to achieve corporate objectives and improvement	98	4.23	0.8	69	4.1	0.73	0.437
Auditor should do both: evaluate the compliance with the standard's requirements and work as an improvement consultant	98	4.13	0.77	69	4	0.89	0.214
Auditor shall primarily check whether the documented procedures comply with the standard's requirements	98	4.04	0.9	69	4.22	0.79	0.281
Auditors shall stick to noting pure compliance with the standard. Going beyond this role is unwelcome	98	4.34	0.73	69	4.17	0.82	0.235

N : Total Surveyed.

Used Scaling :

1 – 5 point Likert Scale, 1. Strongly Disagree, 2. Disagree, 3. Neutral, 4. Agree, and 5. Strongly Agree

Table (4.7) *Auditors' performances as perceived by quality and non-quality employees in the Kuwaiti organizations*

Research items	Kuwait-format (A)			Kuwait-format (B)			P-values
	N	Mean	SD	N	Mean	SD	
Auditors focus far too much on documentation	98	3.5	0.83	69	3.93	0.88	0.002
Auditors are highly demanding	98	3.22	0.81	69	3.46	1.04	0.115
Audits help us very much to improve our QMS	98	4.23	0.69	69	4.01	0.92	0.154
We learn a lot from external audits.	98	4.07	0.75	69	3.84	0.78	0.058
Auditors strongly improve motivation for quality work	98	3.97	0.68	69	3.78	0.89	0.204
Auditors succeed to obtain a complete and true picture of the actual quality practices in our organisation.	98	3.87	0.76	69	3.84	0.74	0.73
Auditors are competent to do their jobs	98	4.14	0.73	69	4.1	0.77	0.69

Table (4.8) *Auditors' performances as perceived by quality employees in the private and government sectors*

Research items	Government sector			Private sector			P-values
	N	Mean	SD	N	Mean	SD	
Auditors focus far too much on documentation	18	3.61	0.689	80	3.48	0.86	0.557
Auditors are highly demanding	18	3.28	0.752	80	3.47	1.04	0.605
Audits help us very much to improve our QMS	18	3.94	0.802	80	4.3	0.64	0.07
We learn a lot from external audits.	18	3.67	0.767	80	4.16	0.72	0.013
Auditors strongly improve motivation for quality work	18	3.72	0.575	80	4.03	0.69	0.072
Auditors succeed to obtain a complete and true picture of the actual quality practices in our organisation.	18	3.61	0.979	80	3.93	0.69	0.112
Auditors are competent to do their jobs	18	3.5	0.985	80	4.29	0.58	0.001

N : Total Surveyed, SD : Standard Deviation.
Used Scaling :
1 – 5 point Likert Scale, 1. Strongly Disagree, 2. Disagree, 3. Neutral, 4. Agree, and 5. Strongly Agree

Table (4.9) *Sources of information collected by auditors in Swedish and Kuwaiti organizations*

Research items	Sweden			Kuwait			P-values	
	N	Mean	SD	N	Mean	SD	PV1	PV2
Interviews with quality manager	265	5.98	1.28	98	4.69	0.66	0	0
Interviews with top management	267	5.39	1.29	98	3.84	1.15	0.93	0.94
Interviews with process owners	260	5.02	1.42	98	4.35	0.95	0	0
Interviews with employees in non-managerial position	268	4.43	1.59	98	3.61	1.17	0	0
Observations of activities and the surrounding work environment	266	4.81	1.36	98	4.11	0.93	0	0
Quality manual	267	5.22	1.6	98	4.77	0.55	0	0
Documented procedures and instructions	267	5.31	1.28	98	4.77	0.49	0	0
Reports, minutes from internal audits	268	5.48	1.34	98	4.71	0.57	0	0
Reports from handling nonconformities as corrective action plans being taken	267	5.5	1.28	98	4.73	0.55	0	0
Reports of performance measurements etc.	267	4.93	1.54	98	4.51	0.69	0	0
Reports of management review meeting minutes	NI	NI	NI	98	4.77	0.47	NI	NI
Definitions of customer requirements and expectations	267	4.58	1.48	98	4.24	0.84	0	0
Customer complaints and satisfaction measurements results	268	5.19	1.38	98	4.55	0.72	0	0
Improvement action plans	267	5.13	1.36	98	4.39	0.77	0	0
Evidence on progress of improvement projects	265	4.74	1.48	98	4.27	0.81	0	0

N : Total Surveyed, SD : Standard Deviation, NI : Not investigated.

Used Scaling :Sweden : 1 – 7 point Likert Scale, 1. Not At All, and 7. Very Much.

Kuwait : 1 – 5 point Likert Scale, 1. Never, 2. Seldom, 3. Sometimes, 4. Often, and 5. Always

PV1 : P-value calculated when both variances are assumed equal.

PV2 : P-value calculated when both variances are assumed unequal.

Table (4.10) *Content of audit report submitted to the Swedish and Kuwaiti organizations*

Research items	Sweden			Kuwait			P-values	
	N	Mean	SD	N	Mean	SD	PV1	PV2
Auditors assured whether the quality manual complies with the standard's requirements.	266	5.41	1.3	98	4.72	0.55	0	0
Auditors evaluated whether the documented procedures comply with the standard's requirements.	268	5.29	1.54	98	4.78	0.49	0	0
Auditors described the extent of conformity of the management system with the audit criteria.	266	4.95	1.46	98	4.57	0.64	0	0
Auditors provided information to top management regarding the organization's ability to meet quality objectives	268	5.08	1.63	98	4.26	1.03	0	0
Auditors identified improvement opportunities and possible areas of risk	268	5.19	1.44	98	4.24	0.9	0	0
Auditors provided valuable insights for the organisation into how the QMS could become more efficient and useful.	268	4.74	1.53	98	4.15	0.83	0	0
If nonconformities were found, the auditors made suggestions for corrective actions.	268	4.18	1.66	98	3.96	1.26	0	0
Auditors identified problems, which, if resolved, will enhance the organization's performance.	268	4.28	1.52	98	3.79	1	0	0
Auditors emphasized the areas of the quality management system, which they found especially effectively or successfully working.	268	4.82	1.47	98	4.06	0.92	0	0
Auditors encouraged and stimulated the organization to go beyond the requirements of the standard.	267	3.94	1.71	98	3.51	1.43	0	0

N : Total surveyed, SD : Standard Deviation.

Sweden : 1 – 7 point Likert Scale, 1. Not At All, and 7. Very Much. Kuwait

Kuwait : 1 – 5 point Likert Scale, 1. Never, 2. Seldom, 3. Sometimes, 4. Often, and 5. Always

PV1 : P-value calculated when both variances are assumed equal.

PV2 : P-value calculated when both variances are assumed unequal.

Table (4.11) *QMS functions as perceived by quality and non-quality employees in the Kuwaiti organizations*

Research items	Kuwait-format (A)			Kuwait-format (B)			P-value
	N	Mean	SD	N	Mean	SD	
Our QMS helps organize business workflow	98	4.23	0.64	69	4.13	0.59	0.192
Our QMS is a tool for handling documentation	98	4.2	0.63	69	4.06	0.75	0.298
Our QMS is a tool for standardizing organisational processes	98	4.26	0.61	69	4.3	0.6	0.621
Our QMS measures customer satisfaction level	98	4.23	0.73	69	4.12	0.72	0.217
Our QMS takes into consideration internal customer needs (Staff needs)	98	3.76	0.72	69	3.71	0.82	0.891
Our QMS has full control and monitoring over our suppliers	98	3.66	0.89	69	3.77	0.93	0.422
Our QMS is a tool to improve internal efficiency	98	4.12	0.6	69	4.01	0.65	0.358
Our QMS is a tool for managing business processes effectively	98	4.12	0.69	69	4.14	0.67	0.89
Our QMS is a tool to fulfil the customer's needs and requirements	98	4.14	0.66	69	4.01	0.76	0.276
Our QMS is a tool for managing and improving quality of our products	98	4.15	0.69	69	4.22	0.73	0.47
Our QMS is a tool for continual improvement of our organisation.	98	4.38	0.62	69	4.23	0.62	0.115

N : Total Surveyed, SD : Standard Deviation.

Used Scaling :
1 – 5 point Likert Scale, 1. Strongly Disagree, 2. Disagree, 3. Neutral, 4. Agree, and 5. Strongly Agree

Table (4.12) *Calculated p-values for testing differences in a QMS awareness level among different business types, sectors, and job positions*

Research items	Org. Type	Business sector	Job positions
ISO 9001 standard implementation has improved our business performance	NSIG 0.745	NSIG 0.558	NSIG 0.626
ISO 9001 standard implementation has helped organization meet its objectives effectively	NSIG **0.057**	NSIG 0.338	NSIG 0.692
ISO 9001 standard has helped the organization control its outsourced processes	NSIG 0.687	NSIG 0.471	NSIG 0.858
Customer requirements are fulfilled and controlled effectively with ISO 9001 standard implementation	NSIG 0.067	NSIG 0.516	NSIG 0.46
Top management is very much involved and committed in the ISO 9001 standard implementation	NSIG 0.089	NSIG 0.203	NSIG 0.269
Continual improvement programs are always adopted by our organization	NSIG 0.123	NSIG 0.089	NSIG 0.106
Our organization provides proper work environment for its employees to perform their tasks efficiently	SIG **0.005**	SIG **0.044**	NSIG 0.519
Sufficient training program in ISO 9001 awareness and implementation was provided to all organization's staff	NSIG 0.175	NSIG 0.387	NSIG 0.72
The audit procedure for ISO 9001 prevents stagnation and promotes improvement of the QMS.	NSIG 0.422	NSIG 0.243	NSIG 0.402
Employees do their tasks efficiently with ISO 9001 implementation	NSIG 0.219	NSIG 0.564	NSIG 590

Note: NSIG : Not statistically significant, SIG : Statistically significant, and printed p-values

List of figures for demographic variables
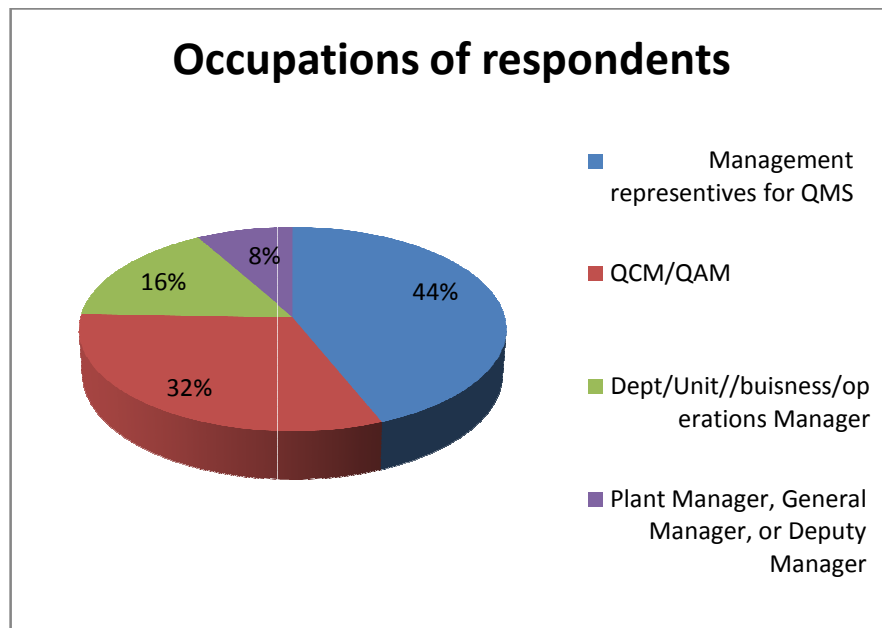
Figure (4.6) Occupations' respondents in percentages
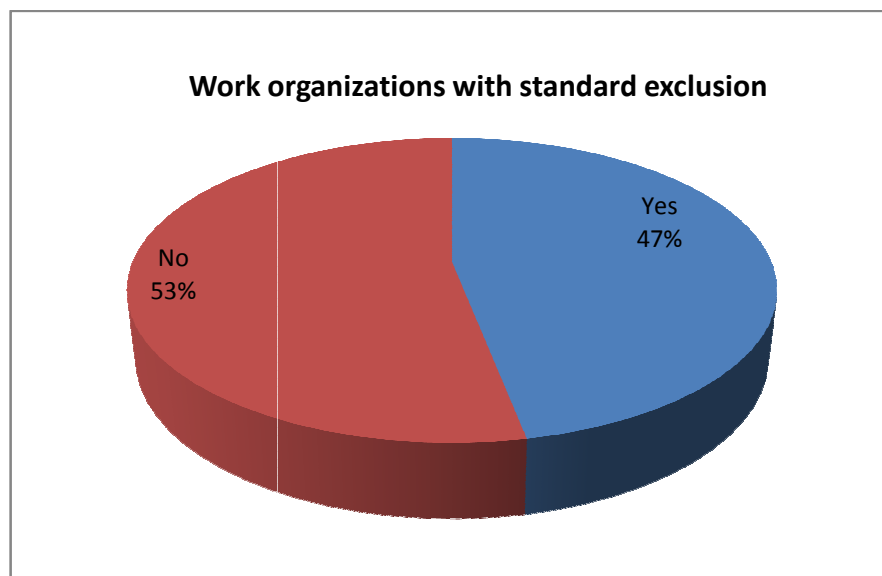
Figure (4.7) Work organizations with a clause exclusion from the standard
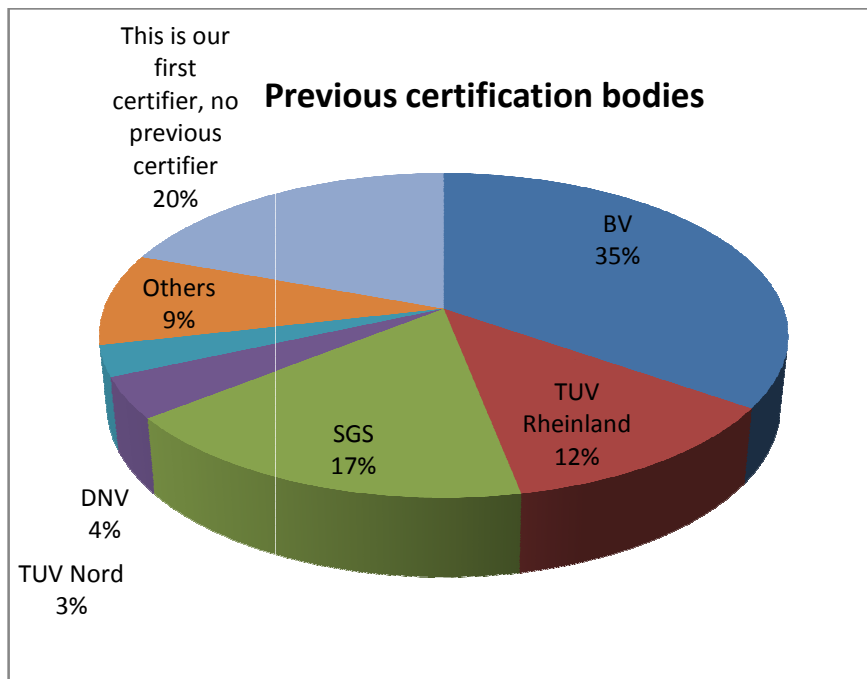
Figure (4.8) Previous certification bodies in percentages
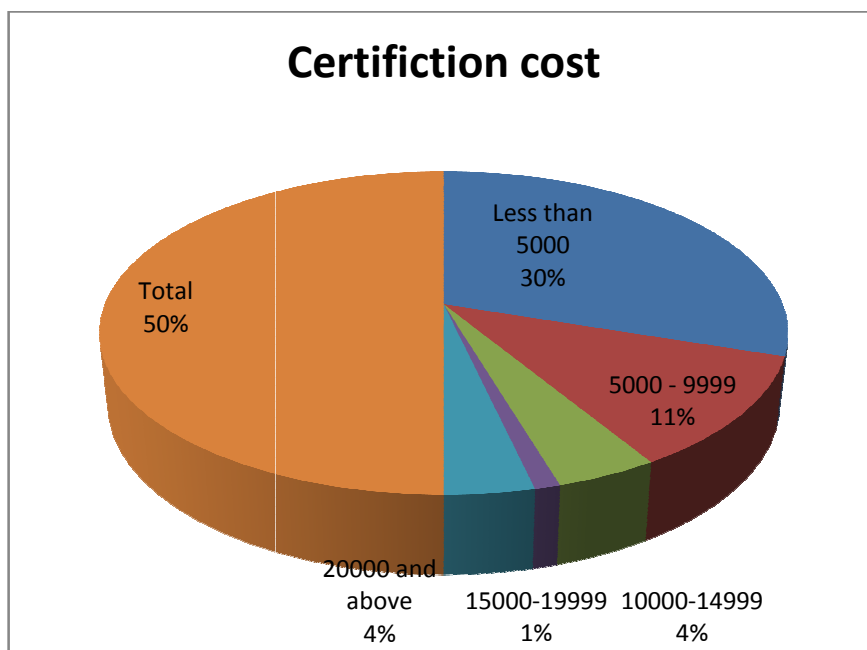
Figure (4.9) Range for the cost of certifications in Kuwaiti Dinars
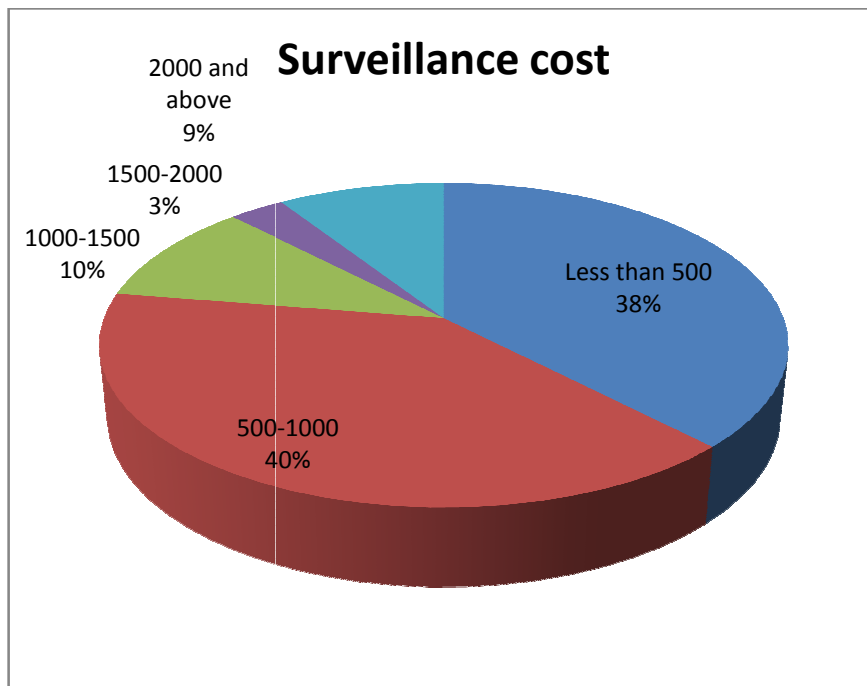
Figure (4.10) Cost of periodic audit in Kuwaiti Dinars
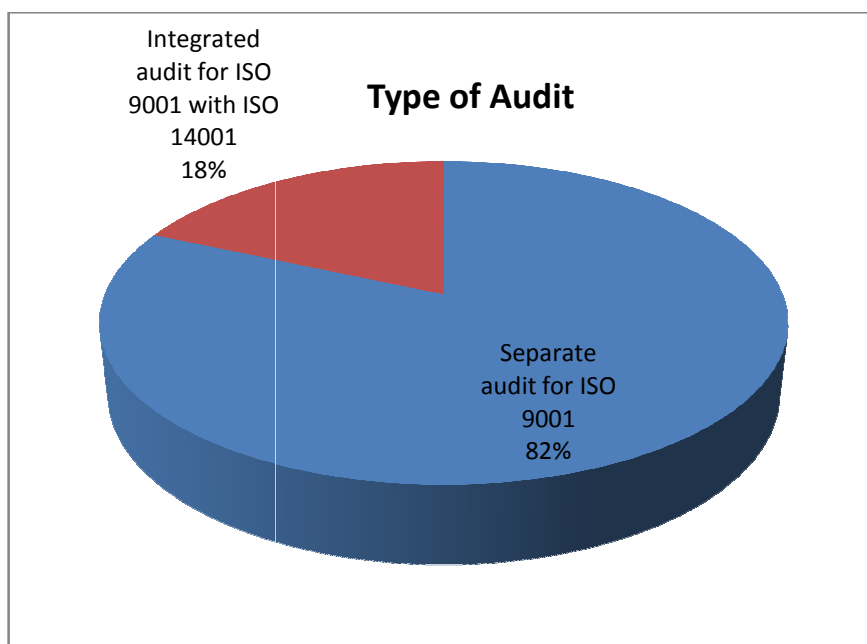
Figure (4.11) Audit type conducted for the organizations
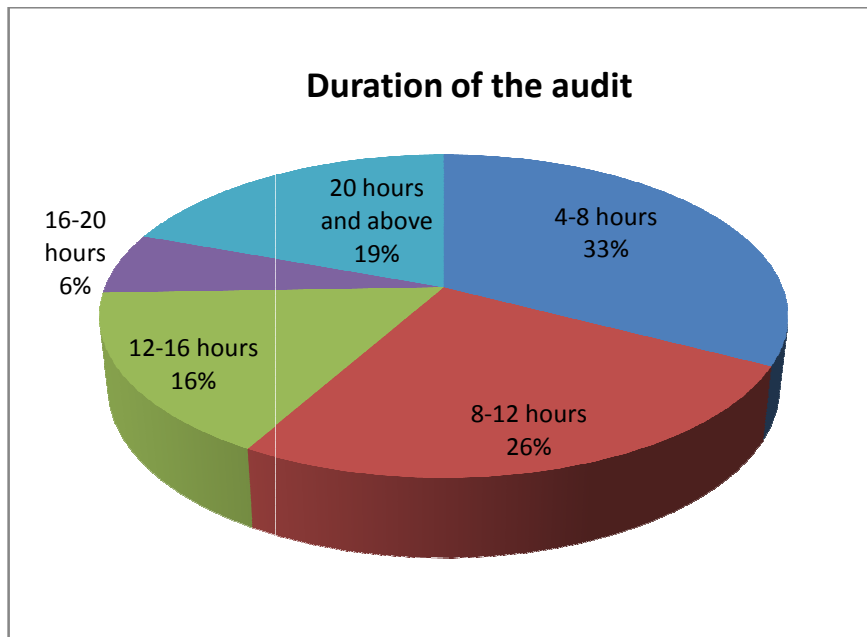
Figure (4.12) Proportion of the length of audit in hours
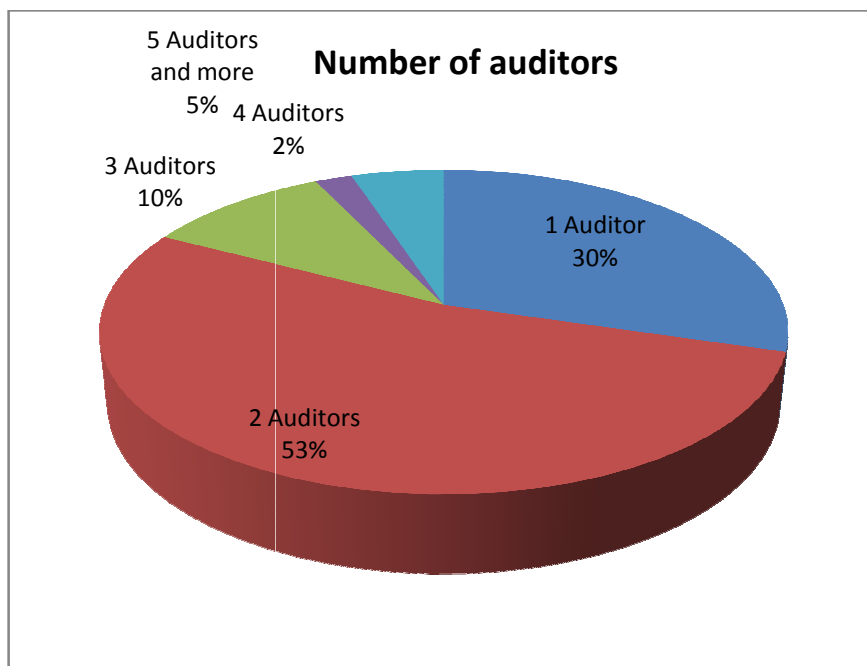
Figure (4.13) Number of auditors conducting the audit in the organization
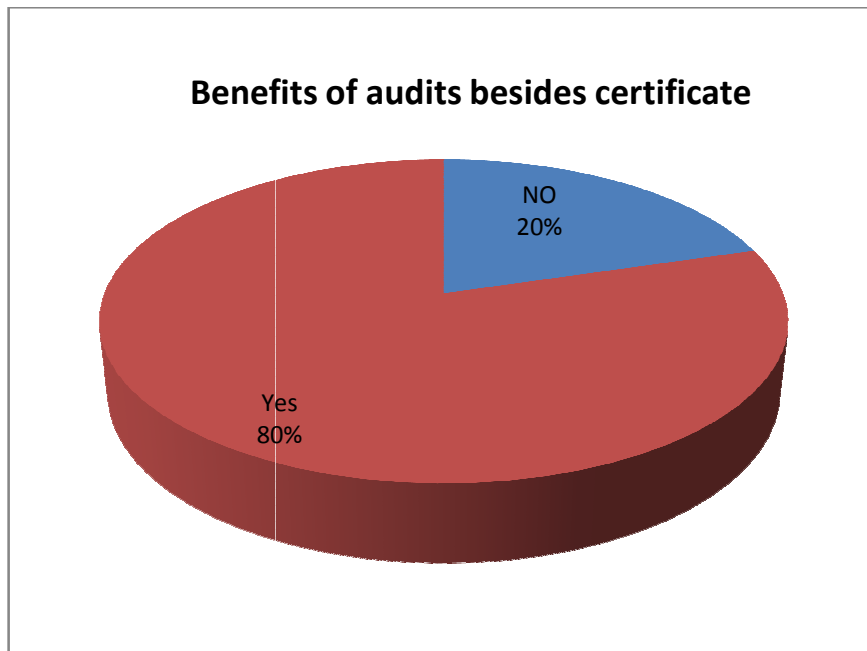
Figure (4.14) Proportion of organizations that benefit from audits

Figure (4.15) Proportion of organization willing to renew certificate
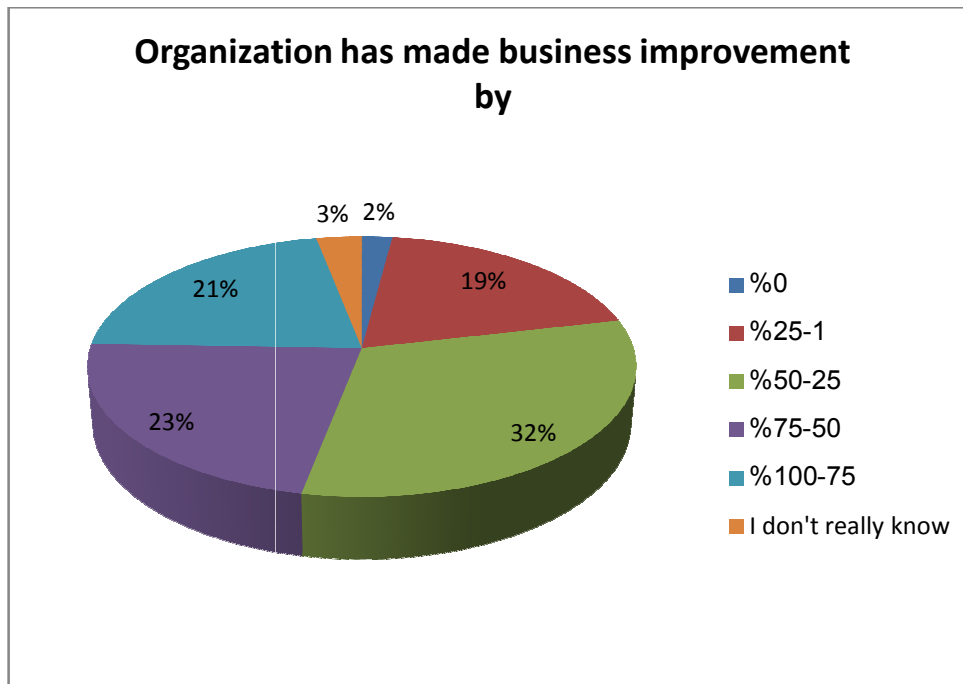
Figure (4.16) Percentages of business improvements seen by the organizations
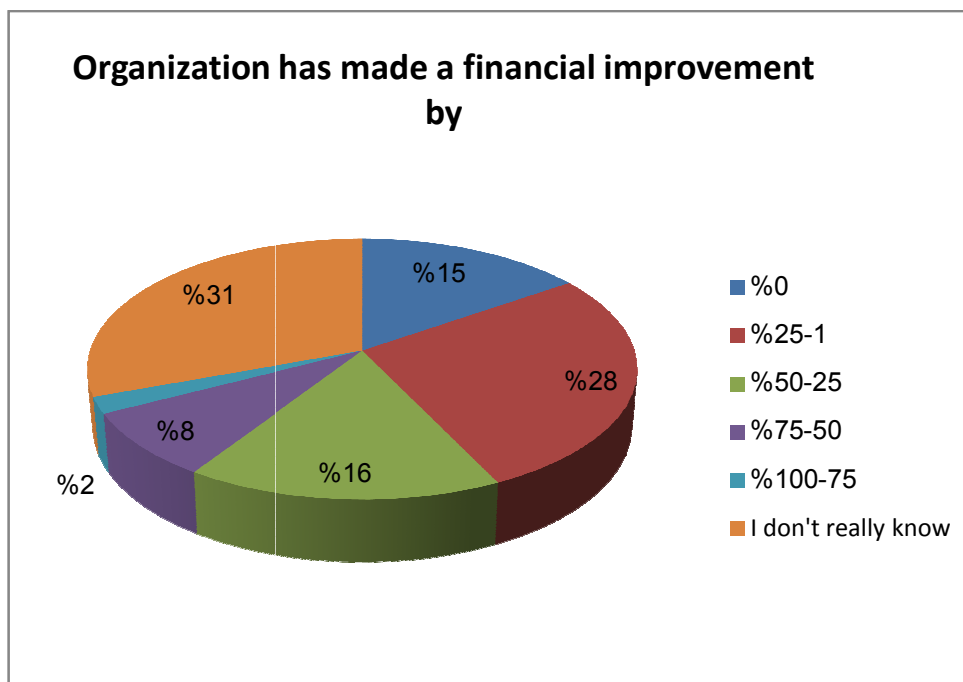
Figure (4.17) Percentages of financial improvements seen by the organizations
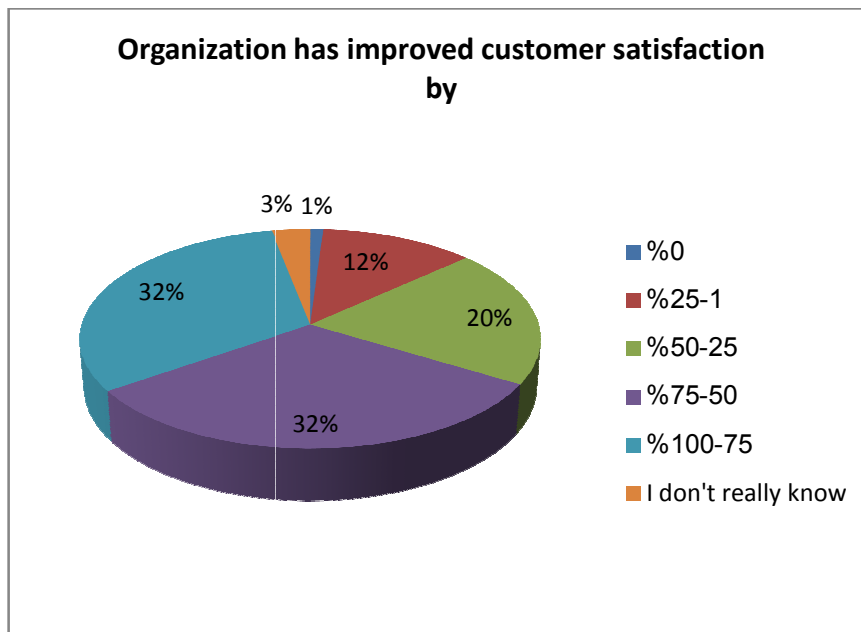
Figure (4.18) Percentages of improved customer satisfaction
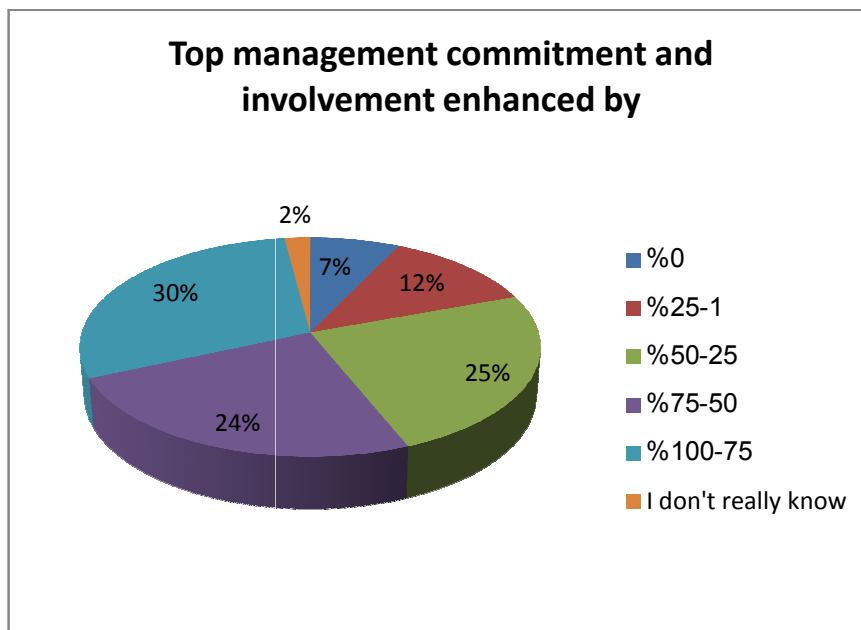
Figure (4.19) Percentages of enhanced top management commitment and involvement

Appendix A5

Table (5.3) Descriptive statistics for the factors

	N	Minimum	Maximum	Mean		Std. Deviation	Variance
	Statistic	Statistic	Statistic	Statistic	Std. Error	Statistic	Statistic
EXM	170	2	5	3.9215	0.05609	0.73132	0.535
INM	170	1.33	5	4.2625	0.05921	0.77197	0.596
CSF	170	1.67	5	3.9728	0.05187	0.67633	0.457
QMF	170	2.98	5	4.3181	0.03946	0.51443	0.265
CAS	170	1.31	5	4.3826	0.04816	0.62794	0.394
PAA	170	2.34	5	4.0656	0.04332	0.56479	0.319
NAA	170	2	5	3.3118	0.05126	0.66829	0.447
DOCR	170	2.76	5	4.7599	0.03469	0.45229	0.205
CONTIMP	170	1	5	4.4182	0.04929	0.64271	0.413
SPISOREP	170	1.38	5	4.0346	0.0621	0.80975	0.656
GISOREP	170	2.39	5	4.7015	0.03677	0.47946	0.23
TMC	170	2.02	5	4.007	0.0529	0.68971	0.476
ISOIMP	170	2	5	3.891	0.04282	0.55826	0.312
Valid N (listwise)	170						

Table (5.4) Testing weighted factors between governmental and private sectors

	EXM	INM	CSF	QMF	CAS	PAA	NAA	DOCR	CONTIMP	SPISOREP	GISOREP	TMC	ISOIMP
Mann-Whitney U	1422	1559.5	1555.5	1594.5	1381	1111	1475	1305.5	1324.5	1327.5	1453	1026.5	1482.5
Wilcoxon W	1698	1835.5	1831.5	12472.5	1657	1387	12353	1581.5	1600.5	1603.5	1729	1302.5	1758.5
Z	-1.244	-0.607	-0.623	-0.447	-1.452	-2.672	-1.007	-2.099	-1.713	-1.66	-1.19	-3.07	-0.958
Asymp. Sig. (2-tailed)	0.213	0.544	0.533	0.655	0.146	**0.008**	0.314	**0.036**	0.087	0.097	0.234	**0.002**	0.338

Table (5.5) Testing weighted factors among different nature of businesses

	EXM	INM	CSF	QMF	CAS	PAA	NAA	DOCR	CONTIMP	SPISOREP	GISOREP	TMC	ISOIMP
Chi-Square	4.192	5.715	0.579	3.355	3.909	1.199	1.539	8.692	6.633	3.096	5.565	13.434	2.712
df	4	4	4	4	4	4	4	4	4	4	4	4	4
Asymp. Sig.	0.381	0.221	0.965	0.5	0.419	0.878	0.82	0.069	0.157	0.542	0.234	**0.009**	0.607

Table (5.6) Testing weighted factors among different organization sizes

	EXM	INM	CSF	QMF	CAS	PAA	NAA	DOCR	CONTIMP	SPISOREP	GISOREP	TMC	ISOIMP
Chi-Square	6.691	9.166	2.155	8.207	2.883	1.447	3.799	6.375	9.413	16.978	9.424	13.603	1.621
df	4	4	4	4	4	4	4	4	4	4	4	4	4
Asymp. Sig.	0.153	0.057	0.707	0.084	0.578	0.836	0.434	0.173	0.052	0.002	0.051	0.009	0.805

Table (5.7) Testing weighted factors among different global organization sizes*.

	EXM	INM	CSF	QMF	CAS	PAA	NAA	DOCR	CONTIMP	SPISOREP	GISOREP	TMC	ISOIMP
Chi-Square	14.28	6.289	5.103	2.402	7.574	3.293	11.342	6.524	4.936	17.445	9.86	10.141	5.635
df	5	5	5	5	5	5	5	5	5	5	5	5	5
Asymp. Sig.	0.014	0.279	0.403	0.791	0.181	0.655	0.045	0.258	0.424	0.004	0.079	0.071	0.343

*. Only 20.6% are global organizations

Table (5.8) Testing weighted factors among different lengths of organizations' certificates

Test Statistics^{a,b}

	EXM	INM	CSF	QMF	CAS	PAA	NAA	DOCR	CONTIMP	SPISOREP	GISOREP	TMC	ISOIMP
Chi-Square	9.654	10.615	8.796	11.123	5.39	5.905	14.326	8.996	2.346	9.419	6.269	18.788	20.228
df	5	5	5	5	5	5	5	5	5	5	5	5	5
Asymp. Sig.	0.086	0.06	0.117	0.049	0.37	0.316	0.014	0.109	0.799	0.093	0.281	0.002	0.001

a. Kruskal-Wallis Test

b. Grouping Variable: How long have your organization been ISO 9001 certified

Table (5.9) Testing weighted factors among different respondents' job positions

Test Statistics^{a,b}

	EXM	INM	CSF	QMF	CAS	PAA	NAA	DOCR	CONTIMP	SPISOREP	GISOREP	TMC	ISOIMP
Chi-Square	2.344	5.735	4.094	3.964	9.198	2.106	8.007	4.902	5.169	10.078	4.878	12.47	6.235
df	3	3	3	3	3	3	3	3	3	3	3	3	3
Asymp. Sig.	0.504	0.125	0.251	0.265	0.027	0.551	0.046	0.179	0.16	0.018	0.181	0.006	0.101

a. Kruskal-Wallis Test

b. Grouping Variable: Define Occupation

Table (5.10) Testing weighted factors among organizations with and without standard exclusions

Test Statistics^a

	EXM	INM	CSF	QMF	CAS	PAA	NAA	DOCR	CONTIMP	SPISOREP	GISOREP	TMC	ISOIMP
Mann-Whitney U	2860.5	3319	3435.5	2928.5	3504.5	3403	3301	3418	3445.5	3474.5	3007	3329.5	3106
Wilcoxon W	6100.5	6559	7530.5	6168.5	7599.5	6643	6541	6658	7540.5	6714.5	7102	6569.5	6346
Z	-2.348	-0.892	-0.52	-2.144	-0.307	-0.622	-0.957	-0.68	-0.496	-0.393	-2.036	-0.857	-1.559
Asymp. Sig. (2-tailed)	0.019	0.373	0.603	0.032	0.759	0.534	0.338	0.496	0.62	0.694	0.042	0.391	0.119

a. Grouping Variable: Please indicate whether your organization is excluded in clause (7) of the standard

Table (5.11) Testing weighted factors among different choice of certification bodies

Test Statistics [a,b]

	EXM	INM	CSF	QMF	CAS	PAA	NAA	DOCR	CONTIMP	SPISOREP	GISOREP	TMC	ISOIMP
Chi-Square	4.849	23.55	6.121	7.952	4.354	5.3	10.309	13.476	1.168	13.846	9.111	3.152	3.592
df	4	4	4	4	4	4	4	4	4	4	4	4	4
Asymp. Sig.	0.303	0	0.19	0.093	0.36	0.258	0.036	0.009	0.883	0.008	0.058	0.533	0.464

a. Kruskal-Wallis Test

b. Grouping Variable: Which certification body is the certifier of your organization

Table (5.12) Testing weighted factors among different cost of certifications

Test Statistics [a,b]

	EXM	INM	CSF	QMF	CAS	PAA	NAA	DOCR	CONTIMP	SPISOREP	GISOREP	TMC	ISOIMP
Chi-Square	7.237	3.692	2.858	12.754	7.168	2.517	3.327	19.673	16.671	6.873	7.971	8.255	6.949
df	4	4	4	4	4	4	4	4	4	4	4	4	4
Asymp. Sig.	0.124	0.449	0.582	0.013	0.127	0.642	0.505	0.001	0.002	0.143	0.093	0.083	0.139

a. Kruskal-Wallis Test

b. Grouping Variable: Certification Cost

Table (5.13) Testing weighted factors among different surveillance cost

Test Statistics [a,b]

	EXM	INM	CSF	QMF	CAS	PAA	NAA	DOCR	CONTIMP	SPISOREP	GISOREP	TMC	ISOIMP
Chi-Square	20.952	1.883	5.505	9.33	6.808	5.878	5.606	3.358	5.614	11.823	7.79	8.691	3.93
df	4	4	4	4	4	4	4	4	4	4	4	4	4
Asymp. Sig.	0	0.757	0.239	0.053	0.146	0.208	0.231	0.5	0.23	0.019	0.1	0.069	0.416

a. Kruskal-Wallis Test

b. Grouping Variable: Surveillance Audit cost

Table (5.14) Testing weighted factors between two types of audits

Test Statistics [a]

	EXM	INM	CSF	QMF	CAS	PAA	NAA	DOCR	CONTIMP	SPISOREP	GISOREP	TMC	ISOIMP
Mann-Whitney U	2116.5	2046.5	2083.5	2111.5	1648.5	2015.5	1983	1896	2126	2166.5	1841.5	2033	2037.5
Wilcoxon W	2644.5	11637.5	11674.5	2639.5	2176.5	11606.5	11574	11487	11717	11757.5	2369.5	11624	11628.5
Z	-0.371	-0.654	-0.503	-0.393	-2.297	-0.777	-0.92	-1.489	-0.336	-0.166	-1.607	-0.708	-0.687
Asymp. Sig. (2-tailed)	0.711	0.513	0.615	0.694	0.022	0.437	0.358	0.137	0.737	0.868	0.108	0.479	0.492

a. Grouping Variable: Type of external audits conducted in your organization

Table (5.15) Testing weighted factors among different audit durations

Test Statistics[a,b]

	EXM	INM	CSF	QMF	CAS	PAA	NAA	DOCR	CONTIMP	SPISOREP	GISOREP	TMC	ISOIMP
Chi-Square	0.758	9.744	2.927	2.441	0.549	5.624	6.668	13.361	3.068	6.17	17.565	9.31	13.002
df	4	4	4	4	4	4	4	4	4	4	4	4	4
Asymp. Sig.	0.944	0.045	0.57	0.655	0.969	0.229	0.154	0.01	0.547	0.187	0.002	0.054	0.011

a. Kruskal-Wallis Test

b. Grouping Variable: Duration of the audit

Table (5.16) Testing weighted factors among different number of auditors

Test Statistics[a,b]

	EXM	INM	CSF	QMF	CAS	PAA	NAA	DOCR	CONTIMP	SPISOREP	GISOREP	TMC	ISOIMP
Chi-Square	2.824	13.522	3.417	7.571	12.006	13.856	6.355	9.818	1.915	8.831	13.07	9.732	7.922
df	4	4	4	4	4	4	4	4	4	4	4	4	4
Asymp. Sig.	0.588	0.009	0.491	0.109	0.017	0.008	0.174	0.044	0.751	0.065	0.011	0.045	0.094

a. Kruskal-Wallis Test

b. Grouping Variable: Number of external auditors participated in auditing your organization

Table (5.17) Testing weighted factors among organizations whether they benefited from ISO

Test Statistics[a]

	EXM	INM	CSF	QMF	CAS	PAA	NAA	DOCR	CONTIMP	SPISOREP	GISOREP	TMC	ISOIMP
Mann-Whitney U	1432.5	1442.5	1511.5	1768	1086	1468	1955.5	1834.5	1613	1672	1855.5	1319	752.5
Wilcoxon W	2027.5	2037.5	2106.5	2363	1681	2063	11271.5	2429.5	2208	2267	2450.5	1914	1347.5
Z	-3.485	-3.443	-3.158	-2.167	-4.919	-3.328	-1.424	-2.227	-2.798	-2.502	-1.956	-3.926	-6.142
Asymp. Sig. (2-tailed)	0	0.001	0.002	0.03	0	0.001	0.154	0.026	0.005	0.012	0.05	0	0

a. Grouping Variable: Do you think there is benefit from external audits besides the certificate

Appendix A6

Table 6.1 *Factor Correlation matrix*

		EXM	INM	CSF	QMF	CAS	DOCR	CONTIMP	GISOREP	TMC	ISOIMP
						Correlations					
EXM	Pearson Correlation	1	.415**	.154*	.205**	.184*	.016	.130	.006	.104	.324**
	Sig. (2-tailed)		.000	.045	.007	.016	.839	.091	.937	.177	.000
	N	170	170	170	170	170	170	170	170	170	170
INM	Pearson Correlation	.415**	1	.321**	.407**	.372**	.166*	.211**	.094	.361**	.504**
	Sig. (2-tailed)	.000		.000	.000	.000	.030	.006	.221	.000	.000
	N	170	170	170	170	170	170	170	170	170	170
CSF	Pearson Correlation	.154*	.321**	1	.392**	.328**	.303**	.255**	.110	.386**	.578**
	Sig. (2-tailed)	.045	.000		.000	.000	.000	.001	.153	.000	.000
	N	170	170	170	170	170	170	170	170	170	170
QMF	Pearson Correlation	.205**	.407**	.392**	1	.312**	.187*	.071	.142	.285**	.294**
	Sig. (2-tailed)	.007	.000	.000		.000	.014	.358	.064	.000	.000
	N	170	170	170	170	170	170	170	170	170	170
CAS	Pearson Correlation	.184*	.372**	.328**	.312**	1	.190*	.044	.253**	.360**	.413**
	Sig. (2-tailed)	.016	.000	.000	.000		.013	.565	.001	.000	.000
	N	170	170	170	170	170	170	170	170	170	170
DOCR	Pearson Correlation	.016	.166*	.303**	.187*	.190*	1	.390**	.338**	.315**	.357**
	Sig. (2-tailed)	.839	.030	.000	.014	.013		.000	.000	.000	.000
	N	170	170	170	170	170	170	170	170	170	170
CONTIMP	Pearson Correlation	.130	.211**	.255**	.071	.044	.390**	1	.119	.202**	.328**
	Sig. (2-tailed)	.091	.006	.001	.358	.565	.000		.123	.008	.000
	N	170	170	170	170	170	170	170	170	170	170
GISOREP	Pearson Correlation	.006	.094	.110	.142	.253**	.338**	.119	1	.319**	.189*
	Sig. (2-tailed)	.937	.221	.153	.064	.001	.000	.123		.000	.014
	N	170	170	170	170	170	170	170	170	170	170
TMC	Pearson Correlation	.104	.361**	.386**	.285**	.360**	.315**	.202**	.319**	1	.490**
	Sig. (2-tailed)	.177	.000	.000	.000	.000	.000	.008	.000		.000
	N	170	170	170	170	170	170	170	170	170	170
ISOIMP	Pearson Correlation	.324**	.504**	.578**	.294**	.413**	.357**	.328**	.189*	.490**	1
	Sig. (2-tailed)	.000	.000	.000	.000	.000	.000	.000	.014	.000	
	N	170	170	170	170	170	170	170	170	170	170

**. Correlation is significant at the 0.01 level (2-tailed).
*. Correlation is significant at the 0.05 level (2-tailed).

Table (6.2) *Causal effects among factors with and EXM as a leading exogenous variable*

Factor Directions	Path Coef.	STD. ERROR	t-value	P-value	Significance
Total Effects of ksi on eta					
EXM ---> TMC	.10	.13	.81	0.208970	NO
EXM ---> INM	.50	.12	4.06	0.000025	YES
EXM ---> DOCR	0.0	.11	.01	0.496011	NO
EXM ---> CSF	.18	.13	1.37	0.085343	YES
EXM ---> CAS	.27	.12	2.18	0.014629	YES
EXM ---> QMF	.28	.13	2.07	0.019226	YES
EXM ---> GISOREP	.02	.13	.15	0.440382	NO
EXM ---> CONTIMP	.23	.15	1.48	0.069437	NO
EXM ---> ISOIMP	.37	.13	2.84	0.002256	YES
Indirect Effects of ksi on eta					
EXM ---> TMC	--	--	--		NO
EXM ---> INM	.04	.05	.82	0.206108	NO
EXM ---> DOCR	.13	.10	1.35	0.088508	NO
EXM ---> CSF	.14	.11	1.26	0.103835	NO
EXM ---> CAS	.17	.10	1.76	0.039204	YES
EXM ---> QMF	.22	.11	2.05	0.020182	YES
EXM ---> GISOREP	-.03	.13	-.24	0.594835	NO
EXM ---> CONTIMP	-.04	.14	-.25	0.598706	NO
EXM ---> ISOIMP	.25	.13	1.83	0.033625	YES

Factor Directions	Path Coef.	STD. ERROR	t-value	P-value	Significance
Total Effects of eta on eta					
TMC ---> INM	.36	.12	3.01	0.001506458	YES
TMC ---> QMF	.37	.14	2.65	0.004406689	YES
TMC ---> DOCR	.44	.13	3.43	0.000379267	YES
TMC ---> CSF	.46	.14	3.25	0.000696346	YES
TMC ---> CAS	.42	.13	3.26	0.000673667	YES
TMC ---> GISOREP	.55	.15	3.65	0.00017463	YES
TMC ---> CONTIMP	.21	.15	1.42	0.078724887	NO
TMC ---> ISOIMP	.58	.15	3.90	6.92913E-05	YES
Indirect Effects of eta on eta	--	--	--		NO
TMC ---> INM	.14	.08	1.78	0.03843643	YES
TMC ---> QMF	.09	.07	1.41	0.080188713	NO
TMC ---> DOCR	.24	.11	2.24	0.013197276	YES
TMC ---> CSF	.21	.10	2.19	0.01494709	YES
TMC ---> CAS	.18	.12	1.48	0.070367497	NO
TMC ---> GISOREP	.36	.20	1.81	0.036036185	YES
TMC ---> CONTIMP	.37	.15	2.46	0.007449987	YES
TMC ---> ISOIMP					

Table (6.2) *Causal effects among factors with and EXM as a leading exogenous variable (Cont…)*

Factor Directions	Path Coef.	STD. ERROR	t-value	P-value	Significance
Total Effects of eta on eta					
INM ---> QMF	.40	.19	2.03	0.021178	YES
INM ---> DOCR	.16	.16	.99	0.161087	NO
INM ---> CSF	.21	.19	1.11	0.133500	NO
INM ---> CAS	.28	.18	1.60	0.054799	YES
INM ---> GISOREP	-.10	.19	-.53	0.701944	NO
INM ---> CONTIMP	.12	.23	.55	0.291160	NO
INM ---> ISOIMP	.41	.18	2.31	0.010444	YES
Indirect Effects of eta on eta					
INM ---> QMF	--				
INM ---> DOCR	.06	.06	.96	0.168528	NO
INM ---> CSF	.19	.11	1.67	0.047460	YES
INM ---> CAS	.08	.07	1.06	0.144572	NO
INM ---> GISOREP	.14	.13	1.03	0.151505	NO
INM ---> CONTIMP	.02	.18	.13	0.448283	NO
INM ---> ISOIMP	.06	.13	.45	0.326355	NO
Factor Directions	Path Coef.	STD. ERROR	t-value	P-value	Significance
Total Effects of eta on eta					
QMF ---> DOCR	.16	.15	1.07	0.142310	NO
QMF ---> CSF	.42	.18	2.30	0.010724	YES
QMF ---> CAS	.16	.16	1.02	0.153864	NO
QMF ---> GISOREP	.07	.17	.45	0.326355	NO
QMF ---> CONTIMP	.01	.20	.04	0.484047	NO
QMF ---> ISOIMP	.01	.15	.04	0.484047	NO
Indirect Effects of eta on eta					
QMF ---> DOCR	--				NO
QMF ---> CSF	.03	.03	.93	0.176186	NO
QMF ---> CAS	.08	.08	1.06	0.144572	NO
QMF ---> GISOREP	.03	.12	.27	0.393580	NO
QMF ---> CONTIMP	.18	.16	1.09	0.137857	NO
QMF ---> ISOIMP	.23	.13	1.72	0.042716	YES

Table (6.2) *Causal effects among factors with and EXM as a leading exogenous variable (Cont…)*

Factor Directions	Path Coef.	STD. ERROR	t-value	P-value	Significance
Total Effects of eta on eta					
DOCR ---> CSF	.20	.14	1.40	0.080757	NO
DOCR ---> CAS	.11	.13	.84	0.200454	NO
DOCR ---> GISOREP	.52	.16	3.34	0.000419	YES
DOCR ---> CONTIMP	.83	.21	3.93	0.000042	YES
DOCR ---> ISOIMP	.24	.13	1.89	0.029379	YES
Indirect Effects of eta on eta					
DOCR ---> CSF	--	--			NO
DOCR ---> CAS	.03	.04	.80	0.211855	NO
DOCR ---> GISOREP	-.01	.06	-.25	0.598706	NO
DOCR ---> CONTIMP	.06	.15	.44	0.329969	NO
DOCR ---> ISOIMP	.11	.17	.65	0.257846	NO

Factor Directions	Path Coef.	STD. ERROR	t-value	P-value	Significance
Total Effects of eta on eta					
CSF ---> CAS	.16	.16	.98	0.163543	NO
CSF ---> GISOREP	-.19	.17	-1.09	0.862143	NO
CSF ---> CONTIMP	.15	.21	.73	0.232695	NO
CSF ---> ISOIMP	.46	.18	2.60	0.004661	YES
Indirect Effects of eta on eta					
CSF ---> CAS	--				NO
CSF ---> GISOREP	.05	.06	.81	0.208970	NO
CSF ---> CONTIMP	-.06	.08	-.70	0.758036	NO
CSF ---> ISOIMP	.01	.06	.23	0.409046	NO

Table (6.2) *Causal effects among factors with and EXM as a leading exogenous variable (Cont…)*

Factor Directions	Path Coef.	STD. ERROR	t-value	P-value	Significance
Total Effects of eta on eta					
CAS ---> GISOREP	.29	.16	1.85	0.032157	YES
CAS ---> CONTIMP	-.22	.19	-1.14	0.872857	NO
CAS ---> ISOIMP	.12	.14	.91	0.181411	NO
GISOREP --> CONTIMP	.10	.24	.39	0.348268	NO
GISOREP --> ISOIMP	.02	.18	.13	0.448283	NO
CONTIMP --> ISOIMP	0.0	.15	-.01	0.503989	NO
Indirect Effects of eta on eta					
CAS ---> GISOREP	--	--	--		NO
CAS ---> CONTIMP	.03	.07	.37	0.355691	NO
CAS ---> ISOIMP	.01	.06	.11	0.456205	NO
GISOREP --> CONTIMP	--	--			NO
GISOREP --> ISOIMP	0.0	.01	-.01	0.503989	NO
CONTIMP --> ISOIMP	--	--	--		NO

Table (6.3) *Analysis of Total Effects among pair factors*

Analysis of Total effects for the two models							
Model 1: EXM (Exogenous)				Model 2 : EXM & TMC (Exogenous)			
Question	Answer	Question	Answer	Question	Answer	Question	Answer
1	NSIG	21	SIG	1	NA	21	SIG
2	SIG	22	SIG	2	SIG	22	SIG
3	NSIG	23	NSIG	3	NSIG	23	NSIG
4	SIG	24	SIG	4	SIG	24	SIG
5	SIG	25	NSIG	5	SIG	25	NSIG
6	NSIG	26	NSIG	6	NSIG	26	NSIG
7	NSIG	27	SIG	7	NSIG	27	SIG
8	SIG	28	NSIG	8	SIG	28	NSIG
9	SIG	29	NSIG	9	SIG	29	NSIG
10	SIG	30	NSIG	10	SIG	30	NSIG
11	SIG	31	NSIG	11	SIG	31	NSIG
12	SIG	32	NSIG	12	SIG	32	NSIG
13	SIG	33	SIG	13	SIG	33	SIG
14	NSIG	34	NSIG	14	NSIG	34	NSIG
15	SIG	35	SIG	15	SIG	35	SIG
16	SIG	36	SIG	16	SIG	36	SIG
17	NSIG	37	NSIG	17	NSIG	37	NSIG
18	SIG	38	NSIG	18	SIG	38	NSIG
19	NSIG	39	NSIG	19	NSIG	39	NSIG
20	NSIG	40	NSIG	20	NSIG	40	NSIG
Total SIG			19				19
Total NSIG			21				20
SIG : Significant							
NSIG : Not Significant							
NA : Not Applicable			0				1

Table (6.4) *Total effects between pair of factors* for the manufacturing model*

Total effect between constrcuts and their t-values

Effect Direction	Original Sample (O)	Sample Mean (M)	Standard Deviation (STDEV)	Standard Error (STERR)	T Statistics (|O/STERR|)
CAS -> CONTIMP	0.0182	0.014	0.133	0.133	0.1368
CAS -> GISOREP	0.27	0.2745	0.0964	0.0964	2.7999
CAS -> ISOIMP	0.1613	0.1683	0.096	0.096	1.6794
CONTIMP -> GISOREP	0.1154	0.134	0.1224	0.1224	0.9435
CONTIMP -> ISOIMP	0.1969	0.1951	0.087	0.087	2.2618
CSF -> CAS	0.2421	0.238	0.1689	0.1689	1.4336
CSF -> CONTIMP	0.1196	0.1137	0.1544	0.1544	0.7749
CSF -> DOCR	0.0962	0.1041	0.1102	0.1102	0.8724
CSF -> GISOREP	0.1287	0.1397	0.1058	0.1058	1.2156
CSF -> ISOIMP	0.2698	0.2749	0.1049	0.1049	2.5705
CSF -> QMF	0.6051	0.5998	0.1192	0.1192	5.0751
DOCR -> CAS	0.3983	0.3573	0.1546	0.1546	2.5762
DOCR -> CONTIMP	0.6167	0.647	0.1052	0.1052	5.8641
DOCR -> GISOREP	0.2538	0.2576	0.1815	0.1815	1.3986
DOCR -> ISOIMP	0.266	0.2592	0.109	0.109	2.4399
EXM -> CAS	0.2269	0.2319	0.1281	0.1281	1.7708
EXM -> CONTIMP	0.2835	0.2942	0.1026	0.1026	2.7641
EXM -> CSF	0.0538	0.0604	0.1308	0.1308	0.4112
EXM -> DOCR	0.1186	0.1245	0.0989	0.0989	1.1994
EXM -> GISOREP	0.1079	0.111	0.1172	0.1172	0.9211
EXM -> INM	0.5998	0.6035	0.0897	0.0897	6.6867
EXM -> ISOIMP	0.4363	0.4408	0.0951	0.0951	4.589
EXM -> QMF	0.1162	0.1043	0.1491	0.1491	0.7795
EXM -> TMC	0.0788	0.0766	0.1612	0.1612	0.489
GISOREP -> ISOIMP	0.0792	0.0832	0.0688	0.0688	1.1523
INM -> CAS	0.1381	0.1539	0.1495	0.1495	0.9236
INM -> CONTIMP	0.0585	0.061	0.1514	0.1514	0.3867
INM -> CSF	-0.1039	-0.1045	0.0918	0.0918	1.1321
INM -> DOCR	0.0943	0.1418	0.1603	0.1603	0.5883
INM -> GISOREP	0.2034	0.2069	0.0986	0.0986	2.0626
INM -> ISOIMP	0.0436	0.0637	0.1204	0.1204	0.3624
INM -> QMF	0.1453	0.1138	0.1979	0.1979	0.734
QMF -> CAS	0.0851	0.1005	0.1667	0.1667	0.5104
QMF -> CONTIMP	0.0488	0.0727	0.1275	0.1275	0.3827
QMF -> DOCR	-0.0299	0.0124	0.2158	0.2158	0.1386
QMF -> GISOREP	0.1725	0.1605	0.119	0.119	1.4495
QMF -> ISOIMP	-0.0809	-0.0522	0.1236	0.1236	0.655
TMC -> CAS	0.3646	0.3603	0.1314	0.1314	2.7746
TMC -> CONTIMP	0.1594	0.1499	0.1174	0.1174	1.3573
TMC -> CSF	0.6977	0.6993	0.0666	0.0666	10.4727
TMC -> DOCR	0.5688	0.566	0.0975	0.0975	5.832
TMC -> GISOREP	0.4829	0.4841	0.094	0.094	5.1395
TMC -> INM	0.306	0.3061	0.1035	0.1035	2.9559
TMC -> ISOIMP	0.62	0.6204	0.0752	0.0752	8.244
TMC -> QMF	0.3838	0.3867	0.14	0.14	2.7409

Note: * constructs and factors are the same and both can be used interchangeably.

Table (6.5) *Outer measurement and cross loadings for the manufacturing model*

	CAS	CONTIMP	CSF	DOCR	EXM	GISOREP	INM	ISOIMP	QMF	TMC
CAS1	0.9008	0.2637	0.3397	0.5021	0.3012	0.4252	0.3871	0.4929	0.2634	0.3769
CAS2	0.6106	0.1004	0.2548	0.187	-0.0917	0.3503	0.0555	0.2943	0.1876	0.2315
CAS3	0.863	0.3479	0.318	0.4674	0.2242	0.4036	0.2571	0.4635	0.2752	0.2928
CONTIMP1	0.4239	0.9088	0.2929	0.5774	0.3248	0.345	0.3141	0.5237	0.2311	0.2322
CONTIMP2	0.1147	0.8099	-0.0817	0.3322	0.1502	0.1392	0.0774	0.2041	0.0449	-0.0385
CONTIMP3	-0.0837	0.5332	0.0664	0.1296	0.0461	0.1186	0.0467	0.237	-0.0452	0.2069
CSF1	0.2276	0.1362	0.7904	0.2507	-0.0593	0.2588	0.0744	0.3717	0.4718	0.5831
CSF2	0.3605	0.2085	0.7726	0.3601	0.0667	0.3509	0.1385	0.4969	0.4574	0.4623
CSF3	0.3032	0.0898	0.8003	0.4264	0.1074	0.3173	0.2204	0.5101	0.424	0.6042
DOCR1	0.5091	0.4274	0.3704	0.8872	0.2458	0.4501	0.3167	0.5952	0.0632	0.5306
DOCR2	0.5319	0.341	0.4975	0.853	0.0419	0.4979	0.2708	0.5682	0.2959	0.5558
DOCR3	0.3925	0.4963	0.3711	0.8849	0.0219	0.3568	0.1994	0.4271	0.2672	0.4421
DOCR4	0.3482	0.5022	0.3166	0.9034	0.0947	0.3181	0.2449	0.4828	0.2631	0.4861
EXM1	0.253	0.1952	0.0479	0.0687	0.7985	0.1703	0.6985	0.2686	0.1158	0.1632
EXM2	0.1884	0.2937	0.0484	0.1377	0.9121	0.0366	0.4222	0.4518	0.0822	0.0138
EXM3	0.1359	0.2569	0.0432	0.1077	0.903	0.0596	0.4038	0.4349	0.102	0.0094
GISOREP1	0.4374	0.3618	0.3886	0.5091	0.0329	0.9608	0.221	0.5119	0.3011	0.4773
GISOREP2	0.4954	0.2759	0.4153	0.4898	0.1524	0.9673	0.3959	0.513	0.4163	0.5586
GISOREP3	0.3504	0.0768	0.1393	0.0153	0.1315	0.7008	0.223	0.1228	0.189	0.0428
INM1	0.2546	0.2237	0.0946	0.188	0.5025	0.2753	0.9226	0.2941	0.3252	0.2113
INM2	0.3722	0.2839	0.2208	0.4249	0.6828	0.3143	0.9365	0.5729	0.1468	0.3964
INM3	0.2364	0.166	0.1833	0.1424	0.4248	0.2997	0.9125	0.3889	0.3103	0.3347
ISOIMP1	0.4667	0.4944	0.5059	0.5734	0.4369	0.4097	0.4029	0.9126	0.2704	0.5894
ISOIMP2	0.4717	0.4166	0.4926	0.5067	0.3652	0.4636	0.4986	0.897	0.232	0.6525
ISOIMP3	0.4623	0.3118	0.5541	0.4722	0.3376	0.4253	0.3331	0.8103	0.355	0.4508
QMF1	0.3437	0.1831	0.5219	0.2123	0.2169	0.2352	0.2231	0.3555	0.8559	0.3248
QMF2	0.0143	0.1266	0.4589	0.1811	-0.0182	0.3194	0.1979	0.2242	0.7485	0.3702
QMF3	0.3577	0.1045	0.4503	0.2263	0.0645	0.366	0.2432	0.2159	0.8928	0.2966
TMC1	0.3648	0.2363	0.6703	0.5993	0.1276	0.5016	0.3391	0.6325	0.4088	0.9089
TMC2	0.2519	0.0345	0.6462	0.3817	-0.1092	0.3485	0.1973	0.5966	0.396	0.8129
TMC3	0.335	0.167	0.3888	0.4316	0.1869	0.3498	0.3498	0.3587	0.1248	0.7752

Table (6.6) *Reliability, AVE, R-Square, and **α** of Cronbach for the manufacturing model*

	AVE	Composite Reliability	R Square	Cronbach's Alpha
CAS	0.643028	0.840371	0.332198	0.71925
CONTIMP	0.588746	0.80432	0.365364	0.705395
CSF	0.620686	0.830737	0.492511	0.695024
DOCR	0.778457	0.933551	0.345703	0.905309
EXM	0.761581	0.905208		0.842518
GISOREP	0.783271	0.914007	0.392872	0.86999
INM	0.853668	0.945944	0.452751	0.916021
ISOIMP	0.764698	0.906749	0.70663	0.845272
QMF	0.69664	0.872647	0.357273	0.781024
TMC	0.695966	0.872385	0.006214	0.782115

Table (6.7) *Factor* Correlations, AVE, and Square root of AVE for the manufacturing model*

Construct correlations, AVE, and square root of AVE values										
	CAS	CONTIMP	CSF	DOCR	EXM	GISOREP	INM	ISOIMP	QMF	TMC
CAS	1									
CONTIMP	0.3167	1								
CSF	0.38	0.1831	1							
DOCR	0.5109	0.5352	0.4442	1						
EXM	0.2269	0.2835	0.0538	0.1186	1					
GISOREP	0.4865	0.3058	0.3944	0.4653	0.1079	1				
INM	0.3225	0.2505	0.1876	0.2957	0.5998	0.3229	1			
ISOIMP	0.5327	0.4713	0.5878	0.5932	0.4363	0.4939	0.4741	1		
QMF	0.3055	0.1665	0.5712	0.2486	0.1162	0.3633	0.2659	0.3215	1	
TMC	0.3802	0.1807	0.6976	0.5746	0.0788	0.4884	0.3514	0.6506	0.3906	1
AVE	0.673	0.5887	0.6207	0.7785	0.7616	0.7833	0.8537	0.7647	0.6966	0.696
SQRT(AVE)	0.820366	0.767268	0.787845	0.882326	0.872697	0.885042	0.923959	0.874471	0.834626	0.834266

Note: * constructs and factors are the same and both can be used interchangeably.

Table (6.8) *Total effects between pair of factors* for the services model*

Total effect between constrcuts and their t-values					
Effect Direction	Original Sample (O)	Sample Mean (M)	Standard Deviation (STDEV)	Standard Error (STERR)	T Statistics (IO/STERRI)
CAS -> CONTIMP	-0.1228	-0.1398	0.1101	0.1101	1.116
CAS -> GISOREP	-0.0001	0.0023	0.0283	0.0283	0.0041
CAS -> ISOIMP	-0.0096	-0.0068	0.0277	0.0277	0.3457
CONTIMP -> GISOREP	0.0009	-0.0136	0.1639	0.1639	0.0057
CONTIMP -> ISOIMP	0.0779	0.0668	0.157	0.157	0.4961
CSF -> CAS	0.3622	0.3523	0.1772	0.1772	2.0445
CSF -> CONTIMP	0.2028	0.165	0.1915	0.1915	1.0588
CSF -> DOCR	0.4549	0.3908	0.2079	0.2079	2.1883
CSF -> GISOREP	-0.0745	-0.068	0.1646	0.1646	0.4528
CSF -> ISOIMP	0.4613	0.4635	0.0984	0.0984	4.6904
CSF -> QMF	0.4204	0.4249	0.1684	0.1684	2.4967
DOCR -> CAS	0.084	0.0989	0.1683	0.1683	0.4988
DOCR -> CONTIMP	0.3877	0.3556	0.1393	0.1393	2.783
DOCR -> GISOREP	0.1675	0.2193	0.2114	0.2114	0.792
DOCR -> ISOIMP	0.0135	0.0062	0.1252	0.1252	0.1081
EXM -> CAS	0.0553	0.0687	0.1595	0.1595	0.3465
EXM -> CONTIMP	0.1734	0.1692	0.1219	0.1219	1.4222
EXM -> CSF	0.2976	0.2994	0.123	0.123	2.4197
EXM -> DOCR	-0.0795	-0.1049	0.1831	0.1831	0.4343
EXM -> GISOREP	-0.2625	-0.2629	0.1313	0.1313	1.9993
EXM -> INM	0.2246	0.2293	0.1277	0.1277	1.7589
EXM -> ISOIMP	0.1464	0.1522	0.1334	0.1334	1.0977
EXM -> QMF	0.2766	0.2873	0.1343	0.1343	2.0589
EXM -> TMC	0.0234	0.0172	0.1541	0.1541	0.152
GISOREP -> ISOIMP	0.026	0.0305	0.1342	0.1342	0.1934
INM -> CAS	0.1011	0.0995	0.1577	0.1577	0.6414
INM -> CONTIMP	0.2476	0.2173	0.1693	0.1693	1.4629
INM -> CSF	0.4821	0.4702	0.1268	0.1268	3.802
INM -> DOCR	0.1057	0.1022	0.1666	0.1666	0.6344
INM -> GISOREP	-0.3753	-0.3628	0.119	0.119	3.1534
INM -> ISOIMP	0.5223	0.5118	0.1014	0.1014	5.1511
INM -> QMF	0.3353	0.3286	0.1689	0.1689	1.9851
QMF -> CAS	-0.139	-0.1377	0.1503	0.1503	0.9245
QMF -> CONTIMP	-0.3656	-0.3443	0.1689	0.1689	2.1651
QMF -> DOCR	-0.0022	0.0512	0.2121	0.2121	0.0102
QMF -> GISOREP	0.071	0.0752	0.1448	0.1448	0.49
QMF -> ISOIMP	-0.045	-0.0432	0.1148	0.1148	0.3921
TMC -> CAS	0.2913	0.2738	0.1368	0.1368	2.1286
TMC -> CONTIMP	0.4092	0.4179	0.0974	0.0974	4.1999
TMC -> CSF	0.3416	0.3293	0.1406	0.1406	2.4291
TMC -> DOCR	0.2691	0.2432	0.1699	0.1699	1.5836
TMC -> GISOREP	0.2361	0.2412	0.1462	0.1462	1.6143
TMC -> INM	0.3648	0.3627	0.1194	0.1194	3.0566
TMC -> ISOIMP	0.451	0.4566	0.0936	0.0936	4.8211
TMC -> QMF	0.0823	0.0838	0.1686	0.1686	0.4879

Note: * constructs and factors are the same and both can be used interchangeably.

Table (6.9) *Outer measurement and cross loadings for the services model*

	CAS	CONTIMP	CSF	DOCR	EXM	GISOREP	INM	ISOIMP	QMF	TMC
				Outer measurements and cross loadings						
CAS1	0.7638	0.0141	0.2246	0.1607	0.0445	0.4398	0.0875	0.2948	0.0677	0.2619
CAS2	0.8198	0.0651	0.2147	0.1445	0.0244	0.1727	0.0382	0.1292	-0.0071	-0.0044
CAS3	0.9492	0.228	0.4242	0.2746	0.0596	0.1256	0.2752	0.3886	0.0671	0.3552
CONTIMP	0.2015	0.8458	0.4697	0.5248	0.1224	-0.0692	0.3584	0.2994	0.1198	0.202
CONTIMP	0.1373	0.9557	0.3755	0.4384	0.263	-0.0518	0.3665	0.413	-0.075	0.4073
CONTIMP	0.103	0.9261	0.3022	0.3685	0.0808	0.1052	0.3456	0.4421	-0.1773	0.487
CSF1	0.3671	0.4099	0.9116	0.4242	0.3651	-0.275	0.5574	0.6744	0.5052	0.2245
CSF2	0.2848	0.3982	0.906	0.2615	0.1945	-0.0175	0.5516	0.6058	0.4342	0.382
CSF3	0.3639	0.3048	0.9035	0.3492	0.2336	-0.2082	0.4783	0.5668	0.4027	0.3579
DOCR1	0.0456	-0.034	-0.1196	0.6003	-0.3903	0.3251	-0.0656	-0.1579	0.0847	0.0402
DOCR2	0.1338	0.3433	0.1337	0.6901	-0.1771	0.2073	0.3261	0.1306	-0.005	0.3509
DOCR3	0.2816	0.5515	0.504	0.9459	0.0056	0.0965	0.1407	0.3665	0.1397	0.2463
DOCR4	0.1838	0.267	0.2514	0.8875	-0.0658	0.1361	-0.0103	0.1981	0.2196	0.099
EXM1	0.0091	0.1078	0.2124	-0.1091	0.8525	-0.222	0.2278	0.1962	0.2492	-0.0636
EXM2	0.071	0.1814	0.2269	-0.0684	0.924	-0.2761	0.1404	0.0941	0.2077	-0.0118
EXM3	0.0616	0.1545	0.3175	-0.0261	0.7785	-0.1744	0.2021	0.0824	0.2469	0.1319
GISOREP	0.2183	-0.0582	-0.0833	-0.0427	-0.1374	0.7022	-0.0565	0.0433	-0.0231	0.3261
GISOREP	0.2423	0.0852	-0.1453	0.2057	-0.2049	0.9178	-0.2725	-0.0832	-0.1809	0.1906
GISOREP	0.178	-0.046	-0.2201	0.1826	-0.2856	0.852	-0.3078	-0.1502	-0.0821	0.1145
INM1	0.2456	0.3806	0.5236	0.1553	0.3941	-0.0622	0.8251	0.5491	0.3028	0.3726
INM2	0.1042	0.2409	0.4212	0.1838	-0.0106	-0.2483	0.8699	0.5067	0.3304	0.228
INM3	0.1594	0.3721	0.5565	0.1026	0.1601	-0.4112	0.9022	0.5574	0.3198	0.3412
ISOIMP1	0.322	0.2634	0.5153	0.0892	0.1899	-0.2131	0.6808	0.7862	0.2958	0.29
ISOIMP2	0.3336	0.4052	0.6754	0.4045	-0.0678	0.0275	0.4224	0.8498	0.2482	0.4775
ISOIMP3	0.1954	0.386	0.4586	0.2009	0.2915	-0.0546	0.4286	0.8256	0.1999	0.3323
QMF1	0.1344	0.0937	0.4846	0.2985	0.1685	-0.1025	0.4016	0.3941	0.8703	0.1483
QMF2	0.0316	-0.1637	0.4261	-0.0888	0.3055	-0.0757	0.2839	0.1864	0.8361	0.1104
QMF3	-0.1126	-0.196	0.2251	0.0416	0.2435	-0.1441	0.1134	0.0436	0.7193	-0.1496
TMC1	0.0324	0.1699	0.0883	0.0065	-0.1692	0.3913	0.205	0.2889	0.0343	0.7689
TMC2	0.349	0.2883	0.2504	0.2297	0.011	0.2931	0.2891	0.323	0.0753	0.9424
TMC3	0.2993	0.5176	0.4544	0.3471	0.1083	0.068	0.4192	0.5221	0.1024	0.9276

Table (6.10)   *Reliability, AVE, R-Square, and α of Cronbach for the services model*

	AVE	Composite Reliability	R Square	Cronbachs Alpha
CAS	0.7188	0.8838	0.195	0.8124
CONTIMP	0.8288	0.9354	0.4988	0.8962
CSF	0.8227	0.933	0.395	0.8927
DOCR	0.6297	0.8682	0.213	0.8328
EXM	0.7288	0.8892	0	0.8107
GISOREP	0.6871	0.8668	0.2686	0.7727
INM	0.7505	0.9001	0.1835	0.8339
ISOIMP	0.6739	0.861	0.5814	0.7595
QMF	0.658	0.8515	0.282	0.7567
TMC	0.7799	0.9134	0.0005	0.8676

Table (6.11) *Factor* Correlations, AVE, and Square root of AVE for the services model*

Construct correlations, AVE, and square root of AVE (SQRT(AVE))

	CAS	CONTIMP	CSF	DOCR	EXM	GISOREP	INM	ISOIMP	QMF	TMC
CAS	1									
CONTIMP	0.1568	1								
CSF	0.3748	0.4114	1							
DOCR	0.2486	0.4791	0.385	1						
EXM	0.0553	0.1734	0.2976	-0.0795	1					
GISOREP	0.2514	-0.0011	-0.1904	0.1632	-0.263	1				
INM	0.2012	0.3903	0.5851	0.1666	0.225	-0.2793	1			
ISOIMP	0.3545	0.428	0.6823	0.2924	0.146	-0.0944	0.624	1		
QMF	0.0593	-0.0615	0.4967	0.1432	0.277	-0.1239	0.366	0.3056	1	
TMC	0.2924	0.413	0.3483	0.2671	0.023	0.2298	0.37	0.4542	0.089	1
AVE	0.7188	0.8288	0.8227	0.6297	0.729	0.6871	0.751	0.6739	0.658	0.7799
SQRT(AVE)	0.84782	0.910385	0.907028	0.79354	0.854	0.82891	0.866	0.8209	0.811	0.8831

Note: * constructs and factors are the same and both can be used interchangeably.

Exhibit (6.2) (LISREL'S EFFECT OUTPUT FOR THE FIRST MODEL)

```
Total and Indirect Effects

     Total Effects of KSI on ETA

                    EXM
                  --------
      TMC           0.10
                   (0.12)
                    0.81

      INM           0.53
                   (0.13)
                    4.06

      CSF           0.18
                   (0.13)
                    1.37

      QMF           0.27
                   (0.13)
                    2.07
      CAS           0.27
                   (0.13)
                    2.11

      DOCR          0.00
                   (0.11)
                    0.01

   CONTIMP          0.22
                   (0.15)
                    1.48

   GISOREP          0.02
                   (0.12)
                    0.15

    ISOIMP          0.36
                   (0.13)
                    2.84


Indirect Effects of KSI on ETA

                    EXM
                  --------
      TMC           - -

      INM           0.04
                   (0.05)
                    0.82

      CSF           0.14
                   (0.10)
                    1.36

      QMF           0.23
                   (0.11)
                    2.06
```

Exhibit (6.2) (LISREL'S EFFECT OUTPUT FOR THE FIRST MODEL) Cont…

```
Indirect Effects of KSI on ETA


                 EXM
               --------
    CAS          0.18
               (0.10)
                1.72

   DOCR          0.13
               (0.09)
                1.37

CONTIMP         -0.04
               (0.14)
               -0.29

GISOREP         -0.01
               (0.13)
               -0.09

 ISOIMP          0.24
               (0.13)
                1.83



Total Effects of ETA on ETA

                 TMC        INM        CSF        QMF        CAS       DOCR
               --------   --------   --------   --------   --------   --------
    TMC          - -        - -        - -        - -        - -        - -

    INM          0.40       - -        - -        - -        - -        - -
               (0.13)
                3.02

    CSF          0.47       0.19       - -        - -        - -        - -
               (0.14)     (0.17)
                3.26       1.11

    QMF          0.37       0.36       0.37       - -        - -        - -
               (0.14)     (0.18)     (0.16)
                2.66       2.03       2.32

    CAS          0.44       0.26       0.22       0.09       - -        0.08
               (0.14)     (0.17)     (0.15)     (0.18)              (0.14)
                3.06       1.57       1.46       0.48                 0.58
```

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Exhibit (6.2) (LISREL'S EFFECT OUTPUT FOR THE FIRST MODEL) Cont…

Total Effects of ETA on ETA

```
                TMC        INM        CSF        QMF        CAS       DOCR
             --------   --------   --------   --------   --------   --------

    DOCR        0.44       0.15       0.24       0.07       - -        - -
              (0.13)     (0.15)     (0.13)     (0.16)
                3.45       0.99       1.77       0.41

 CONTIMP        0.22       0.11       0.28      -0.13      -0.21       0.81
              (0.15)     (0.21)     (0.19)     (0.24)     (0.18)     (0.21)
                1.42       0.55       1.46      -0.54      -1.14       3.78

 GISOREP        0.53      -0.09      -0.03       0.10       0.27       0.54
              (0.14)     (0.16)     (0.14)     (0.18)     (0.15)     (0.16)
                3.67      -0.53      -0.21       0.54       1.84       3.40

  ISOIMP        0.59       0.37       0.42      -0.20       0.12       0.15
              (0.15)     (0.16)     (0.15)     (0.18)     (0.13)     (0.13)
                3.92       2.31       2.86      -1.14       0.91       1.20
```

Total Effects of ETA on ETA

```
              CONTIMP    GISOREP    ISOIMP
             --------   --------   --------
     TMC        - -        - -        - -

     INM        - -        - -        - -

     CSF        - -        - -        - -

     QMF        - -        - -        - -

     CAS        - -        - -        - -

    DOCR        - -        - -        - -

 CONTIMP        - -        - -        - -
```

Total Effects of ETA on ETA

```
              CONTIMP    GISOREP    ISOIMP
             --------   --------   --------

 GISOREP       0.06        - -        - -
             (0.16)
               0.39

  ISOIMP       0.00       0.02        - -
             (0.15)     (0.19)
               0.00       0.13
```

Largest Eigenvalue of B*B' (Stability Index) is   1.100

Exhibit (6.2) (LISREL'S EFFECT OUTPUT FOR THE FIRST MODEL) Cont…

Indirect Effects of ETA on ETA

	TMC	INM	CSF	QMF	CAS	DOCR
TMC	– –	– –	– –	– –	– –	– –
INM	– –	– –	– –	– –	– –	– –
CSF	0.08	– –	– –	– –	– –	– –
	(0.07)					
	1.11					
QMF	0.29	0.07	– –	– –	– –	– –
	(0.12)	(0.07)				
	2.44	1.05				
CAS	0.22	0.07	0.05	0.01	– –	– –
	(0.10)	(0.07)	(0.08)	(0.02)		
	2.13	1.06	0.65	0.33		
DOCR	0.16	0.07	0.03	– –	– –	– –
	(0.08)	(0.07)	(0.06)			
	1.92	1.00	0.41			

Indirect Effects of ETA on ETA

	TMC	INM	CSF	QMF	CAS	DOCR
CONTIMP	0.32	0.04	0.09	0.04	– –	-0.02
	(0.17)	(0.15)	(0.15)	(0.14)		(0.03)
	1.96	0.27	0.60	0.27		-0.49
GISOREP	0.17	0.12	0.21	0.05	-0.01	0.07
	(0.12)	(0.12)	(0.13)	(0.11)	(0.04)	(0.14)
	1.41	1.06	1.62	0.46	-0.36	0.53
ISOIMP	0.38	0.05	-0.03	0.02	0.01	0.02
	(0.15)	(0.12)	(0.11)	(0.05)	(0.06)	(0.15)
	2.47	0.45	-0.26	0.45	0.11	0.14

Indirect Effects of ETA on ETA

	CONTIMP	GISOREP	ISOIMP
TMC	– –	– –	– –
INM	– –	– –	– –
CSF	– –	– –	– –
QMF	– –	– –	– –
CAS	– –	– –	– –
DOCR	– –	– –	– –
CONTIMP	– –	– –	– –
GISOREP	– –	– –	– –
ISOIMP	0.00	– –	– –
	(0.01)		
	0.12		

Exhibit (6.4) (LISREL'S EFFECT OUTPUT FOR THE SECOND MODEL)

```
Total and Indirect Effects

        Total Effects of KSI on ETA

                 TMC        EXM
              --------   --------
INM              0.38       0.46
               (0.12)     (0.12)
                3.26       3.87

QMF              0.37       0.23
               (0.13)     (0.13)
                2.82       1.83

DOCR             0.45      -0.04
               (0.12)     (0.11)
                3.80      -0.40

CSF              0.45       0.12
               (0.13)     (0.12)
                3.56       1.04

Total Effects of KSI on ETA

                 TMC        EXM
              --------   --------

    CAS          0.43       0.22
               (0.12)     (0.12)
                3.59       1.87

 GISOREP         0.53      -0.03
               (0.13)     (0.11)
                4.14      -0.28

 CONTIMP         0.20       0.18
               (0.13)     (0.13)
                1.50       1.34

  ISOIMP         0.63       0.32
               (0.14)     (0.13)
                4.52       2.53

Indirect Effects of KSI on ETA

                 TMC        EXM
              --------   --------
    INM           - -        - -

    QMF          0.22       0.12
               (0.11)     (0.11)
                2.06       1.08

   DOCR          0.06       0.07
               (0.06)     (0.08)
                1.01       0.96

    CSF          0.23       0.09
               (0.10)     (0.10)
                2.33       0.92

    CAS          0.21       0.12
               (0.09)     (0.08)
                2.21       1.45
```

Path coefficient

Standard error of the mean

T-value

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Exhibit (6.4) (LISREL'S EFFECT OUTPUT FOR THE SECOND MODEL) Cont…

```
Indirect Effects of KSI on ETA

                  TMC        EXM

               --------   --------


   GISOREP        0.17      -0.08
                 (0.11)     (0.10)
                  1.52      -0.80

   CONTIMP        0.31      -0.05
                 (0.15)     (0.12)
                  2.11      -0.41

    ISOIMP        0.39       0.19
                 (0.13)     (0.12)
                  3.00       1.54




Total Effects of ETA on ETA

              INM        QMF        DOCR       CSF        CAS       GISOREP

           --------   --------   --------   --------   --------   --------
INM          - -        - -        - -        - -        - -        - -

QMF          0.39      -0.01       0.15      -0.02       0.03       - -
            (0.19)     (0.02)     (0.14)     (0.05)     (0.05)
             2.02      -0.30       1.08      -0.39       0.59

DOCR         0.16       - -        - -        - -        - -        - -
            (0.16)
             1.00

CSF          0.20       0.39       0.24      -0.01       0.01       - -
            (0.18)     (0.18)     (0.13)     (0.02)     (0.02)
             1.12       2.17       1.80      -0.37       0.54

CAS          0.27       0.11       0.13       0.16       0.00       - -
            (0.17)     (0.16)     (0.13)     (0.17)     (0.01)
             1.60       0.69       1.00       0.95       0.57

GISOREP     -0.09      -0.03       0.49      -0.18       0.27       - -
            (0.17)     (0.15)     (0.14)     (0.17)     (0.15)
            -0.53      -0.18       3.46      -1.09       1.83

CONTIMP      0.10       0.04       0.72       0.13      -0.19       - -
            (0.20)     (0.10)     (0.18)     (0.20)     (0.17)
             0.51       0.43       3.95       0.66      -1.12

ISOIMP       0.42      -0.03       0.25       0.51       0.13       - -
            (0.18)     (0.16)     (0.13)     (0.19)     (0.15)
             2.32      -0.19       1.90       2.63       0.92
```

Standard error of the mean

T-value

Path coefficient

Exhibit (6.4) (LISREL'S EFFECT OUTPUT FOR THE SECOND MODEL) Cont…

```
Total Effects of ETA on ETA

              CONTIMP     ISOIMP
              --------    --------
      INM       - -         - -

      QMF      -0.16        - -
              (0.23)
              -0.71

     DOCR       - -         - -

      CSF      -0.06        - -
              (0.10)
              -0.63

      CAS      -0.02        - -
              (0.03)
              -0.59

  GISOREP       0.00        - -
              (0.03)
               0.17


Total Effects of ETA on ETA

              CONTIMP     ISOIMP
              --------    --------
  CONTIMP      -0.01        - -
              (0.02)
              -0.30

   ISOIMP       0.00        - -
              (0.18)
               0.03

Largest Eigenvalue of B*B' (Stability Index) is   0.927


    Indirect Effects of ETA on ETA

               INM        QMF        DOCR        CSF        CAS      GISOREP
              --------   --------   --------   --------   --------   --------
INM            - -        - -        - -         - -        - -        - -

QMF            0.03      -0.01      -0.12       -0.02       0.03       - -
              (0.05)    (0.02)     (0.17)      (0.05)     (0.05)
               0.58     -0.30      -0.69       -0.39       0.59
DOCR           - -        - -        - -         - -        - -        - -

CSF            0.18       0.00       0.06       -0.01       0.01       - -
              (0.11)    (0.01)     (0.06)      (0.02)     (0.02)
               1.67     -0.28       0.97       -0.37       0.54

CAS            0.06       0.06       0.05        0.00       0.00       - -
              (0.07)    (0.07)     (0.04)      (0.01)     (0.01)
               0.89      0.89       1.06       -0.38       0.57

GISOREP        0.13      -0.06      -0.02        0.05       0.00       - -
              (0.12)    (0.09)     (0.06)      (0.06)     (0.01)
               1.02     -0.66      -0.28        0.81      -0.16
```

Exhibit (6.4) (LISREL'S EFFECT OUTPUT FOR THE SECOND MODEL) Cont…

```
Indirect Effects of ETA on ETA

                  INM        QMF       DOCR        CSF        CAS     GISOREP
               --------   --------   --------   --------   --------   --------


  CONTIMP        0.09       0.04       0.01      -0.03       0.00       - -
                (0.13)     (0.10)     (0.06)     (0.05)     (0.00)
                 0.71       0.43       0.26      -0.73       0.28

  ISOIMP         0.07       0.20       0.10       0.02       0.00       - -
                (0.12)     (0.13)     (0.16)     (0.04)     (0.03)
                 0.56       1.62       0.64       0.55      -0.03


Indirect Effects of ETA on ETA

                CONTIMP     ISOIMP
               --------   --------
  INM            - -         - -

  QMF            0.00        - -
                (0.01)
                 0.22
  DOCR           - -         - -

  CSF           -0.06        - -
                (0.10)
                -0.63

Indirect Effects of ETA on ETA

                CONTIMP     ISOIMP
               --------   --------

  CAS           -0.02        - -
                (0.03)
                -0.59

  GISOREP        0.00        - -
                (0.03)
                 0.17

  CONTIMP       -0.01        - -
                (0.02)
                -0.30

  ISOIMP         0.00        - -
                (0.03)
                 0.18
```

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Appendix A7

A(7.1) manufacturing sector survey

1. Please indicate your position at the organisation and name of the organization.

2. How many employees work in your organization? Circle what applies.

	1	2	3	4	5
At your location::	1-9	10-49	50-249	250-499	500 or more
	1	2	3	4	5

3. Specify sector type of the organization?

Government	Private	Government – Private (Jointly owned)
1	2	3

4. Indicate which of the following branches your organisation belongs to.

Manufacturing	Services	Both (manufacturing & services)
1	2	3

5. Please indicate for how long your organization it has been certified. Circle which applies:

Less than a Year	1 – 3 years	3 – 5 years	5 – 7 years	7 – 9 years	9 years and above
1	2	3	4	5	6

6. Please circle whether your organization has been excluded from any of the sub clauses in clause 7 for the ISO 9001:2008 or 2000 standards.

Yes	No
1	2
If Yes please indicate below which sub clause your organization is excluded from by (i.e. 7.3.6 or 7.5.5)	

7. Which certification body your organization is certified with.

BV	TUV Rheinland	SGS	TUV Nord	Others
1	2	3	4	5

8. Please indicate whether you have another ISO certificates besides ISO 9001

No Only ISO 9001	Yes There are other certificates
1	2
Any other, please specify?	

9. Please indicate whether your organization has a quality department or unit.

Yes	No
1	2
If Yes, please indicate below the number of employees in the quality department or unit:	

1 – 10 employees	11 – 50 employees	51 – 100 employees	More than 100

10. Raw materials status

	Never True	Rarely True	Neutral	Usually True	Always True
Raw materials are delivered on time by suppliers					
Sample of raw materials are inspected periodically					
Rejected materials are quarantined and disposed of in timely manner					
Rejected materials are disposed of by the suppliers					

11. Equipment and Machinery

	Never True	Rarely True	Neutral	Usually True	Always True
Corrective measures are taken if machines break down					
Preventive measures are taken prior to machines break down					
Machines and equipment are maintained and calibrated periodically					
Sufficient staff to run and control the machines					
Adequate trainings are provided for staff to run these machines and handle equipment					

Note : Scale definitions for Q9 & Q10 can be equivalent to the following :
Never True = Never Implemented, Rarely True = Rarely Implemented, Neutral = Average Implementation, Usually True = Frequently Implemented, Always True = Fully Implemented.

12. Top management involvement

	Never True	Rarely True	Neutral	Usually True	Always True
Top managers attend management review meetings					
Organization objectives are reviewed on timely manner by top managers to assess achievements.					
Top managers actively involved in affecting improvement in production planning and execution.					
Top management is very much involved and committed in the ISO 9001 implementation					
Organization provides sufficient training programs for its production and manufacturing employees in relation to ISO 9001 implementation					

13. Effectiveness and efficiency of QMS

	Never True	Rarely True	Neutral	Usually True	Always True
Our QMS satisfies customer needs and meets his full requirements					
Our QMS takes into consideration staff needs, mainly production employees.					
Our QMS has improved work efficiency					
Our QMS has improved manufacturing processes effectively					
Our QMS has reduced wastes and controlled defects and non-conformed raw materials					
Our QMS achieves the production and manufacturing targets					

14. ISO Certification

	Never True	Rarely True	Neutral	Usually True	Always True
Our Quality manual is compliant with the ISO 9001 standard requirements					
Operations staff perform their tasks according to the documented procedures as per ISO 9001					
Work Records are documented and maintained for review and further action					
Internal audits are performed periodically for our quality management system					

Table (7.1) *Percentages of governmental and private sector*

Sector Type * Industry Type Crosstabulation

			Industry Type		Total
			Manufacturing	Manufacturing & Services	
Sector Type	Government	Count	1	0	1
		Expected Count	0.7	0.3	1
		% within Sector Type	100.00%	0.00%	100.00%
		% within Industry Type	3.10%	0.00%	2.10%
		% of Total	2.10%	0.00%	2.10%
	Private	Count	31	15	46
		Expected Count	30.7	15.3	46
		% within Sector Type	67.40%	32.60%	100.00%
		% within Industry Type	96.90%	93.80%	95.80%
		% of Total	64.60%	31.20%	95.80%
	Both	Count	0	1	1
		Expected Count	0.7	0.3	1
		% within Sector Type	0.00%	100.00%	100.00%
		% within Industry Type	0.00%	6.20%	2.10%
		% of Total	0.00%	2.10%	2.10%
Total		Count	32	16	48
		Expected Count	32	16	48
		% within Sector Type	66.70%	33.30%	100.00%
		% within Industry Type	100.00%	100.00%	100.00%
		% of Total	66.70%	33.30%	100.00%

Table (7.2) *Certification rate for the certifying bodies*

Certification Body * Industry Type Crosstabulation

			Industry Type		Total
			Manufacturing	Manufacturing & Services	
Certification Body	BV	Count	8	6	14
		Expected Count	9.3	4.7	14
		% within Certification Body	57.10%	42.90%	100.00%
		% within Industry Type	25.00%	37.50%	29.20%
		% of Total	16.70%	12.50%	29.20%
	TUV Rheinland	Count	6	2	8
		Expected Count	5.3	2.7	8
		% within Certification Body	75.00%	25.00%	100.00%
		% within Industry Type	18.80%	12.50%	16.70%
		% of Total	12.50%	4.20%	16.70%
	SGS	Count	11	1	12
		Expected Count	8	4	12
		% within Certification Body	91.70%	8.30%	100.00%
		% within Industry Type	34.40%	6.20%	25.00%
		% of Total	22.90%	2.10%	25.00%
	TUV NORD	Count	2	2	4
		Expected Count	2.7	1.3	4
		% within Certification Body	50.00%	50.00%	100.00%
		% within Industry Type	6.20%	12.50%	8.30%
		% of Total	4.20%	4.20%	8.30%
	OTHERS	Count	5	5	10
		Expected Count	6.7	3.3	10
		% within Certification Body	50.00%	50.00%	100.00%
		% within Industry Type	15.60%	31.20%	20.80%
		% of Total	10.40%	10.40%	20.80%
Total		Count	32	16	48
		Expected Count	32	16	48
		% within Certification Body	66.70%	33.30%	100.00%
		% within Industry Type	100.00%	100.00%	100.00%
		% of Total	66.70%	33.30%	100.00%

Table (7.3) *Certification length for the industry type*

Certification Length * Industry Type Crosstabulation

			Industry Type		Total
			Manufacturing	Manufacturing & Services	
Certification Length	less than a year	Count	0	1	1
		Expected Count	0.7	0.3	1
		% within Certification Length	0.00%	100.00%	100.00%
		% within Industry Type	0.00%	6.20%	2.10%
		% of Total	0.00%	2.10%	2.10%
	1-3 years	Count	0	1	1
		Expected Count	0.7	0.3	1
		% within Certification Length	0.00%	100.00%	100.00%
		% within Industry Type	0.00%	6.20%	2.10%
		% of Total	0.00%	2.10%	2.10%
	5-7 years	Count	10	3	13
		Expected Count	8.7	4.3	13
		% within Certification Length	76.90%	23.10%	100.00%
		% within Industry Type	31.20%	18.80%	27.10%
		% of Total	20.80%	6.20%	27.10%
	7-9 years	Count	5	0	5
		Expected Count	3.3	1.7	5
		% within Certification Length	100.00%	0.00%	100.00%
		% within Industry Type	15.60%	0.00%	10.40%
		% of Total	10.40%	0.00%	10.40%
	9 years and above	Count	17	11	28
		Expected Count	18.7	9.3	28
		% within Certification Length	60.70%	39.30%	100.00%
		% within Industry Type	53.10%	68.80%	58.30%
		% of Total	35.40%	22.90%	58.30%
Total		Count	32	16	48
		Expected Count	32	16	48
		% within Certification Length	66.70%	33.30%	100.00%
		% within Industry Type	100.00%	100.00%	100.00%
		% of Total	66.70%	33.30%	100.00%

Table (7.4) *Size of employees in the manufacturing firms*

Size of employees * Industry Type Crosstabulation

			Industry Type Manufacturing	Industry Type Manufacturing & Services	Total
	10-49	Count	2	1	3
		Expected Count	2	1	3
		% within Size of employees	66.70%	33.30%	100.00%
		% within Industry Type	6.20%	6.20%	6.20%
		% of Total	4.20%	2.10%	6.20%
	50-249	Count	21	5	26
		Expected Count	17.3	8.7	26
		% within Size of employees	80.80%	19.20%	100.00%
		% within Industry Type	65.60%	31.20%	54.20%
		% of Total	43.80%	10.40%	54.20%
	250-499	Count	4	3	7
		Expected Count	4.7	2.3	7
		% within Size of employees	57.10%	42.90%	100.00%
		% within Industry Type	12.50%	18.80%	14.60%
		% of Total	8.30%	6.20%	14.60%
	500 or more	Count	5	7	12
		Expected Count	8	4	12
		% within Size of employees	41.70%	58.30%	100.00%
Size of employees		% within Industry Type	15.60%	43.80%	25.00%
		% of Total	10.40%	14.60%	25.00%
		Count	32	16	48
		Expected Count	32	16	48
		% within Size of employees	66.70%	33.30%	100.00%
		% within Industry Type	100.00%	100.00%	100.00%
Total		% of Total	66.70%	33.30%	100.00%

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Table (7.5) *A standard exclusion from clause 7.0*

Any Exclusion * Industry Type Crosstabulation

			Industry Type		Total
			Manufacturing	Manufacturing & Services	
Any Exclusion	YES	Count	16	2	18
		Expected Count	12	6	18
		% within Any Exclusion	88.90%	11.10%	100.00%
		% within Industry Type	50.00%	12.50%	37.50%
		% of Total	33.30%	4.20%	37.50%
	NO	Count	16	14	30
		Expected Count	20	10	30
		% within Any Exclusion	53.30%	46.70%	100.00%
		% within Industry Type	50.00%	87.50%	62.50%
		% of Total	33.30%	29.20%	62.50%
Total		Count	32	16	48
		Expected Count	32	16	48
		% within Any Exclusion	66.70%	33.30%	100.00%
		% within Industry Type	100.00%	100.00%	100.00%
		% of Total	66.70%	33.30%	100.00%

Table (7.6) *The existence of a quality department in the manufacturing firm*

Is there a quality Unit or department * Industry Type Crosstabulation

			Industry Type		Total
			Manufacturing	Manufacturing & Services	
Is there a quality Unit or department	YES	Count	29	15	44
		Expected Count	29.3	14.7	44
		% within Is there a quality Unit or department	65.90%	34.10%	100.00%
		% within Industry Type	90.60%	93.80%	91.70%
		% of Total	60.40%	31.20%	91.70%
	NO	Count	3	1	4
		Expected Count	2.7	1.3	4
		% within Is there a quality Unit or department	75.00%	25.00%	100.00%
		% within Industry Type	9.40%	6.20%	8.30%
		% of Total	6.20%	2.10%	8.30%
Total		Count	32	16	48
		Expected Count	32	16	48
		% within Is there a quality Unit or department	66.70%	33.30%	100.00%
		% within Industry Type	100.00%	100.00%	100.00%
		% of Total	66.70%	33.30%	100.00%

Table (7.7) *Number of employees in the quality department*

Number of employees in the quality unit * Industry Type Crosstabulation

			Industry Type		Total
			Manufacturing	Manufacturing & Services	
Number of employees in the quality unit	1-10 employees	Count	25	9	34
		Expected Count	22.7	11.3	34
		% within Number of employees in the quality unit	73.50%	26.50%	100.00%
		% within Industry Type	78.10%	56.20%	70.80%
		% of Total	52.10%	18.80%	70.80%
	11-50 employees	Count	1	5	6
		Expected Count	4	2	6
		% within Number of employees in the quality unit	16.70%	83.30%	100.00%
		% within Industry Type	3.10%	31.20%	12.50%
		% of Total	2.10%	10.40%	12.50%
	51-100 employees	Count	3	1	4
		Expected Count	2.7	1.3	4
		% within Number of employees in the quality unit	75.00%	25.00%	100.00%
		% within Industry Type	9.40%	6.20%	8.30%
		% of Total	6.20%	2.10%	8.30%
	NA	Count	3	1	4
		Expected Count	2.7	1.3	4
		% within Number of employees in the quality unit	75.00%	25.00%	100.00%
		% within Industry Type	9.40%	6.20%	8.30%
		% of Total	6.20%	2.10%	8.30%
Total		Count	32	16	48
		Expected Count	32	16	48
		% within Number of employees in the quality unit	66.70%	33.30%	100.00%
		% within Industry Type	100.00%	100.00%	100.00%
		% of Total	66.70%	33.30%	100.00%

Table (7.8) *Descriptive statistics for Raw materials status*

Descriptive Statistics

	N	Minimum	Maximum	Sum	Mean		Std. Deviation	Variance
	Statistic	Statistic	Statistic	Statistic	Statistic	Std. Error	Statistic	Statistic
Raw materials are delivered on time by suppliers	75	3	5	337	4.49	0.069	0.601	0.361
Sample of raw materials are inspected periodically	75	2	5	343	4.57	0.074	0.64	0.41
Rejected materials are quarantined and disposed of in timely manner	75	3	5	350	4.67	0.061	0.528	0.279
Rejected materials are disposed of by the suppliers	75	3	5	339	4.52	0.069	0.601	0.361
Valid N (listwise)	75							

Table (7.9) *Descriptive statistics for Equipment and Machinery*

Descriptive Statistics

	N	Minimum	Maximum	Sum	Mean		Std. Deviation	Variance
	Statistic	Statistic	Statistic	Statistic	Statistic	Std. Error	Statistic	Statistic
Corrective measures are taken if machines break down	75	3	5	342	4.56	0.072	0.62	0.385
Preventive measures are taken prior to machine break down	75	1	5	340	4.53	0.088	0.759	0.577
Machines and equipment are maintained and calibrated periodically	75	3	5	360	4.8	0.05	0.435	0.189
Sufficient staff to run and control the machines	75	3	5	350	4.67	0.064	0.553	0.306
Adequate trainings are provided for staff to run these machines and handle equipment	75	1	5	333	4.44	0.108	0.933	0.871
Valid N (listwise)	75							

Table (7.10) *Descriptive statistics for Top Management Involvement*

Descriptive Statistics

	N	Minimum	Maximum	Sum	Mean		Std. Deviation	Variance
	Statistic	Statistic	Statistic	Statistic	Statistic	Std. Error	Statistic	Statistic
Top management attend management review meetings	75	2	5	334	4.45	0.088	0.759	0.575
Organization objectives are reviewed on timely manner by top managers to assess achievements	75	2	5	340	4.53	0.069	0.6	0.36
Top managers actively involved in affecting improvement in production planning and execution	75	4	5	351	4.68	0.054	0.47	0.221
Top management is very much involved and committed in the ISO 9001 implementation	75	2	5	342	4.56	0.079	0.683	0.466
Organization provides sufficient training programs for its production and manufacturing employees in relation to ISO 9001 implementation	75	3	5	331	4.41	0.081	0.699	0.489
Valid N (listwise)	75							

Table (7.11) *QMS Effectiveness and Efficiency*

Descriptive Statistics

	N	Minimum	Maximum	Sum	Mean		Std. Deviation	Variance
	Statistic	Statistic	Statistic	Statistic	Statistic	Std. Error	Statistic	Statistic
Our QMS satisfies customer needs and meets his full requirements	75	3	5	331	4.41	0.069	0.595	0.354
Our QMS takes into consideration staff needs, mainly production employees	75	3	5	338	4.51	0.064	0.554	0.307
Our QMS has improved work efficiency	75	3	5	339	4.52	0.069	0.601	0.361
Our QMS has improved manufacturing processes effectively	75	3	5	339	4.52	0.072	0.623	0.388
Our QMS has reduced wastes and controlled defects and non-conformed raw materials	75	3	5	347	4.63	0.078	0.673	0.453
Our QMS acheives production and manufacturing targets.	75	3	5	337	4.49	0.067	0.578	0.334
Valid N (listwise)	75							

Table (7.12) *Descriptive statistics for ISO Certification*

Descriptive Statistics

	N	Minimum	Maximum	Sum	Mean		Std. Deviation	Variance
	Statistic	Statistic	Statistic	Statistic	Statistic	Std. Error	Statistic	Statistic
Our Quality manual is compliant with the ISO 9001 standard requirement	75	3	5	352	4.69	0.068	0.592	0.351
Operations staff perform their tasks according to the documented procedures as per ISO 9001	75	3	5	345	4.6	0.068	0.593	0.351
Work Records are documented and maintained for review and further action	75	3	5	356	4.75	0.054	0.468	0.219
Internal audits are performed periodically for our quality management system	75	3	5	357	4.76	0.056	0.489	0.239
Valid N (listwise)	75							

Table (7.14) *Outer measurement loadings for the five scale measures (Q#10-Q#14)*

Research Item	ISO CERT	RAW	TMC	EFFECT	EQUIP
Q10_1	0	0.8868	0	0	0
Q10_2	0	0.9153	0	0	0
Q10_3	0	0.8543	0	0	0
Q10_4	0	0.7785	0	0	0
Q11_1	0	0	0.8206	0	0
Q11_2	0	0	0.8774	0	0
Q11_3	0	0	0.688	0	0
Q11_4	0	0	0.7367	0	0
Q11_5	0	0	0.7713	0	0
Q12_1	0	0	0	0	0.731
Q12_2	0	0	0	0	0.74
Q12_3	0	0	0	0	0.8719
Q12_4	0	0	0	0	0.8531
Q12_5	0	0	0	0	0.8443
Q13_1	0	0	0	0.6867	0
Q13_2	0	0	0	0.7547	0
Q13_3	0	0	0	0.8762	0
Q13_4	0	0	0	0.8735	0
Q13_5	0	0	0	0.7729	0
Q13_6	0	0	0	0.915	0
Q14_1	0.6958	0	0	0	0
Q14_2	0.9453	0	0	0	0
Q14_3	0.8107	0	0	0	0
Q14_4	0.8325	0	0	0	0

Note :

ISO CERT : ISO certification

RAW : Raw materials status

TMC : Top management commitment

EFFECT : Effectiveness and Efficiency

EQUIP : Equipment and Machinery

Table (7.15) *Correlation matrix for Question #10*

Correlation Matrix

		Raw materials are delivered on time by suppliers	Sample of raw materials are inspected periodically	Rejected materials are quarantined and disposed of in timely manner	Rejected materials are disposed of by the suppliers
	Raw materials are delivered on time by suppliers	1	0.8	0.61	0.627
	Sample of raw materials are inspected periodically	0.8	1	0.652	0.69
	Rejected materials are quarantined and disposed of in timely manner	0.61	0.652	1	0.596
Correlation	Rejected materials are disposed of by the suppliers	0.627	0.69	0.596	1

Table (7.16) *Correlation matrix for Question #11*

Correlation Matrix

		Corrective measures are taken if machines break down	Preventive measures are taken prior to machine break down	Machines and equipment are maintained and calibrated periodically	Sufficient staff to run and control the machines	Adequate trainings are provided for staff to run these machines and handle equipment
	Corrective measures are taken if machines break down	1	0.648	0.371	0.394	0.736
	Preventive measures are taken prior to machine break down	0.648	1	0.45	0.654	0.675
	Machines and equipment are maintained and calibrated periodically	0.371	0.45	1	0.561	0.286
	Sufficient staff to run and control the machines	0.394	0.654	0.561	1	0.314
Correlation	Adequate trainings are provided for staff to run these machines and handle equipment	0.736	0.675	0.286	0.314	1

Table (7.17) *Correlation matrix for Question #12*

Correlation Matrix

		Top management attend management review meetings	Organization objectives are reviewed on timely manner by top managers to assess achievements	Top managers actively involved in affecting improvement in production planning and execution	Top management is very much involved and committed in the ISO 9001 implementation	Organization provides sufficient training programs for its production and manufacturing employees in relation to ISO 9001 implementation
	Top management attend management review meetings	1	0.56	0.716	0.443	0.432
	Organization objectives are reviewed on timely manner by top managers to assess achievements	0.56	1	0.47	0.58	0.466
	Top managers actively involved in affecting improvement in production planning and execution	0.716	0.47	1	0.651	0.696
	Top management is very much involved and committed in the ISO 9001 implementation	0.443	0.58	0.651	1	0.698
Correlation	Organization provides sufficient training programs for its production and manufacturing employees in relation to ISO 9001 implementation	0.432	0.466	0.696	0.698	1

Table (7.18) *Correlation matrix for Question #13*

		Our QMS satisfies customer needs and meets his full requirements	Our QMS takes into consideration staff needs, mainly production employees	Our QMS has improved work efficiency	Our QMS has improved manufacturing processes effectively	Our QMS has reduced wastes and controlled defects and non-conformed raw materials
Correlation	Our QMS satisfies customer needs and meets his full requirements	1	0.504	0.449	0.433	0.458
	Our QMS takes into consideration staff needs, mainly production employees	0.504	1	0.537	0.518	0.441
	Our QMS has improved work efficiency	0.449	0.537	1	0.82	0.62
	Our QMS has improved manufacturing processes effectively	0.433	0.518	0.82	1	0.727
	Our QMS has reduced wastes and controlled defects and non-conformed raw materials	0.458	0.441	0.62	0.727	1
	Our QMS acheives production and manufacturing targets.	0.538	0.643	0.807	0.779	0.653

Table (7.19) *Correlation matrix for Question #14*

		Our Quality manual is compliant with the ISO 9001 standard requirement	Operations staff perform their tasks according to the documented procedures as per ISO 9001	Work Records are documented and maintained for review and further action	Internal audits are performed periodically for our quality management system
	Our Quality manual is compliant with the ISO 9001 standard requirement	1	0.647	0.301	0.396
	Operations staff perform their tasks according to the documented procedures as per ISO 9001	0.647	1	0.702	0.737
	Work Records are documented and maintained for review and further action	0.301	0.702	1	0.617
Correlation	Internal audits are performed periodically for our quality management system	0.396	0.737	0.617	1

A(7.2) Model fit with full data (LISREL OUTPUT)

```
                    Degrees of Freedom = 248
         Minimum Fit Function Chi-Square = 102.05 (P = 1.00)
Normal Theory Weighted Least Squares Chi-Square = 115.99 (P = 1.00)
           Estimated Non-centrality Parameter (NCP) = 0.0
         90 Percent Confidence Interval for NCP = (0.0 ; 0.0)
                 Minimum Fit Function Value = 1.38
          Population Discrepancy Function Value (F0) = 0.0
          90 Percent Confidence Interval for F0 = (0.0 ; 0.0)
         Root Mean Square Error of Approximation (RMSEA) = 0.0
         90 Percent Confidence Interval for RMSEA = (0.0 ; 0.0)
          P-Value for Test of Close Fit (RMSEA < 0.05) = 1.00
              Expected Cross-Validation Index (ECVI) = 4.76
         90 Percent Confidence Interval for ECVI = (4.76 ; 4.76)
                  ECVI for Saturated Model = 8.11
                 ECVI for Independence Model = 29.78
    Chi-Square for Independence Model with 276 Degrees of Freedom =
                              2155.65
                   Independence AIC = 2203.65
                       Model AIC = 219.99
                     Saturated AIC = 600.00
                  Independence CAIC = 2283.27
                      Model CAIC = 392.50
                     Saturated CAIC = 1595.25
                  Normed Fit Index (NFI) = 0.95
                Non-Normed Fit Index (NNFI) = 1.09
             Parsimony Normed Fit Index (PNFI) = 0.86
                 Comparative Fit Index (CFI) = 1.00
                 Incremental Fit Index (IFI) = 1.08
                  Relative Fit Index (RFI) = 0.95
                      Critical N (CN) = 220.53
                Root Mean Square Residual (RMR) = 0.11
                      Standardized RMR = 0.053
                 Goodness of Fit Index (GFI) = 0.88
            Adjusted Goodness of Fit Index (AGFI) = 0.86
            Parsimony Goodness of Fit Index (PGFI) = 0.73
```

A(7.3) Model fit output with reduced Data (LISREL OUTPUT)

```
                    Degrees of Freedom = 131
        Minimum Fit Function Chi-Square = 46.76 (P = 1.00)
Normal Theory Weighted Least Squares Chi-Square = 49.03 (P = 1.00)
           Estimated Non-centrality Parameter (NCP) = 0.0
         90 Percent Confidence Interval for NCP = (0.0 ; 0.0)
                 Minimum Fit Function Value = 0.63
       Population Discrepancy Function Value (F0) = 0.0
         90 Percent Confidence Interval for F0 = (0.0 ; 0.0)
       Root Mean Square Error of Approximation (RMSEA) = 0.0
        90 Percent Confidence Interval for RMSEA = (0.0 ; 0.0)
          P-Value for Test of Close Fit (RMSEA < 0.05) = 1.00
             Expected Cross-Validation Index (ECVI) = 2.85
       90 Percent Confidence Interval for ECVI = (2.85 ; 2.85)
                  ECVI for Saturated Model = 4.62
                  ECVI for Independence Model = 17.62
   Chi-Square for Independence Model with 153 Degrees of Freedom =
                             1268.15
                    Independence AIC = 1304.15
                       Model AIC = 129.03
                      Saturated AIC = 342.00
                   Independence CAIC = 1363.86
                       Model CAIC = 261.72
                     Saturated CAIC = 909.29
                   Normed Fit Index (NFI) = 0.96
                 Non-Normed Fit Index (NNFI) = 1.09
              Parsimony Normed Fit Index (PNFI) = 0.82
                  Comparative Fit Index (CFI) = 1.00
                  Incremental Fit Index (IFI) = 1.07
                   Relative Fit Index (RFI) = 0.96
                       Critical N (CN) = 272.50
             Root Mean Square Residual (RMR) = 0.095
                     Standardized RMR = 0.047
                  Goodness of Fit Index (GFI) = 0.93
          Adjusted Goodness of Fit Index (AGFI) = 0.91
          Parsimony Goodness of Fit Index (PGFI) = 0.71
```

A(7.4) *Total direct effects (LISREL OUTPUT)*

```
Total and Indirect Effects

        Total Effects of KSI on ETA

             ISO_CERT
             --------
     RAW        0.62
              (0.16)
                3.96
   EQUIP        0.88
              (0.16)
                5.49
     TMC        0.99
              (0.20)
                4.92
  EFFECT        0.87
              (0.16)
                5.43
```

A(7.5) *Structural equations for the hypothesized model (LISREL OUTPUT)*

```
Structural Equations


     RAW = 0.62*ISO_CERT, Errorvar.= 0.62 , R² = 0.38
         (0.16)                        (0.24)
          3.96                          2.59


   EQUIP = 0.88*ISO_CERT, Errorvar.= 0.21 , R² = 0.78
         (0.16)                        (0.15)
          5.49                          1.44


     TMC = 0.99*ISO_CERT, Errorvar.= 0.023, R² = 0.98
         (0.20)                        (0.10)
          4.92                          0.23


  EFFECT = 0.87*ISO_CERT, Errorvar.= 0.25 , R² = 0.75
         (0.16)                        (0.13)
          5.43                          1.89
```

Personal Information

Name	:	SALAH A. S. AL-OLAYAN
Qualification	:	1- QMI Lead Auditor - Intensive training course in ISO 9001:2000, Kuwait 2006
		2- M.S. in statistics & Operations research 1999, University Of Kuwait – Kuwait.
		3- B.S. in Industrial Engineering 1989, University Of Arizona – USA.
Date Of Birth	:	07/21/1965
Email	:	salahy2k@hotmail.com
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PROFILE

Hard working, fast learning, detail oriented, strong problem solving and organizational skills, with almost 20 years of varied Technical, Supervisory, Administrative, Teaching, Sales, Marketing and Consultation experience. Proficient in numerous software applications such as MINITAB, SPSS, MATLAB and etc..

Work Experience

Kuwait University, College of Engineering and Petroleum   Sept 1993 - Present

Scientific Assistant (Sept 1993 – Present)
I am responsible for teaching, tutoring and evaluation-grading of student assignments and quizzes for the industrial engineering courses such as: Applied probability and statistics for engineers, operations research, and simulation.

Quality Manager (Sept 2000 – Present)
Part of the academic work, I am also responsible for maintaining and improving the quality management systems for the office of consultation and career development in the college as per the ISO 9001:2008 standard requirements.

Engineering Services Consultant (Sept. 1993 – Sept 2000)
Part of the academic work, I was responsible for all the engineering consultation, training, and testing services which are offered by the office of consultations and career development (OCCD) in the college. I was managing the three primary services offered by the OCCD as per the customer and market needs.

Kuwait Petroleum and Corporation (KPC)   Dec 1991 – Sept 1993

Coordination & Follow-Up Analyst
Responsible for identifying and analyzing training needs for all oil sector employees. Also I was responsible for selecting and contracting with the best training organizers to provide training courses for the oil sector staff. Furthermore, I used to submit a monthly statistical report for my superior in order to help the leaders at KPC make the right decisions with respect to training aspects.

Kuwait Finance House (KFH)   May 1990 – Dec 1991

Bank officer
Responsible for opening and managing various bank accounts for individuals, companies, and corporations.

Training Courses attended :

1- QMI Lead Auditor training course for ISO 9001:2008	12/11/2011 – 12/15/2011
2. QMI Lead Auditor training course for ISO 9001:2000	03/25/2006 – 03/29/2006
2- Organizing Conferences	01/10/2004 – 01/14/2004

3- Total Quality Management	10/04/2003 – 10/08/2003
4- Feasibility studies	04/06/2003 – 04/10/2002
5- MCSE Full Track Program	02/12/2000 – 05/17/2000
6- Cost Estimation in industries	05/29/1999 – 06/02/1999
7- Project Management	03/18/1995 – 03/22/1995
8- Introduction to Novell Netware ver. 3.11	11/06/1993 – 11/10/1993
9- Manpower Planning and Career Development	05/08/1993 – 05/12/1993
10- Identification and Analysis of Training Needs	09/07/1992 – 09/10/1992

Recent Publications:

1. An Empirical Evaluation of the ISO 9001 Quality Management Systems for Certified Work Organizations in Kuwait as Benchmarked against Analogous Swedish Organizations. *Journal of Service Science and Management*, **2013, 6, 80-95** doi:10.4236/jssm.2013.61009 Published Online March 2013 (http://www.scirp.org/journal/jssm)

2. Currently working on two research papers to be published this coming March 2013.