PERCEPTIONS OF TURKISH CONTRACTORS TOWARD ISO 9001 QUALITY, ISO 14001 ENVIRONMENTAL AND OHSAS 18001 OCCUPATIONAL HEALTH AND SAFETY MANAGEMENT SYSTEMS

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ABSTRACT

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ISO 9001 QUALITY, ISO 14001 ENVIRONMENTAL AND OHSAS 18001
OCCUPATIONAL HEALTH AND SAFETY MANAGEMENT SYSTEMS

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The objective of this thesis is to reveal the perception of the Turkish contractors toward ISO 9001 Quality, ISO 14001 Environmental and OHSAS 18001 Occupational Health and Safety Management Systems using questionnaires. All of the companies participating in the survey have already been ISO 9000 certified. Thus, the questionnaire prepared included more details for the Quality Management System. The results of the questionnaire outcomes are statistically analysed.

Analysis of the survey results show that the most common motivators of Management Systems for Turkish contractors are to qualify to tender for local and international projects and to increase competitiveness in overseas markets, however the vision approach of top management is not less important than the financial issues. Most of the companies stated that they implement Management Systems as a part of their improvement strategy as well. This proves that the companies are aware of the benefits of certification in the long term period.

Although the most expected advantages of the systems are qualification to tender for projects both locally and internationally, as well as gaining competitive advantage, it has been observed that other benefits are realized

by the Turkish contractors such as; more systematic record keeping, higher company prestige, increased client satisfaction.
The major disadvantages realized by practicing the Management Systems are increased documentation and workload. The solution is proposed as to set an internal network and to integrate the systems to reduce paperwork.

In conclusion, all of the Management Systems were believed to be as useful tools and Turkish contractors think that their advantages overcome disadvantages.

Keywords: ISO 9000, ISO 14001, OHSAS 18001, Turkish Contractors, Construction

ÖZ

TÜRK MÜTEAHHİTLERİNİN ISO 9001 KALİTE, ISO 14001 ÇEVRE VE OHSAS 18001 İŞ ŞAĞLIĞI VE GÜVENLİĞİ YÖNETİM SİSTEMLERİ'NİN UYGULAMALARINA BAKIŞ AÇILARI

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Bu tez çalışmasının amacı Türk müteahhitlerinin ISO 9001 Kalite, ISO 14001 Çevre ve OHSAS 18001 İş Sağlığı ve Güvenliği Yönetim Sistemleri'nin uygulamalarına bakış açısının anket yoluyla incelenmesidir. Araştırmaya katılan tüm firmalar ISO 9000 belgesine sahiptir. Dolayısıyla, anket Kalite Yönetim Sistemi yönünden daha ayrıntılı hazırlanmıştır. Anketlerin çıktılarına ait sonuçlar istatistiksel olarak analiz edilmiştir.

Araştırma sonuçlarına göre, Türk müteahhitlerine göre Yönetim Sistemleri'ni uygulama kararı verilme aşamasında en çok etkili olan nedenler yerel ve uluslararası projelerin ihalelerinde yeterlilik alabilmek ve uluslararası pazarlarda rekabetçi olabilmek olarak belirlenmiştir. Ancak üst yönetimin vizyon yaklaşımı mali konulardan daha az önemli değildir. Pek çok şirket, Yönetim Sistemleri'ni gelişme stratejisinin bir parçası olarak da uygulamaktadır. Bu, firmaların sertifikasyonun uzun vadede sağlayacağı avantajların farkında olduklarını göstermektedir.

Sistemler'in en fazla beklenen avantajları yerel ve uluslararası projelerin ihalelerinde yeterlilik alabilmek kadar rekabetçi olabilmek olsa da, daha sistematik kayıt tutulması, şirketin prestijinin artması, müşteri memnuniyetinin artması gibi diğer getirilerin de Türk müteahhitleri tarafından anlaşıldığı gözlenmiştir.

Yönetim Sistemleri'nin uygulamlarında ortaya çıkan önemli dezavantajlar dokümantasyonun ve iş yükünün artması olarak belirlenmiştir. Bunun için dahili bir şebeke kurulması ve kağıt yükünü azaltmak için Sistemler'in entegrasyonunun sağlanması önerilmiştir.

Sonuç olarak, tüm Yönetim Sistemleri faydalı birer araç olarak değerlendirilmiş ve avantajlarının dezavantajlarından fazla olduğu belirtilmiştir.

Anahtar Kelimeler: ISO 9000, ISO 14001, OHSAS 18001, Türk Müteahhitleri, İnşaat

To my beloved mother and father

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CHAPTER 1

INTRODUCTION

ISO 9000 Quality, ISO 14001 Environmental and OHSAS 18001 Occupational Health and Safety Management Systems are most commonly used management systems in the construction sector in Turkey. These management systems has recently received a great deal of attention in the last years with the increasing demand of the clients', higher importance of quality in construction works, harder conditions of tenders due to these systems. The purpose to establish these systems vary according to the companies' vision, management decision, competitive approach and other reasons. The aim of this study is to reveal a general understanding and perspective of the Turkish construction companies due to these systems, understand the reasons behind why the companies seek to establish them and examine the realized advantages and disadvantages by establishing them.

A questionnaire is prepared and distributed by email to the selected construction companies. The companies are selected to be already ISO 9000 certified. Companies are not necessarily certified for other management systems but the fundamental of this study is based on the idea that the respondents have established and practiced these systems and thus they would have a realistic perspective in order to have realistic results from the survey. The questionnaires are collected again by email and the results are analysed. The results for the outcomes of the management systems are statistically analysed by using a t-test and thus non-significant outcomes are eliminated. Both positive and negative significant outcomes are compared with the similar studies and the results are discussed.

This study consists of four chapters:

1. Chapter 1 – Introduction
   This chapter contains the general outlines and purpose of this study.

2. Chapter 2 – Background Information
   In this chapter general definitions and information about management systems are given. Literature review on the systems concept is discussed and general structure is formed.

3. Chapter 3 – Analysis
   In this chapter, overview of the research methodology and structure of the questionnaire is explained. The results after the statistical analysis are given in numbers. Those results are compared with the previous studies given in literature and discussed.

4. Chapter 4 – Conclusions and Recommendations
   In this chapter, a review of the results is given and suggestions due to future studies are included.

CHAPTER 2

BACKGROUND INFORMATION

2.1. WHAT IS ISO 9000?

ISO 9000 is a series of standards which was first published in 1987 by the International Organization for Standardization (ISO). A slight revision has been made in 1994 and the latest revision has been made in 2000, which the latest version of the standard is obtained and published. The latest version includes major structural and strategic revisions and made mainly to fix the disjoints and confusing parts in the 1994 version. Also the previous version was harder to implement for small sized companies and by the latest revisions the new standard has become more oriented to other industries than the manufacturing industry.

The main purpose of International Organization for Standardization (ISO) is to facilitate international trading by creating only one standard, which everyone will understand and accept.

ISO 9000 term refers to three different kinds of standards that are:

ISO 9000:2000 Quality Management Systems - Basic concepts, terms and definitions. This document defines the fundamental concepts and terminology of the quality management systems.

ISO 9001:2000 Quality Management Systems – Conditions. This document defines the conditions of the quality management system and it is used to show the qualification of the organisation to fulfill the client needs and legal conditions of the product.

ISO 9004:2000 Quality Management Systems – Guidelines for Performance Improvements. This document guides for establishment, management and continuous improvement of an effective quality management system, which will fulfill client needs. It is prepared to help the manager level people, who wish to explore beyond ISO 9001:2000.

Companies worldwide with quality systems that conform to the standards usually get themselves certified by an accredited body. Certification assures a company's customers that it at least has a fundamental quality system in place. Across national boundaries, the standards also provide a common reference point for quality. In addition, the quality system required by ISO 9000 and its accompaniments are believed to serve as a stepping stone to the adoption of the Total Quality Management (TQM) philosophy (Erel and Ghosh 1997).

According to the ISO Survey of Certifications 2005; up to the end of December 2005, at least 776.608 ISO 9001:2000 certificates had been issued in 161 countries and economies. Following table shows the annual growth of ISO 9001 certifications worldwide:

Table 3.1. "ISO 9001:2000 Principal Results" according to ISO Survey of Certifications 2005

World Results	**Dec. 2001**	**Dec. 2002**	**Dec. 2003**	**Dec. 2004**	**Dec. 2005**
World total	44.388	167.124	497.919	660.132	776.608
World growth		122.736	330.795	162.213	116.476
Number of countries/economies	97	133	149	154	161

The 2005 total represents an increase of 116.476 (+18 %) over 2004, when the total was 660.132 in 154 countries and economies (ISO Survey 2005).

2.2. ISO 9000:2000 QUALITY MANAGEMENT SYSTEM

The system is the way how the organization determines, defines and fulfills its client's needs and expectations.

Quality systems involve internal and external aspects. An internal quality system covers activities aimed at providing confidence to the management of an organization that the intended quality is being achieved. This is called a ''quality management system.'' An external quality system covers activities aimed at inspiring confidence in the client that the supplier's quality system will provide a product or service that will satisfy the client's quality requirements. This is called a ''quality assurance system'' (Bubshait and Al-Atiq 1999).

Quality Management System reflects the organization's activities and sources. It evolves with the organization and responds to the changing needs. Understanding the system and operating it to fulfill the client needs are fundamental for the continuity of the organization.

As every organization is unique, it is not possible to have a standard Quality Management System. There are different ways to fulfill ISO 9000's conditions. Standard allows applying different kinds of ways while establishing the system. As long as the Standard's basic conditions are fulfilled, organization is free to choose any kind of Quality Management System. The purpose is not to have a standard Quality System, but to establish a system fulfilling the Standard.

Quality Management System is also works as a control mechanism, which ensures that all the necessary activities are done. Quality Management

System has to be documented including how the activities are handled and how they are controlled and it has to be practiced as the way it is documented. As a summary, the way to change the “facts of life” passes through the “structure”. Quality Management System forms the foundation of this structure. It defines what will be done by whom in what time and it includes strategies and tactics, which keeps the employee to work as a team.

2.2.1. QUALITY MANAGEMENT PRINCIPLES

These principles can be used by senior management as a framework to guide their organizations towards improved performance. The principles are derived from the collective experience and knowledge of the international experts who participate in ISO Technical Committee ISO/TC 176, Quality Management and Quality Assurance, which is responsible for developing and maintaining the ISO 9000 standards.

This document gives the standardized descriptions of the principles as they appear in ISO 9000:2000 and ISO 9004:2000. In addition, it provides examples of the benefits derived from their use and of actions that managers typically take in applying the principles to improve their organizations' performance.

PRINCIPLE 1 CUSTOMER FOCUS

Organizations depend on their customers and therefore should understand current and future customer needs, should meet customer requirements and strive to exceed customer expectations.

Key benefits:

- Increased revenue and market share obtained through flexible and fast responses to market opportunities.

- Increased effectiveness in the use of the organization's resources to enhance customer satisfaction.
- Improved customer loyalty leading to repeat business.

Applying the principle of customer focus typically leads to:

- Researching and understanding customer needs and expectations.
- Ensuring that the objectives of the organization are linked to customer needs and expectations.
- Communicating customer needs and expectations throughout the organization.
- Measuring customer satisfaction and acting on the results.
- Systematically managing customer relationships.
- Ensuring a balanced approach between satisfying customers and other interested parties (such as owners, employees, suppliers, financiers, local communities and society as a whole).

PRINCIPLE 2 LEADERSHIP

Leaders establish unity of purpose and direction of the organization. They should create and maintain the internal environment in which people can become fully involved in achieving the organization's objectives.

Key benefits:

- People will understand and be motivated towards the organization's goals and objectives.

- Activities are evaluated, aligned and implemented in a unified way.
- Miscommunication between levels of an organization will be minimized.

Applying the principle of leadership typically leads to:

- Considering the needs of all interested parties including customers, owners, employees, suppliers, financiers, local communities and society as a whole.
- Establishing a clear vision of the organization's future.
- Setting challenging goals and targets.
- Creating and sustaining shared values, fairness and ethical role models at all levels of the organization.
- Establishing trust and eliminating fear.
- Providing people with the required resources, training and freedom to act with responsibility and accountability.
- Inspiring, encouraging and recognizing people's contributions.

PRINCIPLE 3 INVOLVEMENT OF PEOPLE

People at all levels are the essence of an organization and their full involvement enables their abilities to be used for the organization's benefit.

Key benefits:

- Motivated, committed and involved people within the organization.
- Innovation and creativity in furthering the organization's objectives.
- People being accountable for their own performance.
- People eager to participate in and contribute to continual improvement.

Applying the principle of involvement of people typically leads to:

- People understanding the importance of their contribution and role in the organization.
- People identifying constraints to their performance.
- People accepting ownership of problems and their responsibility for solving them.

- People evaluating their performance against their personal goals and objectives.
- People actively seeking opportunities to enhance their competence, knowledge and experience.
- People freely sharing knowledge and experience.
- People openly discussing problems and issues.

PRICIPLE 4 PROCESS APPROACH

A desired result is achieved more efficiently when activities and related resources are managed as a process.

Key benefits:

- Lower costs and shorter cycle times through effective use of resources.
- Improved, consistent and predictable results.
- Focused and prioritized improvement opportunities.

Applying the principle of process approach typically leads to:

- Systematically defining the activities necessary to obtain a desired result.
- Establishing clear responsibility and accountability for managing key activities.
- Analysing and measuring of the capability of key activities.
- Identifying the interfaces of key activities within and between the functions of the organization.
- Focusing on the factors such as resources, methods, and materials that will improve key activities of the organization.
- Evaluating risks, consequences and impacts of activities on customers, suppliers and other interested parties.

PRINCIPLE 5 SYSTEM APPROACH TO MANAGEMENT

Identifying, understanding and managing interrelated processes as a system contributes to the organization's effectiveness and efficiency in achieving its objectives.

Key benefits:

- Integration and alignment of the processes that will best achieve the desired results.
- Ability to focus effort on the key processes.
- Providing confidence to interested parties as to the consistency, effectiveness and efficiency of the organization.

Applying the principle of system approach to management typically leads to:

- Structuring a system to achieve the organization's objectives in the most effective and efficient way.
- Understanding the interdependencies between the processes of the system.
- Structured approaches that harmonize and integrate processes.
- Providing a better understanding of the roles and responsibilities necessary for achieving common objectives and thereby reducing cross-functional barriers.
- Understanding organizational capabilities and establishing resource constraints prior to action.
- Targeting and defining how specific activities within a system should operate.
- Continually improving the system through measurement and evaluation.

PRINCIPLE 6 CONTINUAL IMPROVEMENT

Continual improvement of the organization's overall performance should be a permanent objective of the organization.

Key benefits:

- Performance advantage through improved organizational capabilities.
- Alignment of improvement activities at all levels to an organization's strategic intent.
- Flexibility to react quickly to opportunities.

Applying the principle of continual improvement typically leads to:

- Employing a consistent organization-wide approach to continual improvement of the organization's performance.
- Providing people with training in the methods and tools of continual improvement.
- Making continual improvement of products, processes and systems an objective for every individual in the organization.
- Establishing goals to guide, and measures to track, continual improvement.
- Recognizing and acknowledging improvements.

PRINCIPLE 7 FACTUAL APPROACH TO DECISION MAKING

Effective decisions are based on the analysis of data and information

Key benefits:

- Informed decisions.
- An increased ability to demonstrate the effectiveness of past decisions through reference to factual records.

- Increased ability to review, challenge and change opinions and decisions.

Applying the principle of factual approach to decision making typically leads to:

- Ensuring that data and information are sufficiently accurate and reliable.
- Making data accessible to those who need it.
- Analysing data and information using valid methods.
- Making decisions and taking action based on factual analysis, balanced with experience and intuition.

PRINCIPLE 8 MUTUALLY BENEFICIAL SUPPLIER RELATIONSHIPS

An organization and its suppliers are interdependent and a mutually beneficial relationship enhances the ability of both to create value.

Key benefits:

- Increased ability to create value for both parties.
- Flexibility and speed of joint responses to changing market or customer needs and expectations.
- Optimization of costs and resources.

Applying the principles of mutually beneficial supplier relationships typically leads to:

- Establishing relationships that balance short-term gains with long-term considerations.
- Pooling of expertise and resources with partners.
- Identifying and selecting key suppliers.
- Clear and open communication.
- Sharing information and future plans.
- Establishing joint development and improvement activities.

- Inspiring, encouraging and recognizing improvements and achievements by suppliers.

(International Organisation for Standardisation (ISO), Quality Management Principles, http://www.iso.org/iso/en/iso9000-14000/understand/qmp.html, Latest Accessed: 12/07/2006)

2.2.2. WHY ISO 9000 IS IMPORTANT?

First of all, ISO 9000 helps to manage quality and enables cost saving. It is the clients' expectation and used by the rivals.

ISO 9000 is important because it is internationally accepted. In over 150 countries national standardization associations support this Standard. This is just enough by itself to choose ISO 9000 for a company operating in international markets. Similarly, clients seeking for products or services internationally qualified will ask for ISO 9000.

ISO 9000 is important for its systematic structure. Only motivation is not sufficient. Unless right attitudes are supported with right politics, procedures, data, sources and structure, it is not possible to succeed in quality.

ISO 9000 is also easy to apply for any kind of company. It is not important what they do or how big they are. It helps production and service based companies to reach global standards.

Of course, there are also many negative opinions about ISO 9000. Many feel that this move has been the result of a bandwagon effect. In more specific terms, the following issues are commonly raised against ISO 9000: the standards are static and inflexible, are not always customer-and market-focused, look mainly at the production process, may not ensure the ultimate quality of an organization's products and services, and, finally, does not utilize the learning capacity of the organization to change itself. It has in fact been

argued that the attention paid to ISO 9000 certification may actually be a shift away from the continuous process improvement which is essential for TQM. These potential pitfalls are recognized by most organizations; it is generally believed that the implementation of ISO 9000 creates order which in turn should help foster the development of TQM (Erel and Ghosh 1997).

2.3. ISO 9000 QUALITY STANDARDS IN CONSTRUCTION

Quality in construction can be defined as meeting the requirements of the designer, constructor, laws and regulations and the client. In order to meet these parties' requirements the projects have to be completed on time, within the designated budget, by conforming to the plans, specifications, any documents that the contract defines, construction related laws, codes and policies. On the other hand, poor workmanship, lack of coordination and communication between the contractor and designer, as well as the contractor and the subcontractors, the unconformity of the design to relevant codes and regulations result in low quality in construction.

It is obvious that the problems due to quality in construction highly due to the involvement of different but dependent parties. Therefore, it is vital to implement a standard quality system, both assurance and control, that will ensure all the parties understand and apply. A quality standard also will give the chance to reduce the failure during the work and increase the quality of work done. It helps to prevent the occurrence and also reoccurrence of the problems. Thus, it will ease the contractor's job and also let the client to relax. But more important is that it will reduce the cost of reworks and repairs.

As the globalization evolves, the international markets have become the focus of contractors as well. Gaining competitive advantage in the international markets brings especially the necessity of establishing a quality system that the client would require. Moreover, in most of the developed countries it is also a prerequisite for tendering in local projects.

The disadvantages of establishing a quality system in the construction sector have also been debated. Quality in construction can be viewed as a part of a triangle in which the contractor must attain the cost level as planned, meet the schedule deadlines, and achieve the required quality level. An equitative balance among these three aspects is considered as ideal. However, quality may be the first of these components to be discarded or sacrificed in favor of increased cost savings and time reductions (Chini and Valdez 2003). Since every construction project is unique and procedures cannot be standardized easily, it is always argued if a standard is applicable or not. Besides, the generic nature of the standards often leads to differences in interpretations, and the implementation, use, and impact of ISO 9000 can vary from company to company and from country to country (Bubshait and Al-Atiq 1999), which is difficult to measure and monitor.

Every contractor may have his own quality system practiced at work but by the help of the standards, quality is understood easily and applied more efficiently by creating uniformity. Companies are being persuaded to adopt quality management systems in order to meet the demands of customers in a globalized market (Chini and Valdez 2003). The most established and used international quality management standard is the ISO 9000 Standard, which is widely adopted by a large number of countries around the world.

There are special features in the construction industry that limit the implementation of the ISO 9000 standard. The following are some of these features:

• A construction project is usually a unique collection of people, equipment, and materials brought together at a unique location under unique weather conditions, while most manufacturing is a system of mass production wherein all of these factors are consistent with producing typical products over and over again.

• Performance testing in construction is generally not feasible as a basis for acceptance.

• It is common to have separate contracts for design and construction.

• It is not feasible to reject the whole constructed project after completion while attached to the purchaser's land.

• Decisions to reject a defective part of a constructed project need to be taken promptly before succeeding parts are constructed or installed.

• The number of parties involved in the constructed project's procurement is more than those involved in manufacturing procurement. Achieving quality construction requires effort from all parties. This makes the interface and responsibilities of the various individuals and organizations more complicated than in manufacturing.

• The organizational structure of a construction company varies depending on the nature of the project, while the same structure in a manufacturing company is almost unchanging. This affects the smoothness of communication and interface between the responsible individuals.

• Turnover of manpower in construction is higher than in manufacturing, which affecting the precision of long-term plans.

• Construction projects are very complicated and their execution may take years. (Phenol 1994)

There are also advantages of implementing the ISO 9000 to a construction company, which are:

1.Optimises resources usage in the organisation.
2.Improves awareness of company's objectives and policies.

3.Improves communication between various departments in the same organisation.
4.Improves tractability of quality problems.
5.Cuts down material wastage.
6.Formalised systems ensure consistent quality services.
7.Provides useful documented reference.
8.Improves work quality with fewer rejects and less repeated work.
9.Rectifies errors at early stage.
10.Improves relationship with the owner, subcontractors, engineer – architect and material suppliers.
11.Improves corporate quality image.
12.Introduces continuous improvement through a review of the quality system.
13.Improves records and makes retrieval of information easy in case of litigation.
14.Helps project to be completed within the time frame stipulated in the contract.
(Chew and Chai 1996)

2.4. ISO 9000 IN TURKEY

The success of Japan in the global markets by using Total Quality Management techniques in 1980's called USA and European countries' and their companies' attention to TQM. This development led an opportunity to move from traditional quality approach to TQM. Applications and literature in this concept evolved rapidly and also affected Turkey. In some associations, minor quality works began and in some universities lectures about quality was started.

In 1980's, Turkey dropping industrialization policy depending on import and adopting an economy policy depending on export opened a way to work on quality. Preliminary condition to export is considered to obtain quality for products and services. Quality works began first in export companies,

companies which are in a high competitive environment in their markets and companies with foreign partners. Export companies tend to work on quality in order to obtain the quality global market requested. Companies which are active in local markets in a high competitive environment understand the importance of quality if their purpose is to be permanent in the market. Companies with foreign partners or established by the license of foreign companies or production companies, started to work on quality as a result of the interaction between their partners.

Starting in the mid 1980's, especially in the West regions, the way of obtaining quality in enterprises seemed to be a quality assurance system. As a result of this approach, International Organization for Standardization (ISO) established the ISO 9000 Quality Certification System in 1987. ISO 9000 intend to certificate the standardization of the process for a product or service rather than certificate that product or service. ISO 9000 as a quality certification system has been perceived as a magical business term and thousands of articles and books have been written about it in the world. Thus, quality concept has come to agenda more often in the world and also in Turkey.

Starting in the mid 1980's in Turkey, while some of LME's and especially holdings have started to establish a quality assurance system, some of them have been in an establishment which may be defined as Total Quality Management. While some of the enterprises started to practice TQM in order to reinforce their leadership in the market, others aimed to overcome crises they struggle, and some of them intended to change and develop (KalDer, Online Yayınlar; http://www.kalder.org/page.asp?PageID=1285, Latest Accessed: 05/09/2006).

There are several advantages for the Turkish construction sector to practice Quality Management System. First of all it will be useful to strengthen its position in the international market, to have access to new job opportunities, and to improve its image. Secondly, application of QMS especially by contractors in the domestic market will be useful in order to restore their

images distorted particularly due to the major earthquakes that occurred recently. As a matter of fact, the devastating loss of life and property in these earthquakes occurring in 1999 in Turkey has adversely affected the image of the construction industry as a whole (Turk 2006). Also the tendency to finish the projects within the time frame and budget by using the recent technologies against the danger of earthquake disaster may overcome the importance of quality concern thus it will be constructive to apply ISO 9000 in the domestic markets. Third aspect is that the use of an international quality standard in Turkey will ease the adaptation process to the European Union and strengthen the position of the construction companies in the international markets.

The premier institution responsible for quality and the implementation of the ISO 9000 standards in Turkey is the TSE. It was founded in 1954 and admitted to ISO in 1955. Since then, it has taken an active role in various ISO councils and committees. As a standardization institute, it has distinguished itself by issuing over 12,600 national standards. It has adopted ISO 9000 verbatim as TS-ISO 9000 and issued the first certification under this name in 1990. By government mandate, TSE is the only organization that can issue the TS-ISO 9000 certificate. TSE publishes a monthly journal called “Standard” with a significant quality and ISO 9000 content. It also sponsors seminars and symposia on quality and ISO 9000.

The National Quality Council (MKK) was formed in 1992 under a TSE initiative with members from government, industry, academia and professional societies. Its goal has been to promote quality and quality education nationally, using all available means. One of its major tasks has been to set up and oversee a nationwide system for ISO 9000 certification. In 1994, it evolved into the National Council for Quality and Accreditation (KAMK).

The Quality Association (KALDER) was created in 1990, through the sponsorship of the industry, as a professional body that will promote quality, raise the level of quality consciousness, help the Turkish industry be

competitive internationally, and provide quality-related assistance and know-how to the industry. KALDER has a strong education and training programme which is offered on and off site. At any given time, it also has a number of different working committees focusing on topics of contemporary interest. KALDER publishes a quarterly journal called “Quality First” and organizes various seminars and symposia around the year; in particular, it hosts an international conference, Quality Congress, annually. Starting in 1993, it has established the annual Quality Award which is accorded to a Turkish company excelling in quality; the criteria for the award are similar to other awards such as the Malcolm Baldrige Award in the USA.

There are other governmental centres and professional associations in Turkey that have a stake in quality. They often address quality issues specific to their interests in their publications and fund projects related to such issues. Of particular interest is the state-run Center for Development and Support of Small and Medium Enterprises (KOSGEB); it holds education and training programmes and has recently taken an initiative to encourage implementation of ISO 9000 among Turkish small and medium-sized enterprises (SMEs).

Finally, while TSE is the exclusive certificate-granting body for TS-ISO 9000, there are a number of European certification agencies operating in Turkey that issue ISO 9000 certificates independently. Also, there are several Turkish as well as foreign companies that provide consultancy on quality matters including ISO 9000 certification.

Table 3.2. Number of ISO 9001:2000 Certifications in Turkey in the last 5 Years according to ISO Survey of Certifications 2005

	Dec. 2001	Dec. 2002	Dec. 2003	Dec. 2004	Dec. 2005
Turkey	72	911	3.248	5.009	10.929

The 2005 total represents an increase of 5.920 (+118 %) over 2004, when the total was 5.009. This is really an outstanding increase in the certification number which is a really solid proof of the positive attitude towards ISO 9001 Quality Management System in Turkey. Also, Turkey is the 15th country among the world and 9th country in Europe when the countries are ranked according to the number of ISO 9001 certifications (ISO Survey 2005).

Increased number of ISO 9001 certifications has also affected the Turkish construction industry. According to data of all kinds of construction sector related parties such as contractors, subcontractors, design companies, construction material producers, there are approximately 650 both ISO 9001:1994 and ISO 9001:2000 certified companies at the end of 2005 (KalDer, Belgeli Kuruluşlar, http://www.kalder.org/genel/download/Belgeli%20Kuruluslar/neslibelgelil3.xls Latest Accessed: 13/09/2006). This number was approximately 54 in 2001 according to the same data obtained by KALDER and 100 in 2003 according to ISO Survey 2003. The 2005 total represents an increase of 550 (+550 %) over 2003, when the increase was +46 % in 2003 over 2001. This is a tremendous increase for the Turkish construction sector and it is mainly due to the trend of going into the international markets as well as the prerequisite condition of ISO 9001 certification for local projects.

It appears that all the effort towards quality improvement has been fruitful. As evidence, note that two Turkish companies, Brisa and Netas, respectively won the 1996 European Great Quality Award and the European Quality Prize given by the European Foundation for Quality Management (Erel and Ghosh 1997).

2.5. ISO 14001 ENVIRONMENTAL MANAGEMENT SYSTEM

ISO 14001 was first published in 1996 and a revision has been made in 2004 by International Organization for Standardization (ISO). It is the corner stone standard of the ISO 14000 series. It specifies a framework of control for an

Environmental Management System against which an organization can be certified by a third party (ISO 14000/ISO 14001 Environmental Management Guide, http://www.iso14000-iso14001-environmental-management.com, Latest Accessed: 27/10/2006).

In the ISO 14000 Environmental Management Standards series, which were formed by the technical committee number TC 207 of ISO, the environment concept was defined as “surroundings in which an organization operate, including air, water, land, natural resources, flora, fauna, humans, and their interrelation.” and the environmental management system was defined as “the part of the overall management system that includes organizational structure, planning activities, responsibilities, practices, procedures, processes, and resources for developing, implementing, achieving, reviewing and maintaining the environmental policy.”

The standard contains 17 key elements grouped into five major areas: environmental policy, planning, implementation and operation, checking and corrective action, and management review. A unique aspect of the system is that it is designed to be appropriate for any company, regardless of industry, size, location, and the level of their environmental responsibilities. The ISO 14001 is a voluntary, consensus-based, and market-driven standard (Kloepfer 1997).

Environmental Management is a tool for an organization to keep aware of the interactions that its products and activities have with the environment and to achieve and continuously improve the desired level of environmental performance.

ISO 9000 is aimed at meeting customer requirements, control of the process and continuous improvement. ISO 14000 is aimed at these, and more: 'customer requirements' has expanded to include regulatory and other mandatory environmental requirements; and 'continuous improvement' is not

only driven by customer expectations but also by priorities and objectives generated internally by the organization (Fredericks and McCallum 1995).

Benefits of implementing an ISO 14001 Environmental Management System:

- Environmental liability
- Reduced costs/increased profit
- Management of change in supply
- Improved image and credibility among customers and peers
- Employee motivation
- Enhanced compliance with environmental regulations
- Increased performance
- Ability to bid for contracts
- Increased efficiency of resource use
- Reduced risks
- Improved performance

It's obvious that the most attractive benefit of the system is the reduced cost and increased profit. It's a fact that reducing pollution and environmental impact is likely to result in increased competitiveness. Potential competitive benefits from environmental improvement are:

- Materials savings from more complete processing, substitution, re-use or recycling of product inputs
- Increases in process yields
- Less downtime through more careful monitoring and maintenance
- Improved utilization of by-products
- Conversion of waste into commercially valuable forms
- Reduced energy consumption
- Reduced material storage and handling costs
- Savings from safer workplace conditions
- Reduction of costs associated with emissions, discharges, waste handling, transport & disposal

- Improvements in the product as a result of process changes

(Goodman and Veritas 1998)

According to the ISO Survey of Certifications 2005; up to the end of December 2005, at least 111.162 ISO 14001 certificates (1996 and 2004 versions consolidated) had been issued in 138 countries and economies.

Table 3.3. "ISO 14001 Principal Results" according to ISO Survey of Certifications 2005

World Results	Dec. 2001	Dec. 2002	Dec. 2003	Dec. 2004	Dec. 2005	
						Total of which 14001:2004
World total	36.464	49.440	64.996	89.937	111.162	56.593
World growth	13.567	12.976	15.556	24.941	21.225	
Number of countries/economies	112	116	113	127	138	107

The 2005 total represents an increase of 21.225 (+24 %) over 2004, when the total was 89.937 in 127 countries and economies (ISO Survey 2005).

Table 3.4. Number of ISO 14001 Certifications in Turkey in the last 5 Years according to ISO Survey of Certifications 2005

	Dec. 2001	Dec. 2002	Dec. 2003	Dec. 2004	Dec. 2005	
						Total of which 14001:2004
Turkey	91	135	240	338	918	493

The 2005 total represents an increase of 580 (+172 %) over 2004, when the total was 338. This is an overwhelming increase in the certification number even compared to the results of ISO 9001 certification. This is a really solid proof of the positive attitude and great importance towards ISO 14001 Environmental Management System in Turkey. Also, Turkey is the 24th country among the world and 11th country in Europe when the countries are ranked according to the number of ISO 14001 certifications (ISO Survey 2005).

2.6. ISO 14001 IN CONSTRUCTION

Construction projects pose enormous challenges to not only finish within an owner's schedule and budget, but to also eliminate and minimize harmful impacts to the environment. Construction has significant impacts on the natural environment (Hendrickson and Horvath 2000). Even a minor impact, such as a small release or spill of a hazardous substance, can cause a health or environmental threat and lead to costly cleanup activities. In many instances, a company's impact can be attributed to the lack of an adequate environmental management system (Christini, Fetsko, Hendrickson 2004). Construction activities generate environmental nuisance in the form of noise, dust, muddy runoffs, and improper disposal of chemical waste (Tse 2001).

Environmental Management in construction has received more and more attention over the past thirty years. Although the expression of Environmental Management in construction came out in the early 1970s after the US National Environmental Policy Act of 1969 was enacted (Warren 1973), the concept in construction was introduced later in the 1970s, when the role of the environmental inspector was defined in the design and construction phases of projects to provide advice to construction engineers on all matters in Environmental Management (Spivey 1974b, Henningson 1978). However, there has been little enthusiasm for establishing an EMS in construction organizations until two main important standards – BS 7750 (issued in 1992)

and the ISO 14000 series (issued in 1996) – were promulgated to guide the construction industry from passive construction management on pollution reduction to active EMS for pollution prevention (Chen et al 2004).

Further researches on Environmental Management led to the implementation of Environmental Management System and the registration of ISO 14001 by important authoritative institutions in the construction industry. Nowadays, an increasing number of construction firms are becoming certified to international standards worldwide, especially the ISO 14001 series. There is continuing growth of ISO 14001 Environmental Management System registration in the construction industry in recent years.
According to data of all kinds of construction sector related parties such as contractors, subcontractors, design companies, construction material producers, there are approximately 56 ISO 14001 certified companies at the end of 2005 in Turkey (KALDER).

2.7. OHSAS 18001 OCCUPATIONAL HEALTH AND SAFETY MANAGEMENT SYSTEM

Ineffective safety policies can contribute to the causes of accidents. It is therefore necessary for an organization to install a set of safety management practices and to be capable of foreseeing the potential risks. Use of self-regulation, safety charters and benchmarking are among the common approaches of safety management practices in industry (Pun and Hui 2002). However the main idea is to set a safety management system in order to control and assure occupational safety. Therefore an Occupational Health and Safety Management System should be established in the organization to provide a framework for managing occupational health and safety (OHS) responsibilities so they become more efficient and more integrated into overall business operations. Some of other driving forces that would promote establishing safety management systems in organizations are increasing competitiveness, complying with legislation and regulations, minimizing

financial losses, developing systematic approach to identify risks and allocate resources. OHS management systems are based on standards and globally and in Turkey most commonly used and known safety standard is OHSAS 18001.

OHSAS 18001:1999 specifies the requirements for an organization to control its (OHS) risks to improve its performance. OHSAS 18001: 1999 does not however set out specific OHS performance criteria, nor does it give detailed specifications for the design of a management system. Rather, it is applicable to any organization that wishes to establish an OHS Management System to eliminate or minimize risks to employees and other interested parties who may be exposed to OHS risks associated with its activities; implement, maintain, and continually improve an OHS Management System; assure itself of its conformance with its stated OHS policy; demonstrate such conformance to others; seek certification/registration of its OHS Management System by an external organization; or make a self-determination and declaration of conformance with the standard's specifications (BSI 1999).

OHSAS 18001:1999 was developed in the hope that it would eventually be adopted as an ISO standard in much the same way that BS 5750 was adopted as ISO 9000 for quality management, and BS 7750 as ISO 14000 for environmental management. OHSAS 18001:1999 was also designed to address the issue of plan-do-check-act at the functional management level to formulate a self-regulating OHS environment (Pheng and Pong 2003).

The OHSAS specification is applicable to any organisation that wishes to:

- Establish an OH&S Management System to eliminate or minimise risk to employees and other interested parties who may be exposed to OH&S risks associated with its activities
- Assure itself of its conformance with its stated OH&S policy
- Demonstrate such conformance to others

- Implement, maintain and continually improve an OH&S Management System
- Make a self-determination and declaration of conformance with this OHSAS specification.
- Seek certification/registration of its OH&S Management System by an external organisation

(OHSAS 18001 Health & Safety Zone, www.ohsas-18001-occupational-health-and-safety.com/how.htm, Latest Accessed: 30/10/2006)

According to data of all kinds of construction sector related parties such as contractors, subcontractors, design companies, construction material producers, there are approximately 54 OHSAS 18001 certified companies at the end of 2005 in Turkey (KalDer, Belgeli Kuruluşlar, http://www.kalder.org/genel/download/Belgeli%20Kuruluslar/neslibelgelil3.xls, Latest Accessed: 13/09/2006).

The main advantage by establishing a safety management system is to decrease occupational accidents and losses due to these accidents for sure. In Turkey, according to the statistical results prepared according to the data submitted to Social Insurance Institution, in 2005, 73.923 occupational accidents occurred and 1.072 personnel died after these accidents and also 519 occupational diseases occurred and 24 personnel died due to these diseases (fig 2.1 & fig. 2.2) (Social Insurance Institution, Statistical Yearbook 2005). Construction sector is in the second rank with an 8,7% accident rate, which production of metal goods is the first. These statistics cover only the data submitted to the Social Insurance Institution thus these are only the numbers for insured labour. When the presence of illegal and uninsured labour is considered, with the unknown, hidden or unsubmitted accidents, the estimated numbers would be four times these numbers.

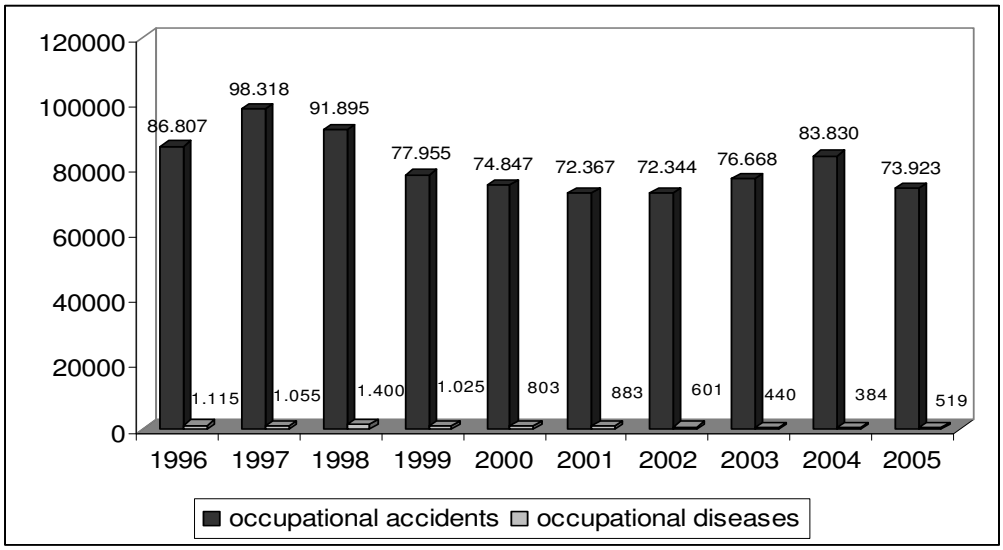

Figure 2.1. Number of occupational accidents and diseases which are submitted to Social Insurance Institution in Turkey between 1996-2005

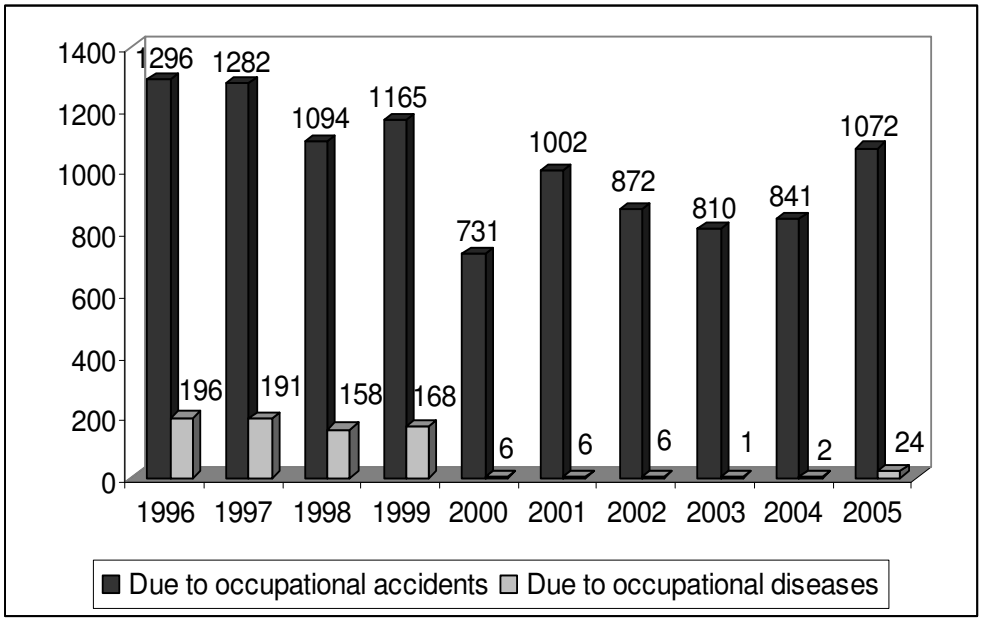

Figure 2.2. Number of death due to occupational accidents and diseases which are submitted to Social Insurance Institution in Turkey between 1996-2005

CHAPTER 3

ANALYSIS

3.1. QUESTIONNAIRE

In order to obtain data for the thesis, a six-page questionnaire is prepared. It contains 6 main sections. First section includes questions about the company in general. Second section aims to get information about the respondents' experience of the management system(s). Third section includes questions about management systems in general. Fourth section includes questions particularly about ISO 9001 Quality Management System, which every company answering the questionnaire has the certification. Fifth section includes questions particularly about ISO 14001 Environmental Management System, for the companies that apply the system. And final section includes questions about OHSAS 18001 Occupational Health and Safety Management System, for the companies that apply the system. In this final section, there are also questions due to the integration of all three systems. All together, there are 24 questions, which are all multiple choice except the question about the person's position in the company. The questionnaire is prepared in Turkish since it was distributed among Turkish Construction Companies.

At first stage, the questionnaire was sent to the Companies that are members of the "Turkish Contractors Association" and having ISO 9001 certification. The questionnaire was sent through email to the selected Companies and they are requested to fill in and return by email. Afterwards, other available Companies that are not members of the Association were scanned and questionnaire was sent. Totally, the questionnaire was distributed to 117 Companies successfully and 24 of them responded, which gives a 20,5 percentage rate. The response rate is quite reasonable according to the

working conditions of the staff in the construction industry and it is also quite impressive that the 23 of the 24 respondents indicated that they personally experienced the practice of management system(s).

3.2. ANALYSIS OF RESULTS

The results of the data from the questionnaires will be analysed according to the sections given in the questionnaire respectively. Data will be analysed only by the numbers. Results will be analysed later.

First Section: This section gives company information in general.

Scope of Business: In the construction industry, there are a lot of project types thus the companies focus on different kinds of projects. In this section, respondents are asked to define their scope of businesses by choosing the related project types but since variety of scopes may be presented in a construction company, the answers were not limited only to one choice. Respondents were free to choose more than one. According to the results, 79% of the companies are active in the residence projects construction area. 63% of the respondents stated that they are constructing infrastructure projects. 54% declared that they deal with transportation projects. 46% of the companies stated that they construct pipelines and industrial plants. Also respondents claimed that they deal with construction of marine structures (29%), dam (25%), energy projects (21%) and other projects (13%) including airport structures, tunnel excavation and reinforcement, concrete works and restoration, reinforcement, earthquake engineering and design works
(Fig. 3.1).

Activation Area: It is obvious that there is a trend towards the international markets in the Turkish construction sector. The results of the questionnaire also shows that 79% of the companies are active internationally which 54% of them are active both locally and internationally. Only 21% of the respondents

stated that they work only locally, while 25% of the respondents being active only internationally (Fig. 3.2).

Total Personnel Number: In this question, the total personnel number would include headquarters and sites both. When results are investigated, data show that 42% of the companies have personnel number changing between 500 and 1500. The number of companies having personnel number between 100 and 150 and more than 1500 is same and the percentage rate is 25%. Only two of the respondents (8%) claimed to have personnel number less than 100 (Fig. 3.3).

Annual Turnover of Construction Works: In order to determine the size of the companies, turnover data may be investigated. As a result, companies with annual turnover between 1-10 million USD are defined as small size, companies with annual turnover between 10-100 million USD are defined as medium size and companies with annual turnover between 100-1000 million USD are defined as large size companies (Fig. 3.4). The results are given below, in Table 3.5.

Table 3.5. Size of the companies according to annual turnover

Size of the companies	Number
Small	4
Medium	11
Large	8

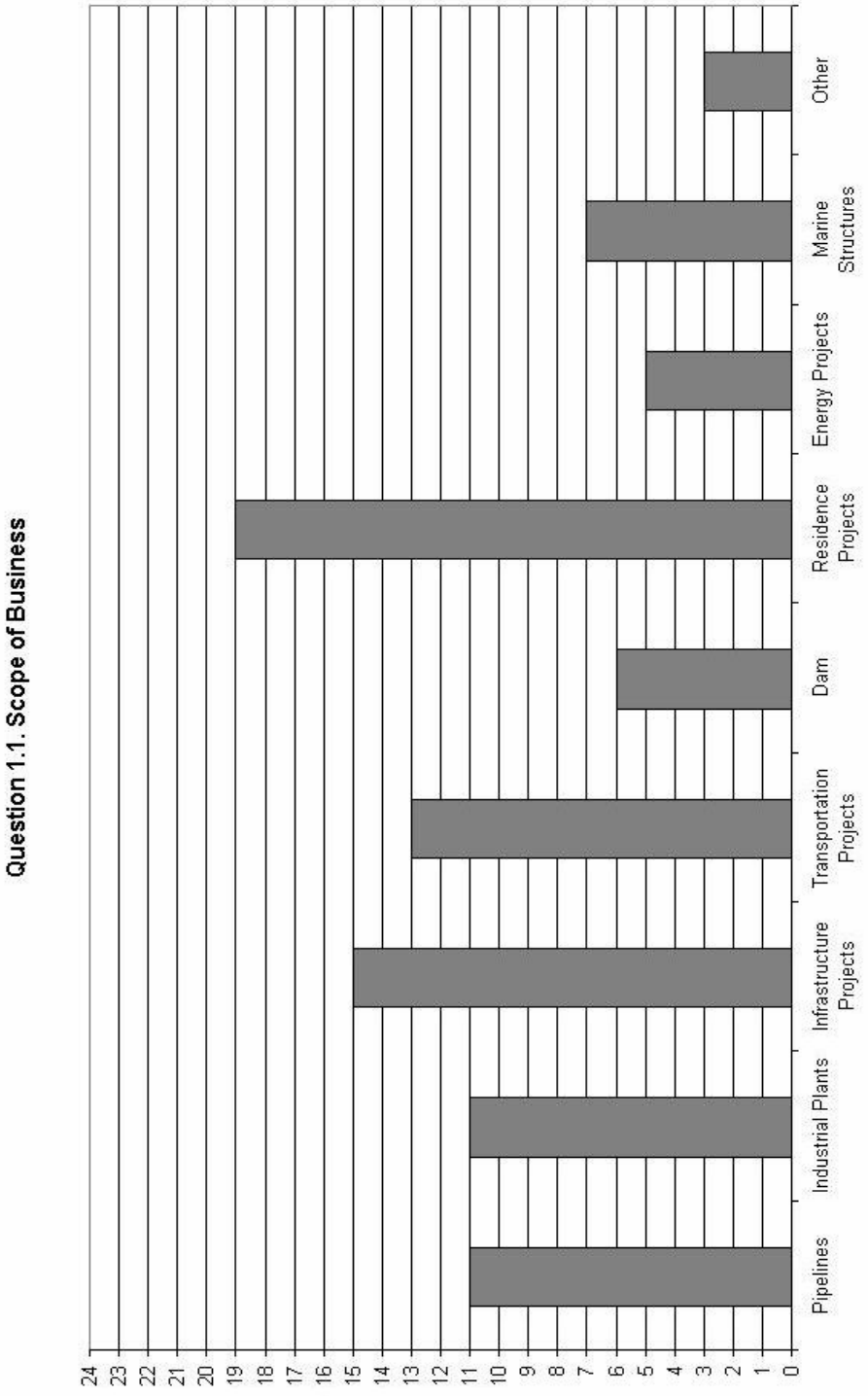

Figure 3.1. Scope of business according to the number of companies

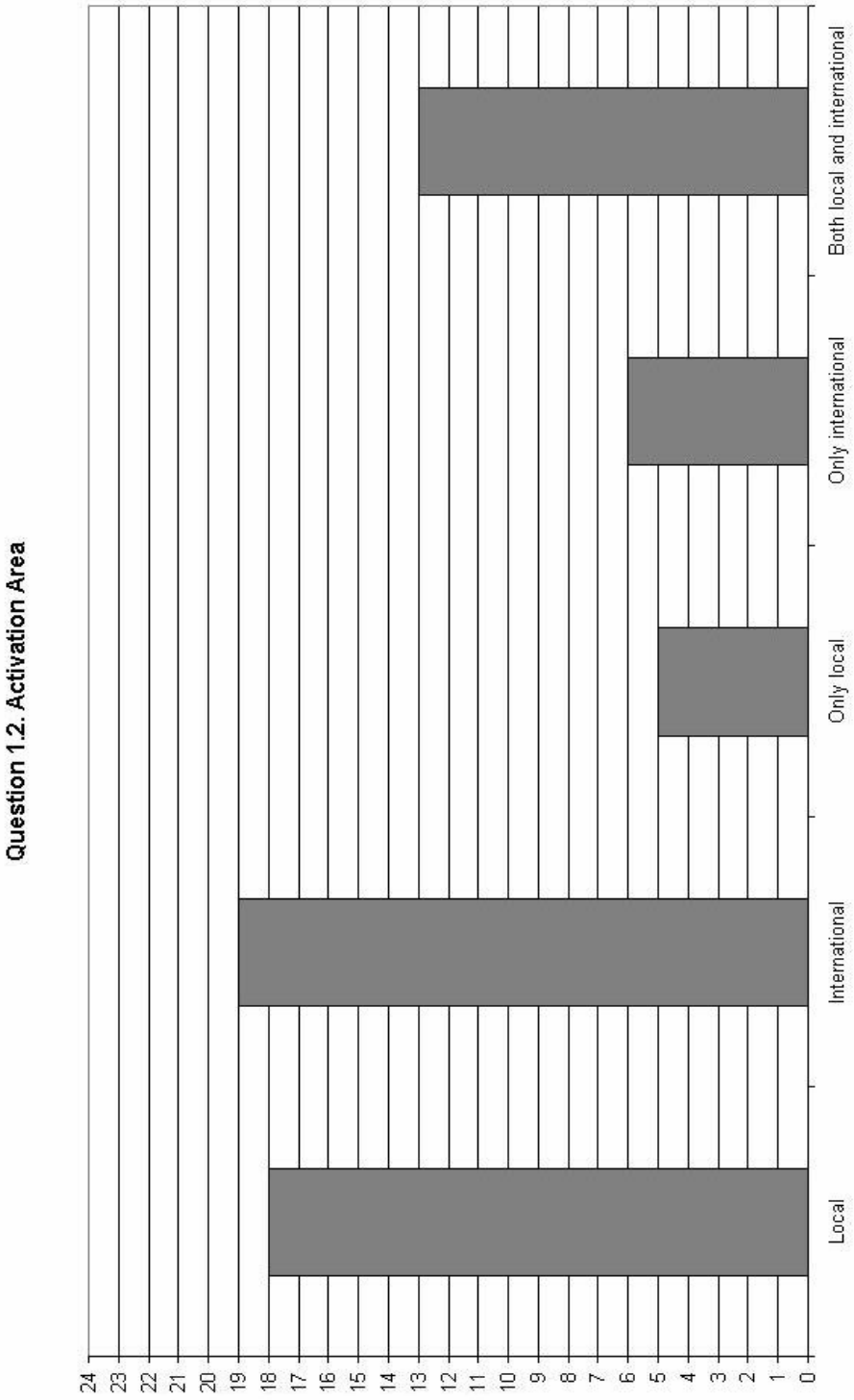

Figure 3.2. Activation area according to the number of companies

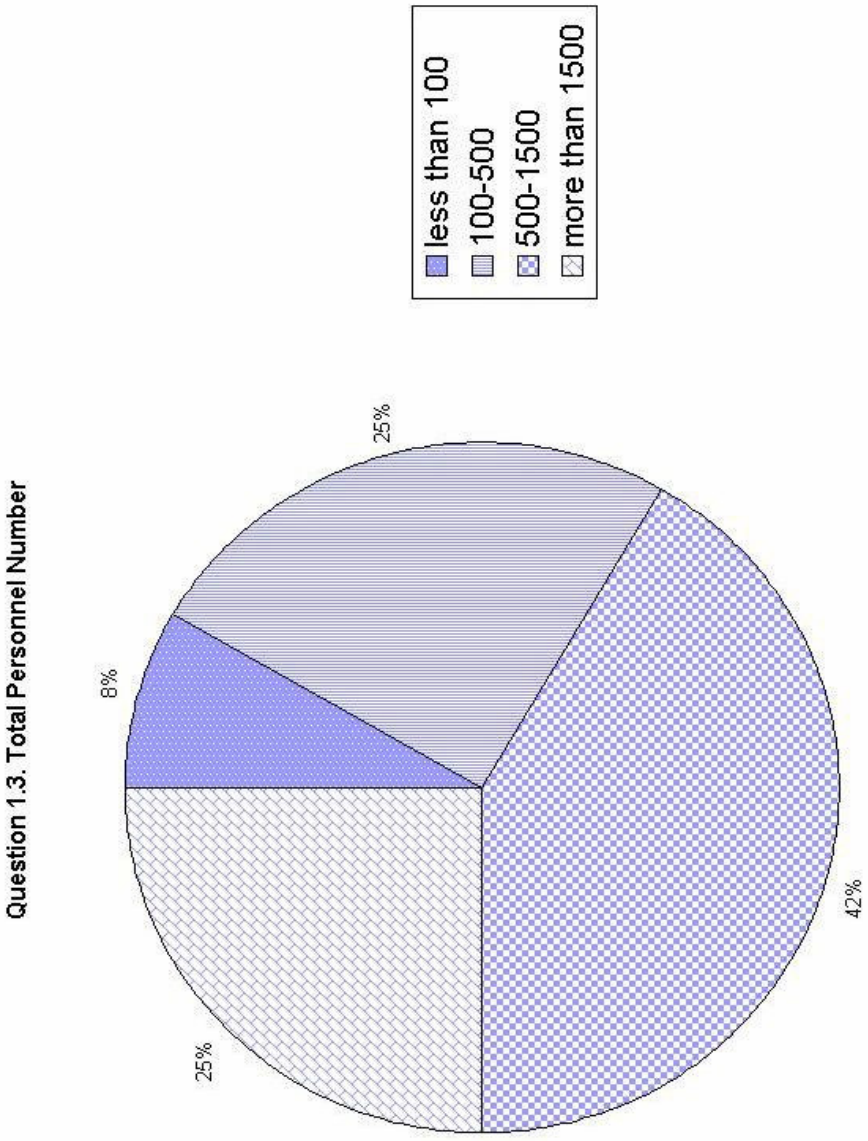

Figure 3.3. Total personnel number of the companies

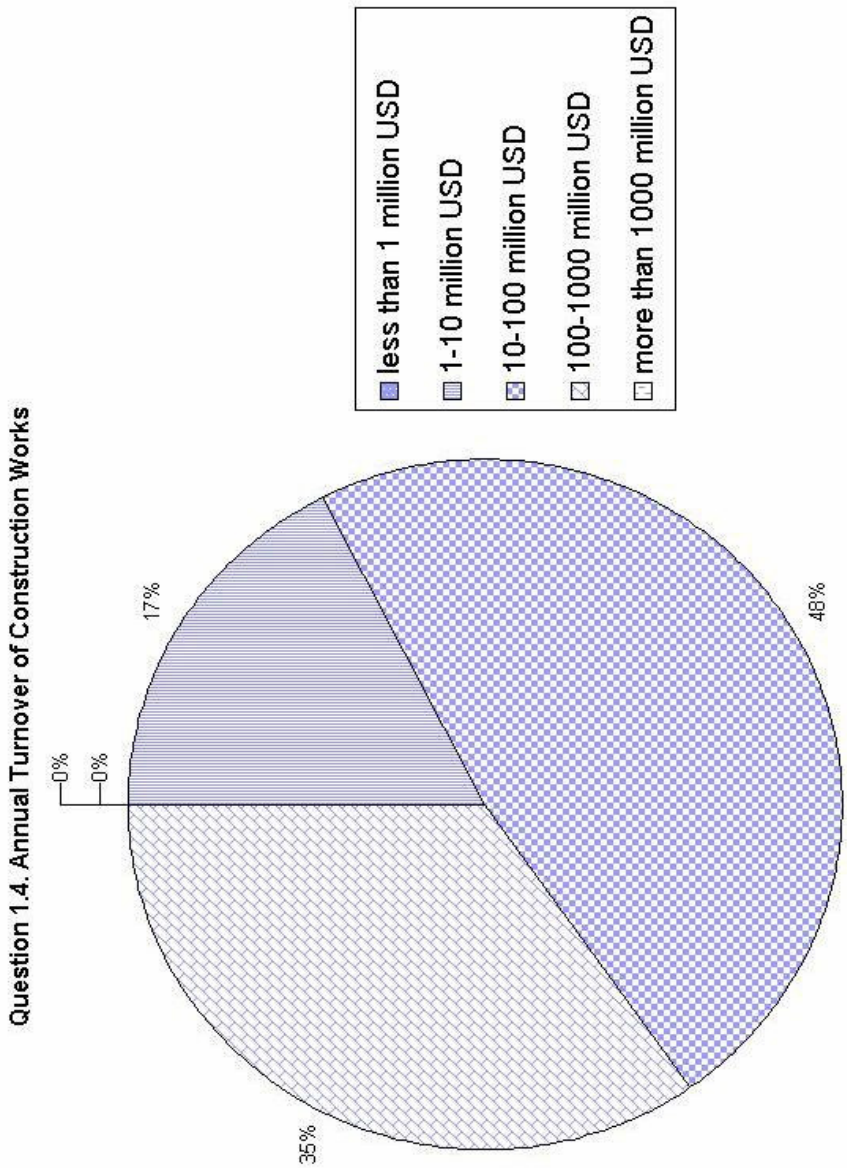

Figure 3.4. Annual turnover of construction works of the companies

Second Section: This section gives personal information of the respondents.

Position in the Company: The results are not sufficient to evaluate the outcomes of the positions of people in their companies. There are just three responses for this question. The answers show that two respondents are management representatives and one is a documentation personnel. Thus, we need to investigate data of the second question in this section.

Personal Experience due to Management Systems: The results of this question is a breathtaking since only one of the respondents claim not having any experience of management systems personally at the site or in the office. This is really an encouraging response rate; since nearly all of the respondents have a personal experience, and hence the results of the survey can be treated as “highly dependable”.

Third Section: This section gives general information about the practicing of the management systems in the companies.

Management Systems: 58% of the respondents stated that they have established all of the three management systems in their companies. Since the questionnaire was sent to only the companies that have certification for ISO 9000 at the beginning, 96% of the companies have ISO 9001:2000 certification while there is only one company that has the certification for ISO 9000:1994 (Fig. 3.5). 72.7% of the companies that are not practicing ISO 14001 Environmental Management System and 81.8% of the companies that are not practicing OHSAS 18001 Occupational Health and Safety Management System are willing to establish in the future. According to this high response rate, it is obvious that companies are aware of the positive outcomes of these systems, which will be investigated later by the use of detailed questions in the questionnaire.

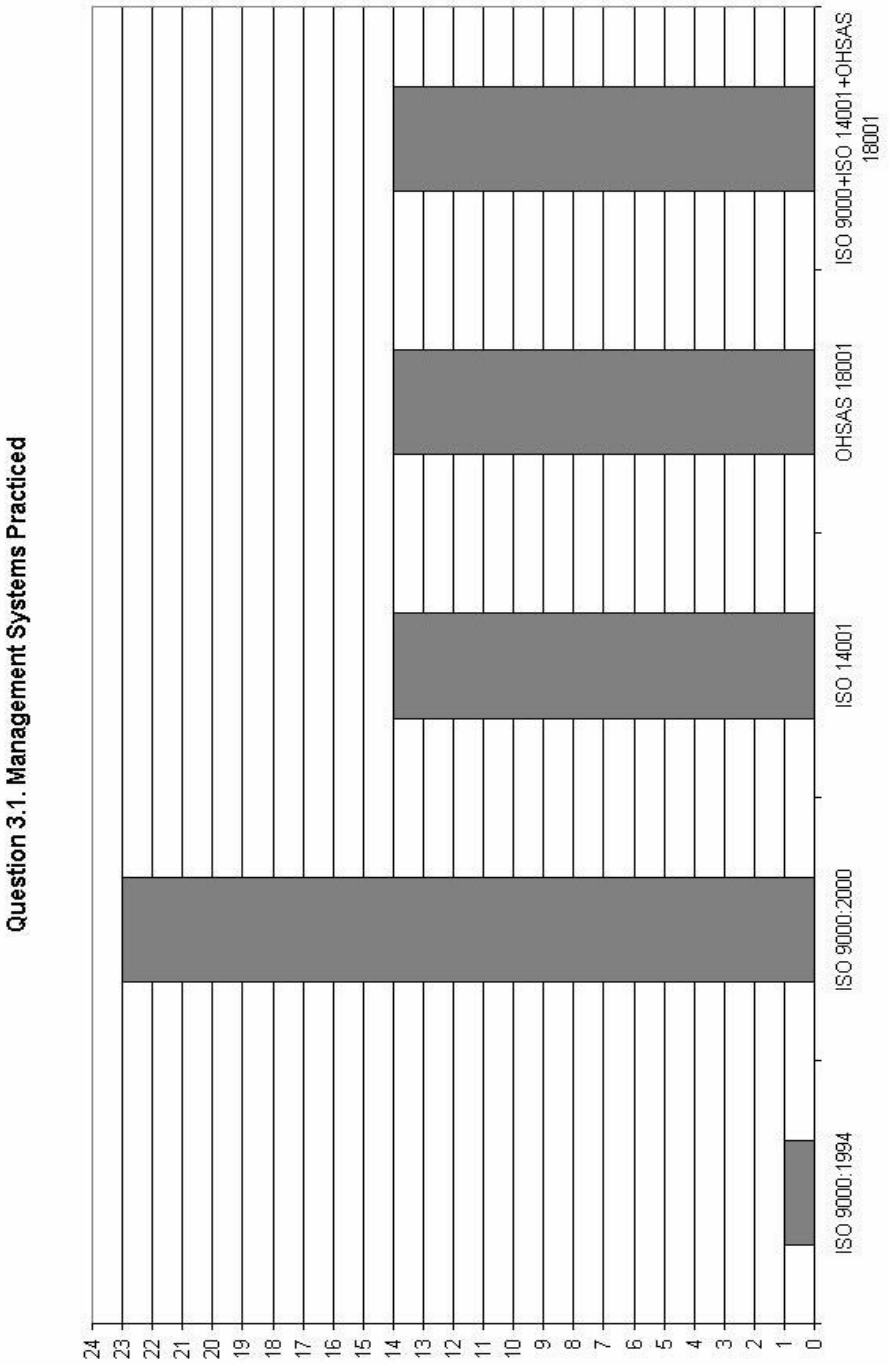

Figure 3.5. Management systems practiced according to the number of companies

Fourth Section: This section which investigates ISO 9001 Quality Management System in details.

General Motivators of the System: In this question, the respondents are asked to state their initial motivators to establish ISO 9001 in their companies. Since there would be more than one motivator for a construction company to have a Quality Management System, the answers were not limited only to one choice. 79% of the respondents evaluate Quality Management System as a part of the improvement strategy (vision) of the company. 71% of the companies stated that ISO 9001 helps them to gain competitive advantage in the international markets. 71% of the respondents stated that they use ISO 9001 as a qualifying agent to tender for international projects, while 75% use to tender for local projects. 63% of the companies use the system to meet customer expectations and 45% use it to improve the quality of work done. Only 25% use ISO 9001 to reduce cost of work. Also, 4% stated that to gain continuous improvement in the company and for the projects is a motivator for the system that can be reported other than the motivators given in the questionnaire (Fig. 3.6).

In general, all of the respondents agree that the advantages they get by establishing and practicing of ISO 9001 are more than its disadvantages and all of them think ISO 9001 Quality Management System is a useful instrument for their companies.

Time and Cost Frame: In the second and third questions of the fourth section, companies participating the questionnaire were asked to state how much time and money they have spent before ISO 9001 Quality Management System is started practicing in their companies effectively (during the ISO 9001 certification process). 50% of the companies spent 6-12 months while 29% spent 1-6 months and 21% spent 1-2 years. None of the respondents stated to spend more than two years for the certification process. 51% of the companies spent 10.000-50.000 USD while 33% spent 5.000-10.000 for the certification (Fig. 3.7 & Fig. 3.8).

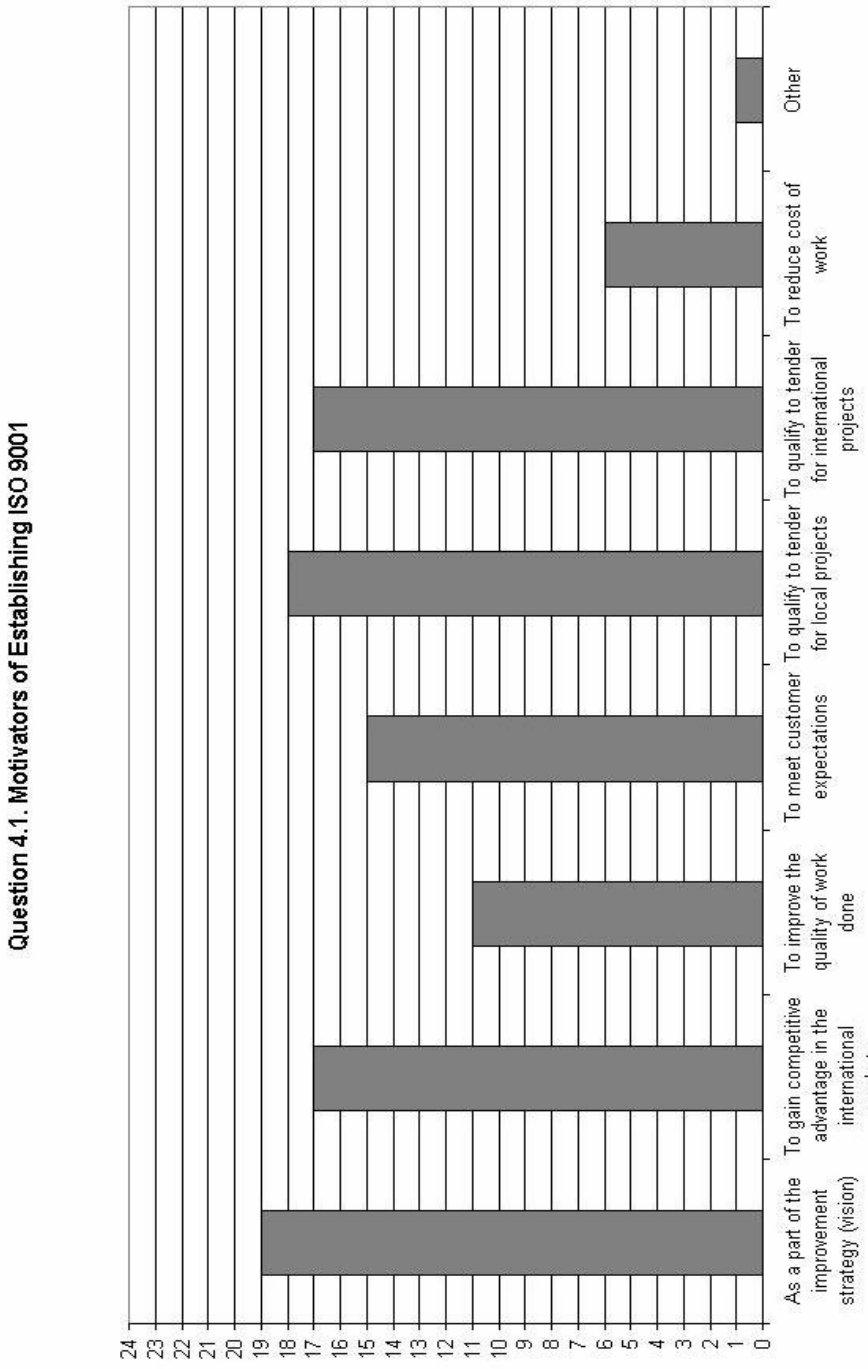

Figure 3.6. Motivators of establishing ISO 9001 according to the number of companies

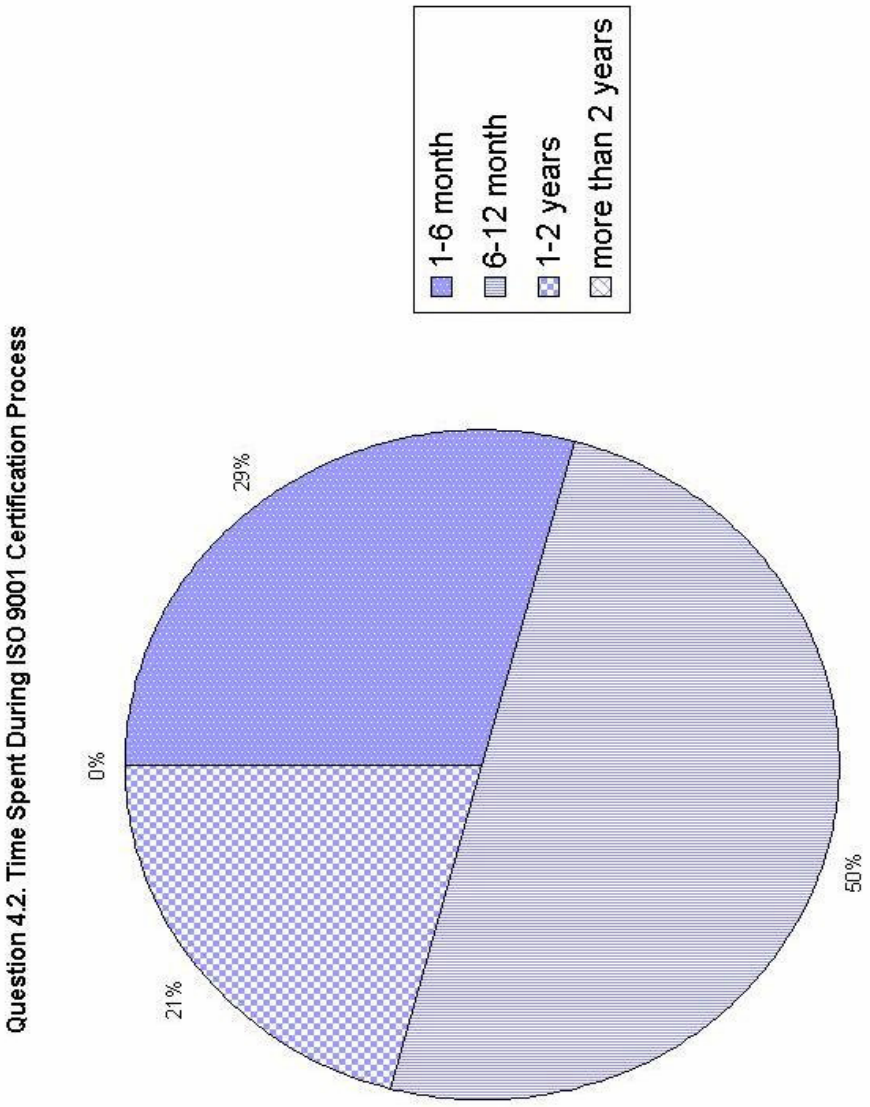

Figure 3.7. Time spent during ISO 9001 certification process in the companies

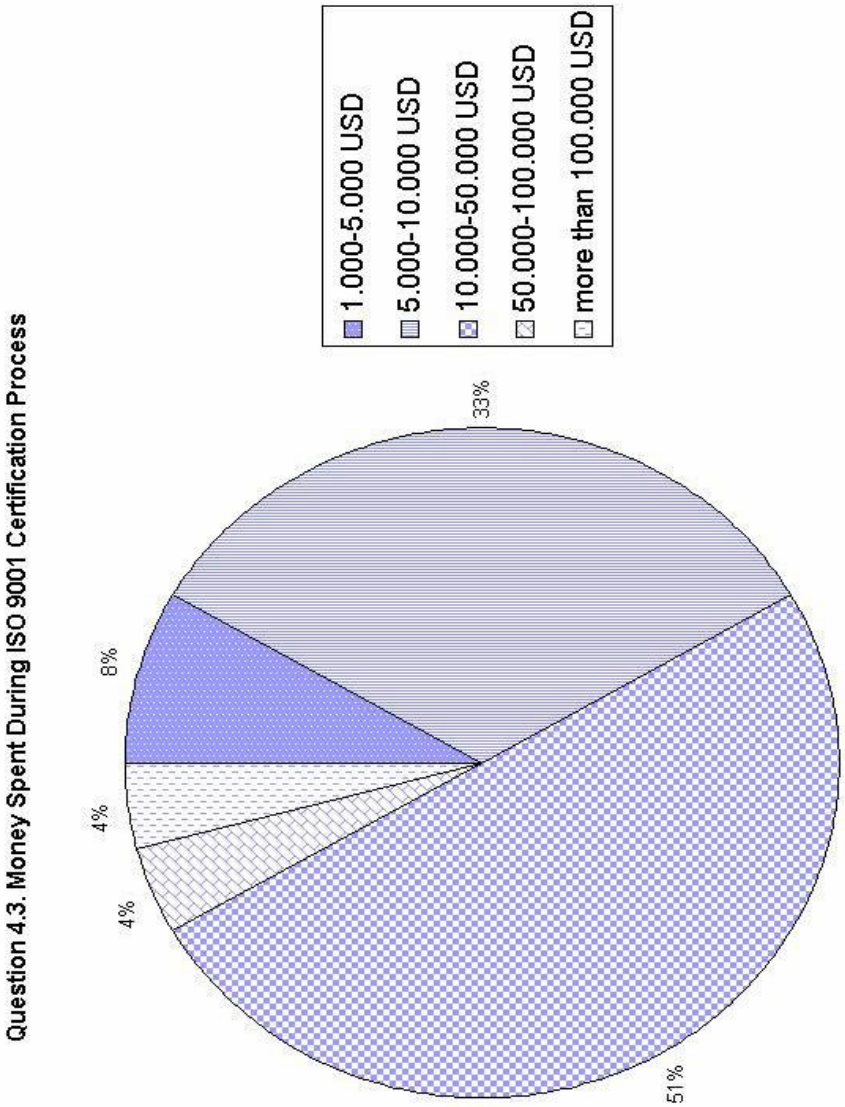

Figure 3.8. Money spent during ISO 9001 certification process in the companies

In the fourth, fifth and sixth sections, first questions are designed to reveal the perspectives of the respondents by determining both positive and negative outcomes of these management systems. Several positive and negative outcomes are listed in a table and a five-point scale from “totally agree” to “totally disagree” is used to quantify the results. In order to get the most probable results, statistical approach is used to quantify. Student’s t-distribution is used to test the results statistically.

The quantity

$$\frac{\check{y} - \mu_0}{s/\sqrt{n}}$$

is called the t statistic and its distribution is called the t distribution.

$\check{y}$: Sample mean
s : Standard deviation
n : Number of responses
μ_0 : Population mean

There are many different t distributions but we specify a particular one by a parameter called the degrees of freedom (df). Thus;

$$df = n - 1$$

For a one-tailed test with the probability of a Type I error equal to α, we locate the region using the value from a standard t-distribution table, for a = α and df = n – 1. (Ott, 1988)

In the survey, a one-tailed test is done by taking $\mu_0 = 0$ and a = α = 0.1, thus gives the results with 90% confidence. If the absolute computed value of t ($t_{calculated}$) is less than the t-value in the standard t-distribution table, the result is said to be “nonsignificant”.

The results are given below after tested statistically:

Table 3.6. Nonsignificant responses after statistical analysis of results of ISO 9001 Quality Management System outcomes

Nonsignificant Responses	
Respond 9	High initial investment cost in the certification process
Respond 10	Increased expense in the projects
Respond 19	Decreased project completion times
Respond 20	More time spent in management due to additional work
Respond 23	Hard to understand the conditions of the Standard
Respond 24	More expenses spent for the education of personnel

Table 3.7. Significant negative responses after statistical analysis of results of ISO 9001 Quality Management System outcomes

Significant Negative Responses		**Agree %**
Respond 2	More paperwork (documentation)	75
Respond 4	Increased bureaucracy in the company	66,7
Respond 13	Dissatisfaction of the employee due to additional work	50
Respond 17	Less flexibility in operation	37,5

Table 3.8. Significant positive responses after statistical analysis of results of ISO 9001 Quality Management System outcomes

Significant Positive Responses		Agree %
Respond 1	Less rework or repair	69,6
Respond 3	Easier qualification to tender for local projects	66,7
Respond 5	Increased efficiency in the company and for the projects	62,5
Respond 6	Continual improvement in the company and for the projects	58,3
Respond 7	Less problems in the defects liability period of the projects	65,2
Respond 8	Faster and easier acceptance of the projects	62,5
Respond 11	Improved internal communication	83,3
Respond 12	Improved external communication	75
Respond 14	Easier qualification to tender for international projects	79,2
Respond 15	More systematic record keeping	100
Respond 16	Increased client satisfaction	70,8
Respond 18	More work opportunities at the overseas market	69,6
Respond 21	Clear understanding of the client for the quality of work done	66,7
Respond 22	Improved quality of subcontractors and suppliers	75

Additional works due to the implementation of the system especially by more paperwork is the main problem for the companies. Also increased bureaucracy in the company is one of the principal drawbacks of practicing ISO 9001 (Table 3.7).

Despite the negative outcomes, there are several positive outcomes as well. All of the respondents agree that establishing a quality system in the company lead to a systematic record keeping. Most of the respondents also believe that the system improves internal communication in the company. Many respondents believe the system is a useful tool for qualification to tender for international projects. Also, improved external communication and quality of subcontractors and suppliers are other important positive outcomes of ISO 9001. Clear understanding of the client for the quality of work done and

therefore increased client satisfaction; increased work opportunities at the overseas markets and also easier qualification to tender for local projects; decreased rework and hence decreased problems in the defects liability period and less time spent for acceptance of the projects leading to increased efficiency and continual improvement in the company and for the projects are other positive outcomes agreed by the respondents more or less by the same percentage (Table 3.8).

Fifth Section: This section which investigates ISO 14001 Environmental Management System in details.

General Motivators of the System: In this question, the respondents are asked to state their initial motivators to establish ISO 14001 in their companies and similar to the questions in the fourth section, the answers were not limited only to one choice. 80% of the respondents evaluate Environmental Management System as a part of the improvement strategy (vision) of the company. 73% of the companies stated that ISO 9001 helps them to gain competitive advantage in the international markets. 80% of the respondents stated that they use ISO 14001 as a qualifying agent to tender for international projects, while 73% use to tender for local projects. 40% of the companies use the system to meet customer expectations and 40% defines the system as a part of the risk management. Also 20% of the respondents believe that other motivators to establish the system are assuring conformity to the laws and regulations, desire to establish Environmental and OHS Management Systems integrated with ISO 9001 and protecting the environment and increasing consciousness on this concept (Fig. 3.9).

In general, nearly all of the respondents (93%) agree that the advantages they get by establishing and practicing of ISO14001 are more than its disadvantages and all of them think ISO 14001 Environmental Management System is a useful instrument for their companies.

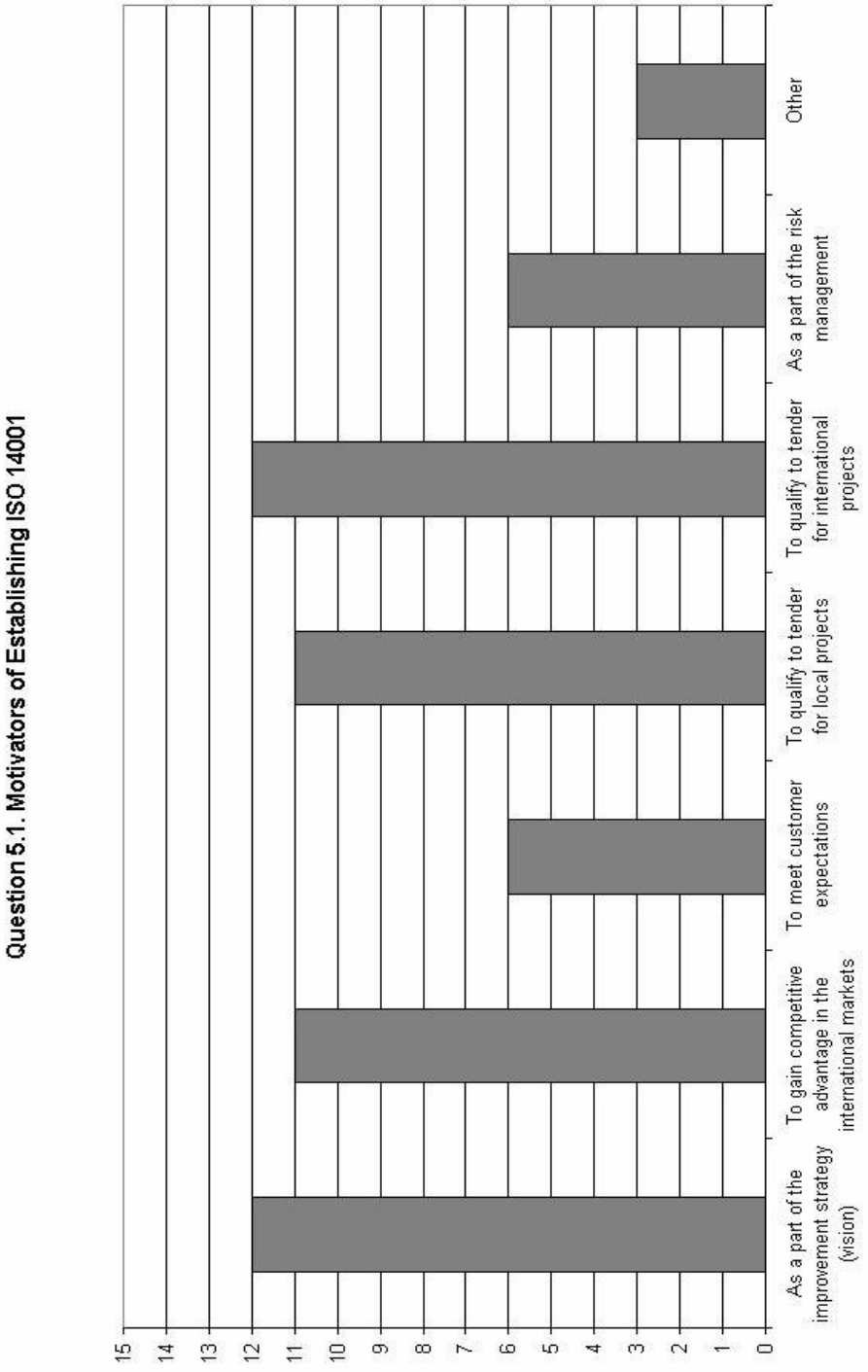

Figure 3.9. Motivators of establishing ISO 14001 according to the number of companies

Table 3.9. Nonsignificant responses after statistical analysis of results of ISO 14001 Environmental Management System outcomes

Nonsignificant Responses	
Respond 1	Increased efficiency in the company and for the projects
Respond 3	High initial investment cost in the certification process
Respond 4	Increased company profit
Respond 6	Decreased project completion times
Respond 14	More expenses spent for the education of personnel

Table 3.10. Significant negative responses after statistical analysis of results of ISO 14001 Environmental Management System outcomes

Significant Negative Responses		**Agree %**
Respond 7	More operational burden	71,4
Respond 9	High expenses in practice	57,1
Respond 13	More paperwork (documentation)	71,4

Table 3.11. Significant positive responses after statistical analysis of results of ISO 14001 Environmental Management System outcomes

Significant Positive Responses		Agree %
Respond 2	Increased quality throughout the company in general	64,3
Respond 5	Higher company prestige	100
Respond 8	Protection of the environment and increased consciousness on this concept	92,9
Respond 10	Increased client satisfaction	64,3
Respond 11	Easier qualification to tender for local projects	50
Respond 12	Easier qualification to tender for international projects	85,7
Respond 15	More work opportunities at the overseas markets	85,7
Respond 16	Increased occupational safety	71,4
Respond 17	Easier getting permits for environmental issues	78,6

Operational burden and additional works due documentation are the main problems for the companies. More than half of the companies also suffer from high expenses in the practice of the system (Table 3.10).

Beside to those negative outcomes, all of the respondents believe that establishing ISO 14001 in the company increase the prestige. And not with a chance that most of the respondents agree that environmental protection and being aware of this concept is an obvious outcome by practicing an Environmental Management System in the company. Many respondents find the system as a useful tool for qualification to tender and getting work opportunities internationally. Another positive outcome is that the permits due to environmental restricts are got easier with the system. Increased occupational safety, client satisfaction and general quality throughout the company are other positive results by implementing ISO 14001. Also, half of the respondents agree that the by the system, it is easier to get qualification to tender for local projects (Table 3.1!).

Sixth Section: This section which investigates OHSAS 18001 Occupational Health and Safety Management System in details.

General Motivators of the System: In this question, the respondents are asked to state their initial motivators to establish OHSAS 18001 in their companies and similar to the questions in the fourth and fifth sections, the answers were not limited only to one choice. 71% of the respondents evaluate Environmental Management System as a part of the improvement strategy (vision) of the company. 79% of the companies stated that OHSAS 18001 helps them to gain competitive advantage in the international markets. 79% of the respondents stated that they use OHSAS 18001 as a qualifying agent to tender for international projects, while 71% use to tender for local projects. 50% of the companies use the system to meet customer expectations and 64% defines the system as a part of the risk management. Furthermore 21% of the respondents stated that other motivators to establish the system are assuring conformity to the laws and regulations, desire to establish Environmental and OHS Management Systems integrated with ISO 9001 and increasing occupational safety and decreasing occupational accidents
(Fig. 3.10).

In general, all of the respondents agree that the advantages they get by establishing and practicing of OHSAS 18001 are more than its disadvantages and all of them think OHSAS 18001 Occupational Health and Safety Management System is a useful instrument for their companies.

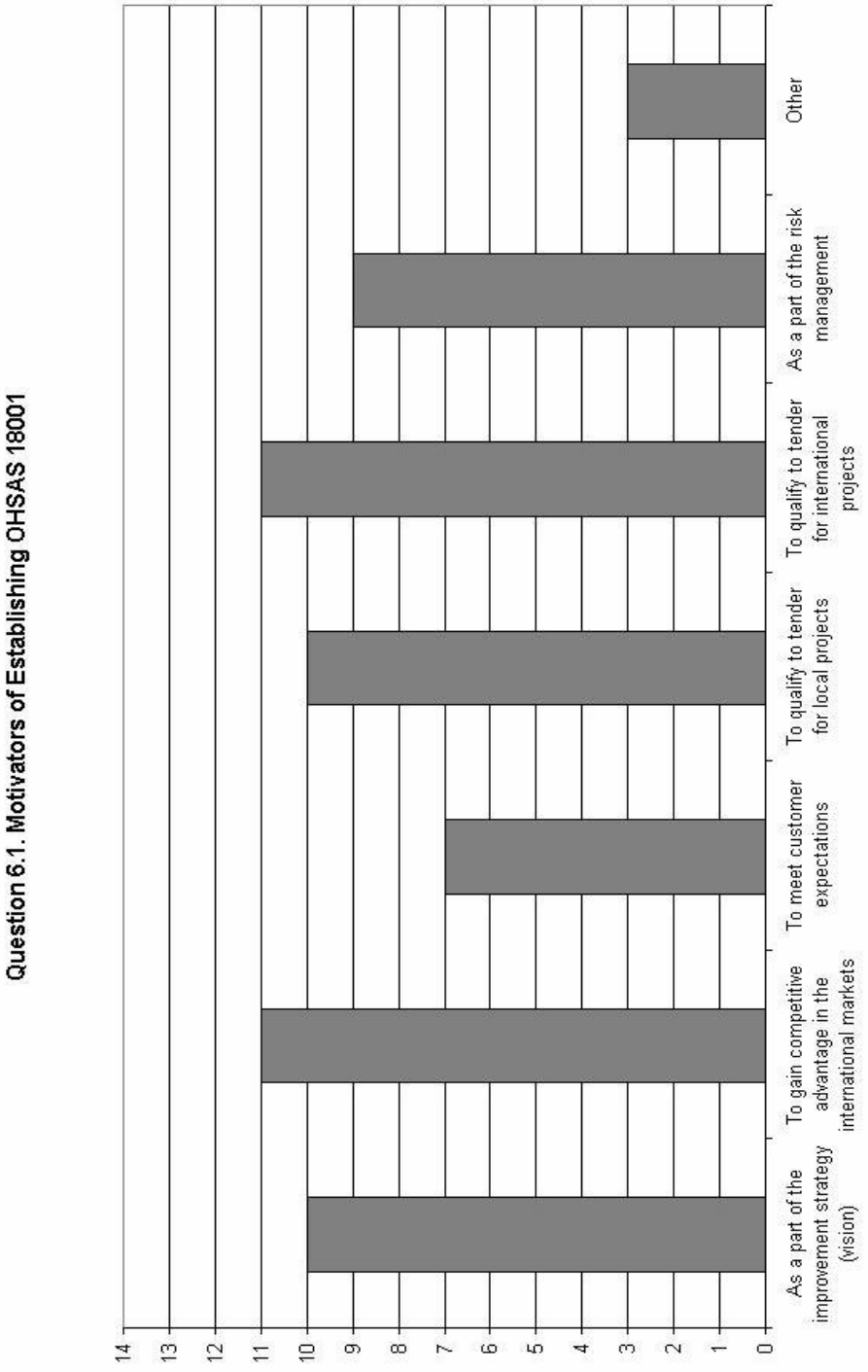

Figure 3.10. Motivators of establishing OHSAS 18001 according to the number of companies

Table 3.12. Nonsignificant responses after statistical analysis of results of OHSAS 18001 Occupational Health and Safety Management System outcomes

Nonsignificant Responses	
Respond 4	Increased company profit
Respond 6	Decreased project completion times
Respond 14	More expenses spent for the education of personnel

Table 3.13. Significant negative responses after statistical analysis of results of OHSAS 18001 Occupational Health and Safety Management System outcomes

Significant Negative Responses		**Agree %**
Respond 3	High initial investment cost in the certification process	35,7
Respond 7	More operational burden	57,1
Respond 8	High expenses in practice	42,9
Respond 13	More paperwork (documentation)	57,1

Table 3.14. Significant positive responses after statistical analysis of results of OHSAS 18001 Occupational Health and Safety Management System outcomes

Significant Positive Responses		Agree %
Respond 1	Increased efficiency in the company and for the projects	57,1
Respond 2	Increased quality throughout the company in general	78,6
Respond 5	Higher company prestige	100
Respond 9	Increased client satisfaction	71,4
Respond 10	Increased employee satisfaction	71,4
Respond 11	Easier qualification to tender for local projects	64,3
Respond 12	Easier qualification to tender for international projects	85,7
Respond 15	More work opportunities at the overseas markets	64,3
Respond 16	Increased occupational safety	100
Respond 17	Decreased occupational accidents	100

Similar negative outcomes with ISO 14001 can be seen for the OHSAS 18001 Occupational Health and Safety Management System. More than half of the respondents agree that operational burden and additional works due documentation are the main problems for the companies. Nearly half of the companies also suffer from high expenses in the practice of the system. Additional to the results of ISO 14001, few of the respondents think that the system requires a high initial investment cost for the certification process (Table 3.13).

Again, similar to the positive outcomes of ISO 14001, all of the respondents believe that establishing ISO 14001 in the company increase the prestige. As expected, all of the companies use OHSAS 18001 as a tool for establishing occupational safety in the company and to decrease occupational accidents. Most of the respondents agree that by implementing the system, qualification to tender for international projects is easier. Many of the respondents think that quality in general is increased throughout the company. Increased client

and also employee satisfaction are other important positive outcomes of OHSAS 18001. More than half of the respondents also agree that establishing the system also leads to easier qualification to tender for local projects, increases international work opportunities and efficiency in the company and for the projects (Table 3.14).

3.3. DISCUSSION OF RESULTS

Size of the Companies and Management Systems:

In the analysis of results section, the companies are categorized according to their turnovers as small, medium or large size firms (Table 3.5). Among four of the small size companies, only one of them established ISO 14001 Environmental and OHSAS 18001 Occupational Health and Safety Management Systems. This is an expected result since the activation area of this company is both locally and internationally. In the international markets, having ISO 14001 and OHSAS 18001 certificates would increase the competitiveness of especially small size firms. On the other hand, other three small size companies only do business in local markets and they do not need any certificate other than ISO 9001 to tender for local projects. This is mainly due to the conditions of tenders for local projects. In the last few years, the prequalification conditions for local projects in Turkey oblige to have an ISO 9001 certificate for the construction companies. There is no significant pattern for medium and large size companies regarding the management systems practiced.

General Motivators of ISO 9001 Quality Management System:

The main motivator with the highest response rate (79.2%) is that the companies establish ISO 9001 Quality Management System as a part of their improvement strategy (vision). The result is similar to the findings of Karim (2005) and Chini (2003). According to Karim's research, for Australian

contractors, certification being a part of the improvement strategy is a key motivator and according to Chini's research the main motivator for establishment and maintenance of ISO 9000 is to improve the internal quality management procedures of the company. The result however is different than the general opinion. This can be somewhat explained by the evolved structure of Turkish contracting companies. It is obvious that the top management does not see the certification as only a piece of paper but a real system to be established in the company. Also a respondent add another motivator as gaining continuous improvement in the company and for the projects, which also proves the better philosophy and distinct perception of contractors due to the system.

Not very long ago, according to other two surveys made in Turkey by Turk (2004) and Madenli (2002), the primary need to have the ISO 9000 certification is found to be related with bidding and competitiveness both in local and international area. The result of this survey was expected to be parallel to that way but the result shows that the contractors really started to understand the importance of a solid established quality system and appreciated the positive outcomes of the system especially in the long term period. Implementing a quality system is very much a long-term exercise. Getting people to take on boards the concept of a quality system probably needs 5 years before it is accepted as a part of the routine (Bradley 1998). This conclusion was also discussed by Madenli (2002) but with different results of the survey. He also stated that construction companies appoint long-term targets for development of a formal QA system. It is really a pleasant progress for the construction sector in just 4 years.

The other significant motivator is that the companies use the system to qualify to tender for local projects with a very close response rate (75%), which overweighs the most expected answers which are to gain competitive advantage in the international markets and to qualify to tender for international projects with the same response rate (70.8%). This can be explained by the changes in the bidding requirements for local projects. In Turkey, in the last

few years, having an ISO 9000 certificate is compulsory for almost every construction projects. Furthermore, for some projects, having a certificate would not be sufficient but in order to qualify, the bidder must prove that the certificate was taken from an accredited auditor. The importance of the ISO 9000 certification is increasing locally. Therefore the result of the survey is not a surprise. Besides, the rates are really close and very similar to the previous studies as expected.

According to Turk (2004), entering the international construction market is the most important motivator. Also the results show that ISO 9000 certification is compulsory for bidding contracts and will be mandatory soon. In another survey by Madenli (2002), he also pointed out that gaining competitive advantage in international markets is the main aim behind ISO certification but on the contrary to this survey, increasing competitive advantage in present markets stays behind international area. At that time, this result was explained by the economic crisis in the domestic markets, which leads Turkish contractors to international markets. The results found by Chini (2003) are very similar to his survey. The other important motivators are competitiveness in the local market and requirements by local customers. Also the respondents stated that certification has become a bidding requirement. According to Karim (2005), to prequalify to tender for local projects is the key motivator for certification. Similarly in Hong Kong, Dissanayaka (2001) stated that to qualify to tender for public projects (88%) is the main motivator and Kwok (1997) listed main motivator as Government requirement (81%).

Another significant result is that 62.5% of the companies use the system to meet customer expectations. The same result was also an important motivator according to Madenli (2002), Karim (2005), Dissanayaka (2001) with a rate of 64%, Kwok (1997) with 72% and Lee (1998) with 39%. Correspondingly, Ofori (2002) stated that Singapore's construction companies seek ISO 9000 certification to give clients greater quality assurance. This shows that the customer perception of quality would be satisfied by establishing ISO 9001 Quality System.

Also it must be noted that ISO 9000 certification is stated to be desired in order to improve the quality of work done (45.8%). This is similar to the findings of Dissanayaka (2001) with a response rate of 52%. This is parallel to the previous result. This time it is clear that in construction works, fulfilling the conditions of the standard, quality of work is improved and the aim of a quality standard is to setup a system in the company and improve work at site and in the office.

ISO 9001 Quality Management System Outcomes:

Establishing a quality system brings both positive and negative outcomes for a construction company. In the fourth section, these outcomes are chosen and listed together in order not to lead the respondents to only one direction. Listing only positive or negative outcomes would have led them judge the system with only one perspective. By this way, respondents would form their opinions by thinking different points of view.

The results are statistically tested and the non-significant items are eliminated. Positive and negative outcomes will be discussed separately.

According to the results, the main positive outcome is establishing ISO 9001 Quality Management System helps to keep more systematic records (100%). The result is very similar to the findings of Karim (2005), which 93.2% of the respondents in his survey have indicated more systematic record keeping as a result of implementing quality management systems. Also Dissanayaka (2001) supports the result by a response rate of 97%. Furthermore, Madenli (2002) has founded that ISO 9001 implementation eases data collection and keeping (100%). This is an expected result since record keeping is the fourth tier of required documentation in ISO 9000, following the Quality Policy Manual, Procedures, and Work Instructions. The reason to keep records is for future use as a reference in case of questions related to contractual and legal matters, work techniques, verification of work done, and other parts essential to the company running smoothly (School for Champions, Mohsin Nishat

2001, www.school-for-champions.com/ISO9000/isorecords.htm, Latest Accessed: 19/10/2006).

Improved internal communication (83.3%) is another positive outcome stated by the respondents. This is an accordance with the findings of Karim (2005) such as 72.1% state that quality systems result in improved internal communication. Dissanayaka's (2001) survey also backs up this idea by a high response rate of 91%. Furthermore Turk (2004) also stated that ISO 9000 quality management system improves communication among the company's employees and Madenli (2002) agreed that it improves communication within the company (long term 83% - short term 89%). This is not a chance that ISO 9000 encourages employees to communicate their concerns about work processes and to promote changes in a way that management can hear. Companies that pursue ISO 9000 in the right way-meaning they involve all employees-create teams for the purpose of documenting work procedures and continued auditing of the quality system they are creating. Sharing information within a team, a department, and a full company is at the heart of the ISO 9000 internal auditing process. It's through information-sharing that a company gains the full benefit of the ISO 9000 process, because it gains the knowledge needed to enhance quality and performance. Company politics present a major hurdle to information-sharing. Because ISO 9000 encourages full employee involvement and open communication, it sets the stage for more advanced information-sharing. (Zuckerman 1999)

Easier qualification to tender for international projects (79.2%), more work opportunities at the overseas market (69.6%) and easier qualification to tender for local projects (66.7%) are expected advantages of implementing ISO 9001. The results of Madenli (2002) have similarities such that major long-term benefits are entrance into new markets (83%), increasing competitive advantage in present markets (67%) and increasing competitive advantage in international markets (83%). In Karim (2005)'s survey, 45.9% indicate better access to overseas market while 57.1% report similar results in domestic markets, which the results are not counted as major. Similar to Karim,

Dissanayaka (2001)'s findings state better access to domestic (58%) and overseas markets (44%) out of major benefits.

As explained previously, the prerequisite condition of the local tenders for ISO 9000 certification and tendency of the Turkish contractors to overseas markets reveal this result. The perspectives of the Turkish contractors differ from Australian and Hong Kong contractors, which is due to different competitive forces, strategies and politics acting in these countries about internationalization.

Improved external communication (75%) is stated as a positive outcome by establishing quality management system. Similarly, Dissanayaka (2001) stated that improved external communication (52%) seemed to be a perceived positive outcome. According to Turk (2004)'s survey, it is also agreed that the system improves communication with customers and subcontractors.

Improved quality of subcontractors and suppliers is pointed up by the respondents with a response rate of 75%. This is somehow in accordance with the research outcomes of Turk (2004), which he finds out that ISO 9001 improves the control on subcontractor firms thus leading improvement of their quality.

The respondents declare increased client satisfaction (70.8%) is another benefit. The result is highly expected and similar to other findings of Karim (2005) with achievement of greater client satisfaction (72.4%), Dissanayaka (2001) with greater client satisfaction (76%), Turk (2004) with improved customer satisfaction and Madenli (2002) with increased customer satisfaction (long term 100% - short term 87%). This would be one of the main goals of the contractors to ensure that the expected quality is achieved. Quality is expected both by the client and also by the company itself. Therefore, by satisfying the client, company also fulfills its goals and long term expectations from a quality system. By ensuring a satisfying quality system, not only client is satisfied but also quality is ensured at each stage of the construction

process thus minimizing rework costs, increasing final product quality. Furthermore, as explained in section 2.2.1., customer focus is one of the principals of ISO 9000 Quality Management System.

Another remarkable point is that companies anticipate from ISO 9001 Quality Management System to decrease rework or repair (69.6%), which supports the previous claim, as well as fewer problems in defects liability period of the projects (65.2%) and therefore leading faster and easier acceptance of the projects (62.5%). In the study performed by Karim (2005), 68.4% of the respondents have indicated that establishing the system results in less rework and repair, as well as fewer problems in the defects liability period. Correspondingly, Dissanayaka (2001) reported that less rework or repair (79%) thus fewer problems in defects liability period (61%) are positive outcomes of the system. Similarly, Kwok's (1997) survey show that quality system results in less rework or repair (68%). According to the study of Madenli (2002) decreased cost of reworks (long term 100% - short term 72%) are benefits of ISO 9001. It is an expected and well known advantage of quality management systems to decrease the cost of reworks or repairs due to errors and shortcomings by quality control during the construction process and also to foresee possible difficulties and taking preventive action after clear understanding contract documents, evaluating technical and financial requirements by quality assurance. Therefore, less the cost, greater the client satisfaction and more the productivity. Furthermore, the most common problematic stages of construction projects, namely acceptance and defects liability periods, are handled with fewer problems and faster.

66.7% of the companies also stated that the client understand the quality of work more clearly if quality system is implemented. The result is very similar to the findings of Karim (2005) (78.6%) and Dissanayaka (2001) (70%), which the Australian and Hong Kong construction companies also believe that clients perceive the achievement of better quality if the contractor has implemented a quality management system. The result is parallel to client satisfaction. When

the client is convinced on the quality of work done, he is satisfied with the work done.

As a final discussion, companies stated that ISO 9001 quality management system increases efficiency in the company and for the projects (62.5%) and continual improvement is achieved (58.3%). In Karim (2005)'s survey 68.4% have indicated the achievement of higher efficiency in operation and Dissanayaka (2001) found out that higher efficiency in operation (64%) is a positive outcome. Kwok (1997) also stated that quality systems lead to continuous improvements of work and performance (79%). Continual improvement is one of the principals of ISO 9000 Quality Management System, as explained in section 2.2.1 previously. There is no specific section defined in the Standard but it is referenced everywhere. The main goal is "getting better and better" and can be achieved by carrying out internal audits, performing management reviews, analyzing data and implementing corrective and preventive actions.

When implementing a quality system, there are of course disadvantages reported along with many of the advantages. The main drawback of ISO 9001 is increased paperwork (75%) and bureaucracy (66.7%) in the company. These results of this study are in accordance with findings of most of the previous studies. According to Turk (2004), companies think that ISO 9000 increases documentation. Also Madenli (2002) found out that increased paperwork (long term 75% - short term 56%) and increased bureaucracy (long term 92% - short term 50%) are the main disadvantages of quality system. Similarly, Bubshait (1999) stated that high amount of paperwork associated with the documentation of the quality system and its implementation is a difficulty surrounding ISO 9000 requirements. According to Chini (2003), the main difficulty observed by the respondents is related to documentation, leading to increased bureaucracy. Correspondingly, Karim (2005) reported that 95% of the respondents agreed with the proposition that quality systems result in increased paperwork and 86.2% stated that this results in an increased bureaucracy. According to Dissanayaka (2001), Hong Kong

contractors see more paperwork (100%) as the major negative outcome. Finally but not limited, Chew (1996) stated that huge amount of paperwork is a major problem that is encountered when implementing the ISO 9000. In summary, increased paperwork and bureaucracy are the most frequently cited disadvantages of establishing ISO 9000 Quality Management System in construction companies. Therefore, the result was highly expected.

At the preparation process for certification, there are significant documentation requirements. First of all, quality manual has to be prepared. Accordingly, procedures, processes, work definitions, instructions, forms. have to be written. All of these documentations are compulsory but the companies are free to set the system requirements in accordance to their company processes, ensuring the basic requirements of the Standard are fulfilled. Therefore, companies would document only the one they need. Unrequired documentation would lead to additional undesired work load and paperwork, as well as increased bureaucracy. When the quality system is implemented, documentation will be a routine part of the personnel's work load, as long as the system is in conformance with the company's routine. In order to do this, people in the company must be involved in every step of the system, especially at the preparation phase.

Another problem leading to paperwork is distribution of documents inside the company. As a basic rule, but the conditions change in every company due to their defined processes, documents are distributed to the responsible personnel whenever they are revisioned. The old revisions are collected and stored or destroyed, again according to the process, by the quality assurance department and revised documents are kept by the responsible personnel again. This is really a burden for personnel. But fortunately, an easy solution is available. An internal network system can be established and the distribution of the documents is handled by this way. In this alternative, documents are prepared and broadcasted in the network by the quality assurance department. Everyone else can reach those documents anytime they need and get an uncontrolled copy by getting a printout. The originals with

signatures are kept only by the quality assurance department and some required documents by the quality control department at sites. Only records are kept by the defined responsible personnel. This would enormously decrease paperwork and bureaucracy.

Dissatisfaction of the employee due to additional work (50%) is another significant disadvantage. Similar results are reported in previous studies. Madenli (2002) reported that negative reactions (long term 58% - short term 44%) of the staff to the new management occur. Bubshait (1999) agree that establishing quality system brings additional workload for personnel thus loss of productivity of the workforce. According to Chini (2003), certification process is time consuming and ends with resistance of personnel. In Karim (2005)'s survey 39.7% have indicated an increased staff discontent as a result of implementation of quality management systems. Correspondingly, Chew (1996) reported resistance to change of personnel is a main disadvantage. Increased paperwork is the primary reason for the dissatisfaction of employee and the solution alternative is discussed earlier. Furthermore, when the employees are not satisfied, resistance to the new system occurs. Also, as long as the personnel are not trained of ISO 9000, they would not be aware of the benefits of the system and they would only see it as an additional burden and a frustrating effort. Resistance to change is in human nature but it is necessary to break down the traditions and convince people about the advantages of the system. Here, key is education and top management commitment.

An interesting point is observed from the results that while 66.7% denoted increasing bureaucracy as a main disadvantage, 37.5% stated less flexibility in operation as a drawback of ISO 9001. This result may be due to the fact that improved internal and external communication overcomes the problem.

In general, all of the respondents agree that the advantages they get by establishing and practicing of ISO 9001 are more than its disadvantages and all of them think ISO 9001 Quality Management System is a useful instrument

for their companies. This is similar to the findings of Turk (2004), which 83.6% of the surveyed construction firms consider that ISO 9000 QMS is an appropriate tool for construction firms. According to Chini (2003), 75% of the companies believe that ISO 9000 has provided specific advantages to their organizations. 80% of the companies consider that ISO 9000 is an appropriate tool for construction companies in particular. Correspondingly, in Karim (2005)'s survey, 72.4 % and in Dissanayaka (2001)'s survey 85% of the respondents have indicated that the benefits of quality systems outweigh their disadvantages.

General Motivators of ISO 14001 Environmental Management System:

The main motivator with the highest response rate (80%) is that the companies establish ISO 14001 Environmental Management System as a part of their improvement strategy (vision). This result proves that Turkish construction companies see the system as a value and they are aware of the benefits. Furthermore, top management decide on establishing ISO 14001 as a part of their vision in order to constitute environmental consciousness in the company, to improve company's image, to fulfill their environmental responsibilities and to improve their environmental performance. Environmental management is no longer something extra which organizations need to do for moral or corporate responsibility reasons – it is part of every company's business strategy to help achieve that competitive edge (Goodman and Veritas 1998).

Another main motivator with the same response rate (80%) is to qualify to tender for international projects, which overweighs the need for qualification to tender for local projects (73.3%). Moreover, respondents stated that they seek for ISO 14001 certification to gain competitive advantage in the international markets (73.3%). This result was vice versa in the quality system part. The result shows that the ISO 14001 certification is implemented mostly for international markets. This is due to the fact that the bidding requirements for most of the local projects made ISO 9001 certification compulsory however

ISO 14001 certification is hardly requested. On the other hand, environmental management system is a valuable asset to qualify for tenders in international markets and also it gives a competitive advantage for contractors.

As an interesting note that the companies do not seek for ISO 14001 certification to meet customer expectations (40%) at the first place. This is due to the fact that clients in construction sector do not necessarily ask for environmental management system but it is also true that certification gives competitive advantage both for local and international projects.

ISO 14001 Environmental Management System Outcomes:

All of the companies agree that ISO 14001 certification increase company's prestige (100%). This is similar to the findings of Ofori (2002) which he stated that enhanced corporate image and credibility is a benefit form ISO 14001 Environmental Management System implementation. Also Valdez (2002) identified key benefits of implementing ISO 14001 as improving public image. Increased public awareness of environmental issues brings to light the importance of environmental performance of companies. In recent years, company's image is parallel with its "environmental friendly" label. A "green" image would increase community support by demonstrating concern for local environment through an environmental management system. Moreover, it is a well known fact that improved prestige ends up with increased competitiveness.

Another important advantage is that by establishing ISO 14001 environment is protected and consciousness on this concept is increased (92.9%). Similarly, Ofori (2002) stated that improved environmental performance is an important advantage. This is an important result to show that Turkish construction companies are aware of public expectations on environmental issues and only financial expectations are not the main purpose to implement an environmental management system.

“Disposals Management” is the most effective solution for construction firms to protect environment. It helps to recycle/reuse or demolish without any damage to the environment of harmful disposals. Pollution is highly prevented by proper management of disposals. Engine oil, oil filter, accumulators, form lubricants, contaminated soil, excavated soil, construction and demolition disposals are the most common examples of disposals at a construction site that need to be managed. Furthermore, construction would result in water, air and soil pollution as well as environmental noise pollution. All necessary measures are taken according to ISO 14001 Standard and also in accordance with the related environmental laws and regulations.

Easier qualification to tender for international projects (85.7%) and more work opportunities at the overseas markets (85.7%) are the most expected benefits from implementing Environmental Management System. However, they are in the third place for the Turkish contractors’ point of view. There are similar findings in other surveys, which Ofori (2002) stated increased access to markets as a benefit while Valdez (2002) pointed out competitive advantage and Tse (2001) reported competition encouragement (by providing a means to differentiate services) as a positive outcome.

It is no longer enough simply to have resources. Using resources productively is what makes for competitiveness today. How an industry responds to the environmental challenge may in future be a leading indicator of its overall competitiveness. Certification to ISO 14001 could be a key factor (Goodman and Veritas 1998). It is also an increasing trend in international markets to ask for ISO 14001 certification as a prerequisite condition to tender for projects.

Getting permits easier for environmental issues (78.6%) is stated as a positive income by implementing ISO 14001 Environmental Management System. Ofori (2002) similarly reported demonstrated compliance with regulations as a benefit. Correspondingly, Valdez (2002) stated that ISO 14001 certification helps to improve relations with regulators. There are many laws and regulations on environmental issues in Turkey. And construction companies

have to get permits in accordance with these laws. Furthermore, these laws and regulations carry financial and/or criminal penalties if not conformed. A reputation for non-compliance can lead to delays in the issuing of permits and licenses by the regulatory authorities and cause more intense scrutiny from environmental agencies and activist groups. Legal compliance is, after all, the main premise of ISO 14001. By systematically identifying all relevant environmental legislation, an organization can make an informed judgment on where it stands with regard to legal compliance. It can also monitor its compliance and take appropriate, timely and effective action in cases of any breaches of legislation (Goodman and Veritas 1998). Therefore companies can protect themselves against legal liabilities.

Increased occupational safety (71.4%) is found out to be an advantage of the system as well. Tse (2001)'s survey has pointed out a similar finding that occupational health improvement (by tracking and following appropriate environmental and health laws) is a major benefit associated with implementing an ISO 14001 environmental management system. Occupational health and safety and environmental management are closely related subjects, thus the training due to ISO 14001 brings in increased occupational safety. With a good environmental management system in place, many potential environmental incidents or accidents can be avoided.

There are also disadvantages of ISO 14001 according to the results. The main negative outcomes are stated as increased paperwork (71.4%) and operational burden (71.4%). Chen (2004) also stated that multifarious documental operation process of the ISO 14000 series is a reason for not implementing the Standard. As mentioned previously, increased paperwork is a natural problem resulting from implementing a new Standard in the company. However, the solution of a network system is also applicable here. Another solution may be integration of ISO 9000 Quality Management System and ISO 14000 Environmental Management System, if existed together. This is easier with the recent version of ISO 9000 standard, which mainly the revision in 2000 is made for this purpose. Integrating these two separate

systems would decrease paperwork by using common procedures, forms and instructions. Integration concept will be discussed later with the results of the survey. For the increased operational burden, companies would be aware of the benefits of an Environmental Management System and put those on a balance. They will immediately see that the advantages overcome disadvantages extensively. Furthermore, many organizations already employ some form of environmental management meaning that they do have to start from scratch (Goodman and Veritas 1998). Compliance to the Standard is already a legal responsibility for the companies.

Third negative outcome is reported as high expenses in practice (57.1%), which is also stated previously by Chen (2004) and Tse (2001). Certainly, certification involves expenditure during the implementation phase, due to new procedures, testing, inspection and auditing but also it is a well known fact that environmental management supplies cost savings. Also, it must be noted that costs are reduced by preventing monetary fines due to environmental laws and regulations. Moreover, increased competitiveness and work opportunities in the markets would overcome those operational expenses.

In general, nearly all of the respondents (93.3%) agree that the advantages they get by establishing and practicing of ISO14001 are more than its disadvantages and all of them think ISO 14001 Environmental Management System is a useful instrument.

General Motivators of OHSAS 18001 Occupational Health and Safety Management System:

The main motivators to seek for OHSAS 18001 certification are to qualify to tender for international projects (78.6%) and to gain competitive advantage in the international markets (78.6%), which overweighs the need for qualification to tender for local projects (71.4%). This is due to the same factors effective for the reasons to seek ISO 14001 certification in international area more than local. However, there is an interesting point to note that the tendering

considerations and competitiveness issues are more important than the improvement strategy (71.4%) of the company to implement OHSAS 18001. This has a sector based explanation, such that the measurements for occupational health and safety in the construction sector are somehow dealed with or without an implemented system. “Construction workers have to wear helmets or safety belts while working at the site” is a well known fact and many organizations see OHSAS 18001 certification as extra cost and burden for them, claiming that they already take all necessary measures to protect workers without the system. They seem to underestimate the benefits of implementing OHSAS 18001 Occupational Health and Safety System. Therefore, results of the survey show that the motivators are due to profit and job opportunities mainly. But it must be kept in mind those motivators for certification reveals only the first impressions of the companies. The advantages or disadvantages of the system in the long term are reported according to the results of outcomes of the system.

OHSAS 18001 Occupational Health and Safety Management System Outcomes:

All the respondents agree that Occupational Health and Safety Management System increase company’s prestige (100%). OHSAS 18001's recognizable name is a sign of commitment from top management to employees, customers and potential customers that health and safety is a priority. Registration enhances marketability while increasing worker confidence, and positions any organization to strongly address its industry occupational health and safety regulations (O’Connell 2004). OHSAS 18001 certification reinforces a responsible and well-managed reputation with customers, stakeholders and communities and establishes company’s credibility and commitment to safety.

All of the companies stated that OHSAS 18001 increased occupational safety (100%) and decreased occupational accident (100%). This is the most expected result since the main goal of an Occupational Health and Safety Management System is to reduce work related accidents and ill-health and

thus the cost associated with them. This also improves efficiency in the company and for the projects (57.1%) by eliminating or minimizing the risk of accidents, emergency situations, occupational injuries and other work related illnesses. OHSAS 18001 assess hazards and risks in the workplace and implement preventive measures to protect workers. Furthermore, OHSAS 18001 requires regular lectures due to safety thus the workers are kept aware of the dangers and outcomes that might have happen if they do not obey the rules of the Standard. The statistics of Social Insurance Institution for number of occupational accidents and diseases (Fig. 2.1) and the corresponding deaths (Fig. 2.2) shows the frightening status of Turkey in this manner. Therefore, certification for safety systems must be the first priority for Turkish contractors.

Easier qualification to tender for international projects (85.7%) is another important motivator to implement OHSAS 18001. Bidding requirements for international projects ask for OHSAS certification more than local projects. Therefore the result overweighs the advantage of easier qualification to tender for local projects (64.3%) Also companies stated that safety management system creates more work opportunities at the overseas markets (64.3%). Even when certification is not a prerequisite, organizations with an OHSAS 18001 Occupational Health and Safety Management System in place would be preferred, giving them a competitive edge.

Increased client and employee satisfaction (71.4%) are other key benefits of OHSAS 18001. The system includes health and safety impacts as part of the business process and planning activities and thus the goal of an accident free workplace is achieved, which satisfy employee. It also improves performance increased employee morale. On the other hand client is satisfied with significant cost savings and reduced time losses through employee illness and injury.

According to the results of the survey, the disadvantages of OHSAS 18001 are at minor importance. Increased paperwork (57.1%) and operational

burden (57.1%) are the only disadvantages of the system that more than half of the companies agree on. Increased paperwork problem is also reported as a disadvantage for implementation of ISO 9001 Quality and ISO 14001 Environmental Management Systems as well, and the same solution is applicable for OHSAS 18001 Occupational Health and Safety Management System: a network to broadcast documents online. And again, an integrated system would reduce number of documents. As for the operational burden issue, the long-term benefits to an organization can result in significant dollar, time and man-day savings and a proactive approach to managing health and safety risks can also produce dollar savings through reduction of health and safety liabilities (O'Connell 2004). Therefore benefits overcome disadvantages easily, especially when the result is about saving human lives.

In general, all of the respondents agree that the advantages they get by establishing and practicing of OHSAS 18001 are more than its disadvantages and all of them think OHSAS 18001 Occupational Health and Safety Management System is a useful instrument.

Integrating Management Systems:

92.9% of the companies that establish all three management systems stated that they manage to integrate these systems and a majority of those companies (84.6%) reported that they would prefer a management system comprising all the systems together. An interesting note to the results is that the companies which do not have an integrated system prefer a management system comprising all the systems together.

The differences in the standards, particularly the differences in the scope of ISO 9001:2000, indicate that integration which is based on the standards is likely to be difficult to achieve, and further work and changes will be required before these differences are eliminated. On the other hand, merging the documentation is less difficult and may be encouraged by the revised QMS standard (Wilkinson and Dale 2002).

The concept of integrated management systems is just discussed to give a general opinion of the companies. Detailed research is not the main objective of this study.

CHAPTER 4

CONCLUSIONS AND RECOMMENDATIONS

4.1. CONCLUSIONS

In this study, the perceptions of the Turkish contractors regarding to ISO 9001 Quality, ISO 14001 Environmental and OHSAS 18001 Occupational Health and Safety Management Systems are examined. The following conclusions are found out based on the results obtained:

1. The most important motivators to seek for ISO 9001 Quality Management System stated by the respondents are as follows:

- As a part of the improvement strategy (vision)
- To qualify to tender for local projects
- To qualify to tender for international projects
- To gain competitive advantage in the international markets
- To meet customer expectations

One of the remarkable points is that the Turkish contractors seem to understand the real benefits of the quality system, thus they seek for ISO 9001 as a vision of the company before thinking about the financial issues. It is obvious that the contractors appreciate the importance of quality management system in the long term period, even before establishing the system.

The main advantages of implementing ISO 9001 pointed out by the companies can be summarized as:

- More systematic record keeping
- Improved internal communication
- Easier qualification to tender for international projects
- Improved quality of subcontractors and suppliers
- Improved external communication
- Increased client satisfaction
- More work opportunities at the overseas market
- Less rework or repair
- Easier qualification to tender for local projects
- Clear understanding of the client for the quality of work done
- Less problems in the defects liability period of the projects

The most expected advantages by implementing ISO 9001 are bidding opportunities and competitiveness; however companies stated that systematic record keeping and improved internal communication are most likely outcomes they realize by the quality system. This is an evidence that the Turkish contractors get the benefits of ISO 9001 in the long term period for the company's internal processes.

The main disadvantages of implementing ISO 9001 pointed out by the companies are:

- More paperwork (documentation)
- Increased bureaucracy in the company
- Dissatisfaction of the employee due to additional work

Majority of the companies reported increase in paperwork and bureaucracy as a disadvantage of ISO 9001. First of all it must be noted that the percentages are low compared to the previous studies in different countries. A solution to the problem of increased documentation is proposed; a network system to store documents of the system up to date by the quality assurance department, which all the personnel can reach online anytime they need. This

would enormously decrease the paperwork and additional workload of employee due to paperwork, as well as bureaucracy in the company.
All in all, ISO 9001 Quality Management System is found out to be useful and the advantages overcome disadvantages.

Also it is worth to remind that the number of ISO 9001 certified companies in Turkey increased enormously in the last year and also construction sector is catching up the train by an increase of with a great percentage rate of 550% over 2003.

2. The most important motivators to seek for ISO 14001 Environmental Management System stated by the respondents are as follows:

- As a part of the improvement strategy (vision)
- To qualify to tender for international projects
- To gain competitive advantage in the international markets
- To qualify to tender for local projects

It is obvious that establishing ISO 14001 Environmental Management System has become a part of the top management's decision as a part of the company vision similarly to ISO 9001, thus Turkish construction companies see the system as a value rather than extra and they are aware of the benefits.

The main advantages of implementing ISO 14001 pointed out by the companies can be summarized as:

- Higher company prestige
- Protection of the environment and increased consciousness on this concept
- Easier qualification to tender for international projects
- More work opportunities at the overseas markets

- Easier getting permits for environmental issues
- Increased occupational safety

Correspondingly to the motivators of the system, outcomes show that Environmental Management System is a useful tool to boost company prestige. In Turkey, consciousness on environmental issues and the legal necessities are increasing and the need to do something to protect the environment is becoming a “duty”. The impact of ISO 14001 on this manner is highly reputable, which gives the companies a “green image”. The positive affects of the system on protection of the environment cannot be denied.

The main disadvantages of implementing ISO 14001 pointed out by the companies are:

- More paperwork (documentation)
- More operational burden
- High expenses in practice

The disadvantages of the system are similar to the ones for ISO 9001 and thus the solution is the same. However, another additional solution can be integration of the systems. This would also decrease documentation.

All in all, ISO 14001 Environmental Management System is found out to be useful and the advantages overcome disadvantages.

3. The most important motivators to seek for OHSAS 18001 Occupational Health and Safety Management System stated by the respondents are as follows:

- To qualify to tender for international projects
- To gain competitive advantage in the international markets
- To qualify to tender for local projects
- As a part of the improvement strategy (vision)

The analysis denoted that the most important reasons to seek for OHSAS 18001 certification is mainly due to getting work opportunities in the international markets. The reason may be explained by the construction sector specific rules. In a construction site, workers have to obey the safety rules with or without a written Standard. Therefore, the need for certification is treated as only formality, however in the long term period contractors would appreciate the additional benefits of the system after they implement.

The main advantages of implementing OHSAS 18001 pointed out by the companies can be summarized as:

- Increased occupational safety
- Decreased occupational accidents
- Higher company prestige
- Easier qualification to tender for international projects
- Increased quality throughout the company in general
- Increased client satisfaction
- Increased employee satisfaction

The result supports the fact that a safety system increases safety and decreases accidents. According to the statistics of Social Insurance Institution, the numbers of accidents and deaths are frustrating. When it comes to “life”, all necessary measures have to be taken by the contractors, no matter what it costs financially.

The main disadvantages of implementing OHSAS 18001 pointed out by the companies are:

- More paperwork (documentation)
- More operational burden

The disadvantages of the system are similar to the ones for ISO 9001 and ISO 14001, which the solution is the same. However, another additional solution

can be integration of the systems. This would also decrease documentation. In conclusion, OHSAS 18001 Occupational Health and Safety Management System is found out to be useful and the advantages overcome disadvantages.

Finally, majority of the respondents that implement all three management systems managed to integrate these systems and most of them prefer a management system comprising all the systems together.

4.2. RECOMMENDATIONS

- This is the first survey conducted regarding all three management systems together. A similar study can be done with a higher response rate and the differences between the perceptions can be examined in more details. This would provide a higher level of accuracy and would provide more definite conclusions.

- The integration of the management systems could also be investigated for the Turkish construction sector.

- An internal network system can be established to decrease documentation problems.

Management systems have great influences on the success of construction companies. Turkish contractors seem to understand the importance of implementing efficient and effective management systems in order to get the best out of these systems.

REFERENCES

Bradley K., 1998. “Laying the Foundations”, Directory of ISO 9000 Certified Companies in Hong Kong, pp. 20-25

British Standards Institution (BSI), 1999. “OHSAS 18001:1999 Occupational Health and Safety Management Systems – Specification”, London

Bubshait A. A. and Al-Atiq T. H., 1999. “ISO 9000 Quality Standards in Construction”, Journal of Management in Engineering, Vol. 15, No. 6, November/December 1999, pp. 41-46

Chen Z., Li H., Shen Q., Xu W., 2004. “An Empirical Model for Decision-Making on ISO 14000 Acceptance in the Shangai Construction Industry”, Construction Management and Economics, Vol. 22, January 2004, pp. 55-73

Chew Y. S. and Chai L. N., 1996. ISO 9002 in Malaysian Construction Industry. McGraw Hill Book Co.

Chini A. R. and Valdez H. E., 2003. “ISO 9000 Implementation in Turkish Industry”, Journal of Management in Engineering, Vol. 19, No. 2, April 2003, pp. 69-77

Christini G., Fetsko M., Hendrickson C., 2004. “Environmental Management Systems and ISO 14001 Certification for Construction Firms”, Journal of Construction Engineering and Management, Vol. 130, No. 3, June 1, 2004, pp. 330-336

Dissanayaka S. M., Kumaraswamy M. M., Karim K., Marosszeky M., 2001. “Evaluating Outcomes Form ISO 9000-Certified Quality Systems of Hong Kong Constructors”, Total Quality Management, Vol. 12, No. 1, 2001, pp. 29-40

Erel E. and Ghosh J. B., 1997. “ISO 9000 Implementation in Turkish Industry”, International Journal of Operations & Production Management, Vol. 17, No. 12, 1997, pp. 1233-1246

Fredericks I. and McCallum D., 1995. “International Standards for Environmental Management Systems: ISO 14000”, Canadian Environmental Protection, August 1995

Goodman S. L. and Veritas D. N., 1998. “Is ISO 14001 an Important Element in Business Survival?”, The Quality Magazine of Australia, June 1998

Hendrickson C. T. and Horvath A., 2000. “Resource Use and Environmental Emissions of U.S. Construction Sectors”, Journal of Construction Engineering and Management, Vol. 126, No. 1, 2000, pp. 38-44

Henningson J. C., 1978. “Environmental Management during Construction”, Journal of the Construction Division, ASCE, Vol. 104, No. 4, 1978, pp. 479-485

International Organisation for Standardisation (ISO), Quality Management Principles, Latest Accessed: 12/07/2006, http://www.iso.org/iso/en/iso9000-14000/understand/qmp.html

ISO 14000/ISO 14001 Environmental Management Guide, ISO 14000 Environmental Management, Latest Accessed: 27/10/2006, http://www.iso14000-iso14001-environmental-management.com

KalDer, Belgeli Kuruluşlar, Latest Accessed: 13/09/2006, http://www.kalder.org/genel/download/Belgeli%20Kuruluslar/neslibelgelil3.xls

KalDer, Online Yayınlar; Latest Update: 12/11/2002 15:06, Kalitenin Seyir Defteri, “Türkiye’de Kalite Hareketi ve KalDer’in Ortaya Çıkmasına İmkan Veren Koşullar”, Latest Accessed: 05/09/2006, http://www.kalder.org/page.asp?PageID=1285

Karim K., Marosszeky M., Kumaraswamy M., 2005. “Organizational Effectiveness Model for Quality Management Systems in the Australian Construction Industry”, Total Quality Management, Vol. 16, No. 6, August 2005, pp. 793-806

Kloepfer R. J., 1997. “Will the Real ISO 14001 Please Stand Up?”, Civ. Eng. (N.Y.), Vol. 67, No. 11, 1997, pp. 45-47

Kwok, W. I., 1997. “A critical evaluation on the implementation of ISO 9000 in the building industry in Hong Kong”, MBA Dissertation, The University of Hong Kong

Lee, S. F., 1998. “Survey on TQM Implementation in Hong Kong”, In: S.K.M. Ho (Ed.), Proceedings of the 3rd International Conference on ISO 9000 and Total Quality Management (Hong Kong, School of Business, Hong Kong Baptist University), 7-9 April 1998, pp. 386-392

Madenli Ö., 2002. “Quality Assurance System in the Construction Industry: A Research on Perceptions, Expectations and Trends of Turkish Contractors”, Thesis (MSc). Middle East Technical University

O’Connell R., 2004. “Making the Case for OHSAS 18001”, http://www.occupationalhazards.com/Issue/Article/37056/Making_the_Case_for_OHSAS_18001.aspx, Latest Accessed: 19/10/2006, 17 June 2004

Ofori G., Gang G., Briffett C., 2002. “Implementing Environmental Management Systems in Construction: Lessons from Quality Systems”, Building and Environment, Vol. 37, 2002, pp.1397-1407

OHSAS 18001 Health & Safety Zone, “Benefits – How can OHSAS help?”, Latest Accessed: 30/10/2006, www.ohsas-18001-occupational-health-and-safety.com/how.htm

Ott L., 1988. An Introduction to Statistical Methods. PWS-KENT Publishing Company, Boston

Pheng L. S. and Pong C. Y., 2003. “Integrating ISO 9001 and OHSAS 18001 for Construction”, Journal of Construction Engineering and Management, Vol. 129, No. 3, June 1, 2003, pp. 338-347

Phenol L. U., 1994. “ISO 9000: Implementation Problems in the Construction Industry”, Quality World, American Society of Quality Control, May, pp. 2-4

Pun K. F. and Hui I. K., 2002. “Integrating the Safety Dimension into Quality Management Systems: A Process Model”, Total Quality Management, Vol. 13, No.3, 2002, pp. 373-391

School for Champions, Mohsin Nishat, 14 April 2001, “Records Required by ISO 9001”, Latest Accessed: 19/10/2006, www.school-for-champions.com/ISO9000/isorecords.htm

Social Insurance Institution, Statistical Yearbook 2005, Issue No:687

Spivey D. A., 1974b. “Construction Solid Waste”, Journal of the Construction Division, ASCE, Vol. 100, No. 4, 1974b, pp. 501-506

Tse R. Y. C., 2001. “The Implementation of EMS in Construction Firms: Case Study in Hong Kong”, Journal of Environmental Assessment Policy and Management, Vol. 3, No. 2, June 2001, pp. 177-194

Turk A. M., 2006. “ISO 9000 in Construction: An Examination of its Application in Turkey”, Building and Environment, Vol. 41, No. 4, April 2006, pp. 501-511

Valdez H. E. and Chini A. R., 2002. “ISO 14000 Standards and the U.S. Construction Industry”, Environmental Practice Journal, Vol. 4, No. 4, 202, pp. 210-219

Warren F. H., 1973. “Environmental Impact on Project Schedules”, Journal of Professional Activities, ASCE, Vol. 99, No. 3, 1973, pp. 299-306

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, Vol. 13, No. 3, 2002, pp. 284-297

Zuckerman A., 1999. “Winning numbers: ISO 9000 and TC-176 meet Y2K”, Journal for Quality and Participation, September/October 1999

APPENDICES

A. QUESTIONNAIRE

ISO 9001 QUALITY, ISO 14001 ENVIRONMENTAL AND OHSAS 18001 OCCUPATIONAL HEALTH AND SAFETY MANAGEMENT SYSTEMS PRACTICES IN THE CONSTRUCTION SECTOR IN TURKEY

In Turkey, practices due to 3 different Management Systems are applied in the construction sector in Turkey. These systems are basicly applied for the benefit of the companies but there are also negative effects in certain aspects This research is conducted to reveal the point of view for these Management Systems' practices of the companies which are active in the construction sector.

The questions in the questionnaire are not asked based on a particular project. Questions are designed to reveal the point of view for these Management Systems of your Company in general.

All the answers you have given and all the data obtained afterwards will be evaluated in the secrecy rules and they will only be used for academic purposes. In this extent, company and person names are not necessary and important.

1.0. COMPANY INFORMATION:

1.1. Scope of business: (You may choose more than one)

☐Pipelines (Oil, Natural gas, etc.)
☐Industrial Plants (Chemical plants, Refinery, Factory, etc.)
☐Infrustructure Projects (Sewer, Drinking Water Treatment Plant, etc.)
☐Transportation Projects (Highway, Railway, etc.)
☐Dam
☐Residence Projects (House, Hotel, School, etc.)
☐Energy Projects (Nuclear, Hydroelectric plants, etc.)
☐Marine Structures (Harbour, Breakwater, etc.)
☐Other, please specify…

1.2. Activation area: (You may choose more than one)

☐Local
☐International

1.3. Total personnel number: (including headquarters and sites)

☐less than 100
☐100-500
☐500-1500
☐more than 1500

1.4. Annual turnover of construction works:

☐less than 1 million USD
☐1-10 million USD
☐10-100 million USD
☐100-1,000 million USD
☐more than 1,000 million USD

2.0. PERSONAL INFORMATION:

2.1. Position in the Company:

2.2. Have you personally experienced the practice of Management System(s) at the site and/or in the office?

☐Yes
☐No

3.0. MANAGEMENT SYSTEMS:

3.1. Which of the following Management Systems are practiced in your Company? (You may choose more than one)

☐ISO 9001:1994
☐ISO 9001:2000
☐ISO 14001
☐OHSAS 18001

3.2. If ISO 14001 Environmental Management System is not practiced in your Company, do you consider to apply in the future?

☐Yes
☐No

3.3. If OHSAS 18001 Occupational Health and Safety Management System is not practiced in your Company, do you consider to apply in the future?

☐Yes
☐No

4.0. ISO 9001 QUALITY MANAGEMENT SYSTEM:

4.1. Which of the following motivated your Company to establish ISO 9001 Quality Management System? (You may choose more than one)

☐As a part of the improvement strategy (vision)
☐To gain competitive advantage in the international markets
☐To improve the quality of work done
☐To meet customer expectations
☐To qualify to tender for local projects
☐To qualify to tender for international projects
☐To reduce cost of work
☐Other, please specify…

4.2. How much time have you spent before ISO 9001 Quality Management System is started practicing in your Company effectively (during the ISO 9001 certification process)?

☐1-6 month
☐6-12 month
☐1-2 years
☐more than 2 years

4.3. How much money totally have you spent before ISO 9001 Quality Management System is started practicing in your Company effectively (during the ISO 9001 certification process)? (including audits, certification, structuring inside the Company, etc.)

☐1.000-5.000 USD
☐5.000-10.000 USD
☐10.000-50.000 USD
☐50.000-100.000 USD
☐more than 100.000 USD

4.4. ISO 9001 Quality Management System outcomes:

The table below shows possible positive and negative outcomes of implementing ISO 9001 Quality Management System. Based on your experience or perception, please state your opinion for each of the following items.

Outcomes	**Totally agree**	**Agree**	**Neutral**	**Disagree**	**Totally Disagree**
Less rework or repair	☐	☐	☐	☐	☐
More paperwork (documentation)	☐	☐	☐	☐	☐
Easier qualification to tender for local projects	☐	☐	☐	☐	☐
Increased bureaucracy in the Company	☐	☐	☐	☐	☐
Increased efficiency in the Company and for the projects	☐	☐	☐	☐	☐

Continual improvement in the Company and for the projects	☐	☐	☐	☐	☐
Less problems in the defects liability period of the projects	☐	☐	☐	☐	☐
Faster and easier acceptance of the projects	☐	☐	☐	☐	☐
High initial investment cost in the certification process	☐	☐	☐	☐	☐
Increased expense in the projects	☐	☐	☐	☐	☐
Improved internal communication	☐	☐	☐	☐	☐
Improved external communication	☐	☐	☐	☐	☐
Dissatisfaction of the employee due to additional work	☐	☐	☐	☐	☐
Easier qualification to tender for international projects	☐	☐	☐	☐	☐
More systematic record keeping	☐	☐	☐	☐	☐
Increased client satisfaction	☐	☐	☐	☐	☐
Less flexibility in operation	☐	☐	☐	☐	☐
More work opportunities at the overseas markets	☐	☐	☐	☐	☐
Decreased project completion times	☐	☐	☐	☐	☐
More time spent in management due to additional work	☐	☐	☐	☐	☐
Clear understanding of the client for the quality of work done	☐	☐	☐	☐	☐
Improved quality of subcontractors and suppliers	☐	☐	☐	☐	☐
Hard to understand the conditions of the Standard	☐	☐	☐	☐	☐
More expenses spent for the education of personnel	☐	☐	☐	☐	☐

4.5. In general, do you think that the advantages you get by establishing and practicing of ISO 9001 Quality Management System more than its disadvantages?

☐Yes
☐No

4.6. In general, do you think ISO 9001 Quality Management System is a useful instrument for your Company?

☐Yes
☐No

5.0. ISO 14001 ENVIRONMENTAL MANAGEMENT SYSTEM: (Will be answered only by the Companies that apply the Management System)

5.1. Which of the following motivated your Company to establish ISO 14001 Environmental Management System? (You may choose more than one)

☐As a part of the improvement strategy (vision)
☐To gain competitive advantage in the international markets
☐To meet customer expectations
☐To qualify to tender for local projects
☐To qualify to tender for international projects
☐As a part of the risk management
☐Other, please specify…

5.2. ISO 14001 Environmental Management System outcomes:

The table below shows possible positive and negative outcomes of implementing ISO 14001 Environmental Management System. Based on your experience or perception, please state your opinion for each of the following items.

Outcomes	**Totally agree**	**Agree**	**Neutral**	**Disagree**	**Totally Disagree**
Increased efficiency in the Company and for the projects	☐	☐	☐	☐	☐
Increased quality throughout the Company in general	☐	☐	☐	☐	☐
High initial investment cost in the certification process	☐	☐	☐	☐	☐
Increased Company profit	☐	☐	☐	☐	☐
Higher Company prestige	☐	☐	☐	☐	☐
Decreased project completion times	☐	☐	☐	☐	☐
More operational burden	☐	☐	☐	☐	☐
Protection of the environment and increased consciousness on this concept	☐	☐	☐	☐	☐
High expenses in practice	☐	☐	☐	☐	☐
Increased client satisfaction	☐	☐	☐	☐	☐
Easier qualification to tender for local projects	☐	☐	☐	☐	☐
Easier qualification to tender for international projects	☐	☐	☐	☐	☐
More paperwork (documentation)	☐	☐	☐	☐	☐
More expenses spent for the education of personnel	☐	☐	☐	☐	☐
More work opportunities at the overseas markets	☐	☐	☐	☐	☐
Increased occupational safety	☐	☐	☐	☐	☐
Easier getting permits for environemental issues	☐	☐	☐	☐	☐

5.2. In general, do you think that the advantages you get by establishing and practicing of ISO 14001 Environmental Management System more than its disadvantages?

☐Yes
☐No

5.3. In general, do you think ISO 14001 Environmental Management System is a useful instrument for your Company?

☐Yes
☐No

6.0. OHSAS 18001 OCCUPATIONAL HEALTH AND SAFETY MANAGEMENT SYSTEM: (Will be answered only by the Companies that apply the Management System)

6.1. Which of the following motivated your Company to establish OHSAS 18001 Occupational Health and Safety Management System? (You may choose more than one)

☐As a part of the improvement strategy (vision)
☐To gain competitive advantage in the international markets
☐To meet customer expectations
☐To qualify to tender for local projects
☐To qualify to tender for international projects
☐As a part of the risk management
☐Other, please specify…

6.2. OHSAS 18001 Occupational Health and Safety Management System outcomes:

The table below shows possible positive and negative outcomes of implementing OHSAS 18001 Occupational Health and Safety Management System. Based on your experience or perception, please state your opinion for each of the following items.

Outcomes	**Totally agree**	**Agree**	**Neutral**	**Disagree**	**Totally Disagree**
Increased efficiency in the Company and for the projects	☐	☐	☐	☐	☐
Increased quality throughout the Company in general	☐	☐	☐	☐	☐
High initial investment cost in the certification process	☐	☐	☐	☐	☐
Increased Company profit	☐	☐	☐	☐	☐
Higher Company prestige	☐	☐	☐	☐	☐
Decreased project completion times	☐	☐	☐	☐	☐
More operational burden	☐	☐	☐	☐	☐

High expenses in practice	☐	☐	☐	☐	☐
Increased client satisfaction	☐	☐	☐	☐	☐
Increased employee satisfaction	☐	☐	☐	☐	☐
Easier qualification to tender for local projects	☐	☐	☐	☐	☐
Easier qualification to tender for international projects	☐	☐	☐	☐	☐
More paperwork (documentation)	☐	☐	☐	☐	☐
More expenses spent for the education of personnel	☐	☐	☐	☐	☐
More work opportunities at the overseas markets	☐	☐	☐	☐	☐
Increased occupational safety	☐	☐	☐	☐	☐
Decreased occupational accidents	☐	☐	☐	☐	☐

6.3. In general, do you think that the advantages you get by establishing and practicing of OHSAS 18001 Occupational Health and Safety Management System more than its disadvantages?

☐Yes
☐No

6.4. In general, do you think OHSAS 18001 Occupational Health and Safety Management System is a useful instrument for your Company?

☐Yes
☐No

6.5. If Quality, Environmental and Occupational Health and Safety Management Systems are all practicing in your Company, do you manage to integrate these systems?

☐Yes
☐No

6.6. Do you rather prefer a Management System comprising all the systems together?

☐Yes
☐No

Thank you for your concern, co-operation and effort.