University of Twente
KEMA Quality

ISO certification in Chinese electrotechnical and ICT industries

Drivers, barriers and benefits

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KEMA

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Preface

This report is the result of the research done for my graduation study for the Master of Business Administration at the University of Twente in collaboration with KEMA Quality BV.

The preparation of this report would not have been possible without the support and guidance of my supervisors from the University of Twente and from KEMA Quality BV. I would like to thank Dr. Huub Ruël for encouraging and inspiring me in setting up and executing the research and for assisting me during the process at any time. Moreover, I would like to thank Dr. Peter Schuur for his role in optimizing the report and for his critical remarks. Of course I also would like to thank Ir. Jan van Lochem for his trust and motivation during my time spend at KEMA Quality.

I am grateful to all the people at KEMA Quality, in the Netherlands as well as in China, who were willing to share and provide information and insights regarding the organization, ISO certification and China. Further I would like to thank all the participating companies for their time and efforts spend in providing information about their experiences with ISO certification.

Last but not least, I would like to express my gratitude to my family and friends who have supported and helped me though my education and thesis.

Monica Pibia

Enschede, July 2009

Executive summary

Background and problem formulation

China is the one of the world's fastest growing economies and its growth affects many international business decisions. The country is of increasing importance in international trade, and one of the issues involved with this is the need for monitoring quality. This is especially relevant in a country as China because its exceptional size influences significantly many industrial sectors and, secondly, because the label 'made in China' was usually seen as indicator of poor quality and cheap products. Even though the Chinese industries evolve rapidly, revealing increased innovative power and high-end technologies, recent international quality scandals (like the case of the Mattel toys and the 'milk powder scandal') affect the image of Chinese quality in a very negative way. The concept of quality knows different interpretations and a constant quality is not obvious in many parts of the world. Therefore, also Chinese companies are getting more involved in communicating quality to their export partners. One way to address the quality issue is *certification* of the management system of the enterprise by an independent body. The ISO standards lend themselves perfectly for this purpose because they are internationally recognized and the implementation of the ISO standards guarantee a minimum level of a quality management system.

The ISO management standards are designed to monitor the quality of the management system. Companies and international organizations attach credence to standardized management standards which aim to preserve a continuous quality of the output. There are two different types of ISO management standards. The ISO 9000 series concern quality management and focus on the customer requirements and satisfaction and the continual improvement of the organization's performance. The ISO 14000 series addresses various aspects of environmental management.

The ISO standards are not mandatory and this raises the question why a company would spend efforts in getting certification. International trade certainly is relevant, especially in times of globalization, but which other reasons are involved and what role do they play? Which deterrents exist when a company considers ISO certification? It is also interesting to know if companies reach their goals once the ISO standards are successfully implemented. Much research is carried out about these topics. However, as Pan (2003) points out, it is remarkable that, although ISO certification stands for international standardization, much of the research on ISO certification is done on a national level. Very little is known about ISO certification in the Chinese context.

The lack of knowledge about ISO certification in the Chinese context is a problem for international certification bodies, because the motivations for deciding for ISO certification influence the strategic decisions of the certification bodies. One of these certification bodies is KEMA Quality, a business unit of KEMA NV. Its customers have become increasingly multinational and have moved their production facilities, among others, to China. These customers have initially been served from Business Teams in Europe (Netherlands, Poland, Italy, and Czech) and the USA. But, due to the high costs, the urgency for local presence became progressively more significant. The business line KEMA Quality Systems, responsible for management system certification, is represented in China with offices in four different cities; however, its activities are more or less ad hoc and are

not profitable enough. For these reasons, KEMA Quality Systems is deciding on the strategy to adopt for the Chinese market.

In order to find out how ISO certification is experienced by Chinese companies the following research question is formulated:

Which elements can be defined as drivers and barriers for ISO certification and which are the perceived benefits in Chinese companies?

Two delimitations of the research have to be considered: (1) the ISO certifications discussed in the report are only the ISO 9000 series, the ISO 14000 series and, the non-ISO standard, OHSAS 18000 series; (2) the Chinese companies on which the research focuses are active in the semi-conductor industry, the electronic and electrotechnical industries and the software industry.

Model for ISO certification

In order to assess the Chinese perception on ISO certification, a model is constructed based on the existing literature on ISO certification. This model is tested in Chinese companies in the industries of interest.

A comprehensive literature research learns that the motives, or drives, for ISO certification can be classified in two ways: internal and external motivations. The internal motivations reflect an aspiration for certification driven by the desire of quality or environmental performance improvement. External motivations are related to pressures from outside the organization, mostly related to customers or commercial factors. The external drives can be subdivided into 'legal and institutional pressures', 'competitiveness' and 'stakeholders pressures'.

Four different types of deterrents for ISO certification can be recognized. These are the existence of better alternatives, the costs of certification, the risk of competitive disadvantage and the regulatory inflexibility.

Like the drivers for ISO certification also the benefits of the implementation of the standards can be classified into two groups: internal and external benefits. The internal benefits generally refer to improvements in the (production) process, quality and costs, or related to the human resource area. Therefore, the internal benefits can be subdivided into 'internal efficiency' and 'HR and managerial processes'. The external benefits are related to the market performance or the contact with customers. The external benefits can be subdivided into 'competitiveness', 'external orientation', 'societal' (for the ISO 14000 series) and 'financial'.

Not all companies have the same motivations for pursuing ISO certification, and not all perceive the same benefits after obtaining certification. Literature search shows that different subgroups of drivers have as a result different subgroups of benefits. These relations are shown in figure I.

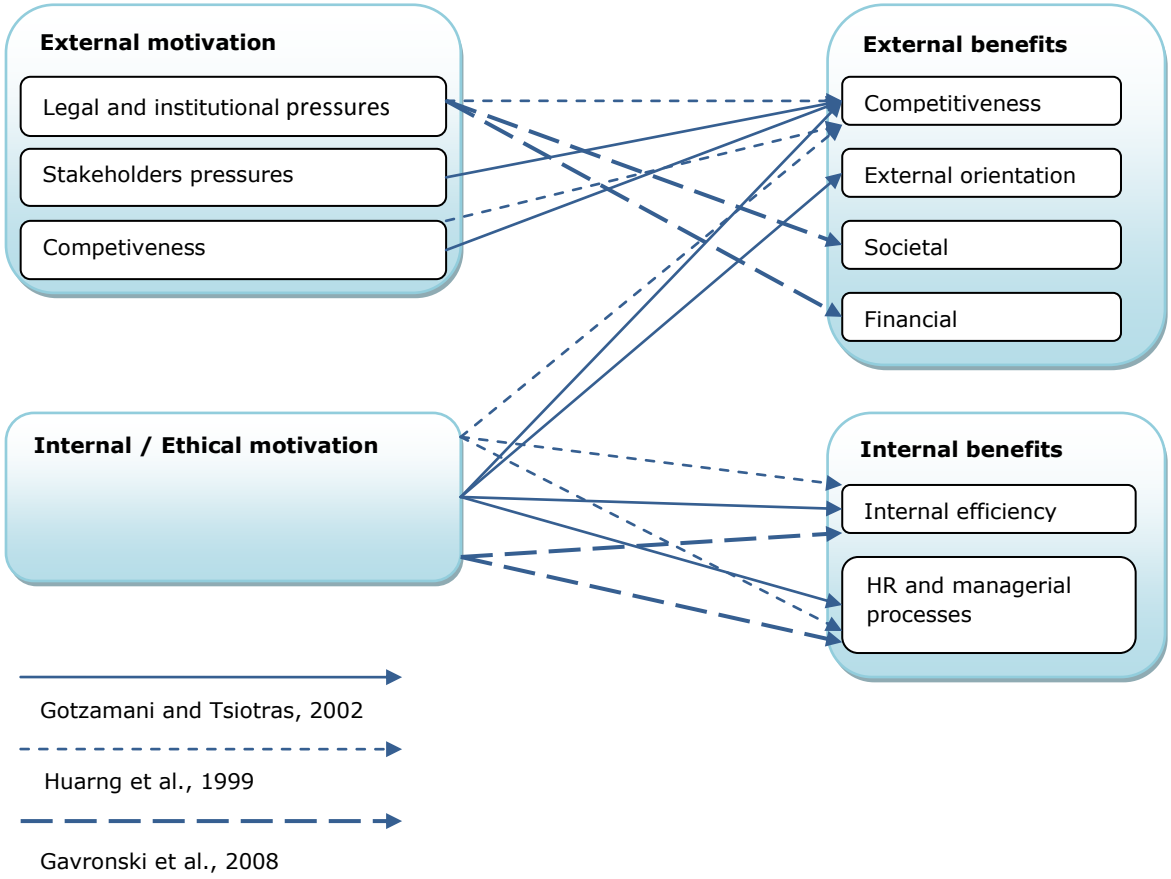

Figure I. Relation between subgroups of motivations and subgroups of benefits

It is remarkable to observe that internal motivations lead to a broader spectrum of results than the external motivations do, which lead only to external benefits. This outcome is in line with the point of view of Terziovski and Power (2007, p. 142) who state that: *"… organizations that pursue ISO 9000 certification willingly and positively across a broad spread of objectives are more likely to report improved organizational performance than those organizations that are pursuing ISO 9000 certification in a reactionary mode due to customer pressure"*.

Outcomes, conclusions and recommendations

The model constructed based on the theory is tested in Chinese companies in the semi-conductor industry, the electronic and electrotechnical industries and the software industry through interviews and a survey.

The results of the survey confirm just four causal relations of the fifteen predicted based on the literature, and reveals one new relation. The confirmed relations are those between 'stakeholders pressures' and competitiveness (external benefit); between competitiveness (external motivation) and competitiveness (external benefit); between 'internal motivation' and 'internal efficiency' and between 'internal motivation' and 'HR and managerial processes'. A new relation was found between competitiveness (external motivation) and 'external orientation'. The results also confirm a clear distinction between the internal variables (drivers as well as benefits), but do not confirm the assumption which states that internal motivation cover a broader spectrum of benefits than external motivations do.

The interviews with two Chinese companies and experts revealed more information about the importance of the drivers, the benefits and the deterrents as well as on the Chinese context. Based on this information, and the information from the survey, the following conclusions can be drawn:

- The Chinese government stimulates the adoption of ISO 9000 certification and ISO certification is never compulsory; yet the degree of involvement differs in the different provinces. No information is found on the attitude of the government towards the ISO 14000 and OHSAS 18000 standards.

- Major drivers for ISO certification in China have to be recognized in the external drivers, such as customers' pressure and export. This can be explained by two reasons, depending on the type of company.
  In the first case, companies use other tools for monitoring the quality of the management system which guarantees them a high level of quality. In fact, their management systems exceed the quality level provided by the ISO standards. These types of companies have ISO certification because it is an international recognized quality standard for system management, which is often required by customers. For these companies, the ISO certificate is very easy to acquire; however, the costs involved in getting certificated can act as a barrier for these companies. Not as much the design and maintaining costs, as well as the registration costs. Another barrier is the time spent getting a certificate; think for example of time used in making adaptations in the documents and time spent in audits.
  In a second case companies do have ISO certification only to show a piece of paper to their customers and are not so much interested in improving the quality of the management system. In fact, the literature, as well as the qualitative research and the quantitative research, do not provide evidence of a relation between the external motivations for ISO certification and actual improvements in the process or the product (internal benefits).

- ISO certification is supposed to be an indication of a minimum level of quality of the management system; however, the level of quality can vary substantially from company to company even if all ISO certified. This explains the increasing interest of customers for product certification.

- The main deterrents for ISO certification are the costs involved and the time and energy put into implementing and maintaining the certificate.

- Companies which gain ISO certification because of external reasons are more likely to obtain external benefits. It is also true that there is a relation between the internal reasons for choosing ISO certification and the internal benefits perceived by the company. This seems to be true especially for those companies which use the ISO standard as a start for improving the quality of the management system.

Based on the findings it looks like Chinese companies approach ISO certification in various ways, some of them are driven by a genuine goal of improving their quality; other companies are driven by factors coming from the market, especially the requirements of customers. This influences the strategic decisions of KEMA Quality; therefore, the following recommendations are made:

- In order to be successful in China, KEMA Quality should discover the niche in the market; those companies who recognize the importance of optimizing their management system.

- KEMA Quality should express their added-value and unique selling points in money and give some successful examples of the KEMA Quality approach.

- Use the KEMA brand for companies involved in business with Dutch companies of export to the Netherlands. Use also the existing connections with KEMA partners in different countries to expand the network.

- Use the existing KEMA Quality clients in order to broader the network. Look at clients of KEMA Quality products as well as KEMA Quality Systems. Explore the possibilities of using the supply chain of these clients.

- KEMA Quality should use its network to inform about the environmental standards and promote these, as the interest for environmental responsibility is globally increasing.

- KEMA Quality should adapt their staff further in order to be able to reduce as far as possible the gap between the European and the Chinese culture.

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1. Introduction

1.1 Background

China is one of world's fastest growing economies from the time when, in 1979, the country passed from an economy in which the state controlled most aspects of the economy to an open economy in terms of trade and investments. Foreign multinationals started to move their production sites to China in order to have access to the enormous amount of human resources at low wages. Due to the foreign investments and know-how and economic reforms, China is able to develop its industry very rapidly, increasing its productivity, which leads to increased outputs every year.
Labeling the 'made in China' (see also section 2.1) as cheap and of poor quality is nowadays superseded. European and American customers and enterprises become increasingly more aware of the innovative power of Chinese companies and their delivered high-quality. Chinese enterprises and the Chinese government are becoming more conscious about how to improve the quality of their products.

Optimizing the quality of the products delivered by a company can be achieved, among other things, by optimizing the management system of a company. This can have a positive effect not only on the product quality but also on the quality of for instance the internal and external communication, the job responsibilities etc. In order to monitor the management system a company can use the ISO standards as a guideline. There are two types of ISO standards: one types refers to products, the other type concerns management systems. Both types of ISO standards are internationally recognized and aim to improve the communication of quality and features of products between different companies in different countries.
A company can be certificated for the ISO management standards (ISO 9000 and ISO 14000). The implementation of the standards guarantees the company with a minimum level of quality concerning the management system; certification of the ISO standard is a signal to the external stakeholders. Since the introduction of the ISO management standards and the possibility of certification, the popularity of the standards knows a rapid growth in Europe and subsequently also in other parts in the world.

With the growth of the popularity of the ISO management standards, the academic interest in the effects of certification increased as well. These studies initially focused on the motivations that companies have to implement ISO certification (see e.g. Anderson et al., 1999; Prakash and Potoski, 2006) and, later, on the benefits the company gains from certification (see e.g. Beattie and Sohal, 1999; Santos and Escanciano, 2002). Some authors considered also the barriers for getting ISO certification (see e.g. Anderson et al. 1999; Delmas, 2002). Different attempts are made to reveal the relations between different motivations for ISO certification and the benefits perceived by companies (see e.g. Gavronski et al., 2008; Huarng et al., 1999).
Many of these studies are carried out in European countries and some in the United States. A few studies are cross-country studies (see e.g. Guler et al., 2002; Corbett, 2006; Albuquerque et al., 2007), these studies focus mainly on the diffusion of the ISO standards (see also section 2.3) and not so much on the motivations and benefits. Very little is known about the perception of ISO certification in Asian countries, and especially China. The main studies are those of Zeng et al. (2002) and Zeng et al. (2005) and these refer mainly to the Chinese construction industry.

The little knowledge of the perception of Chinese companies about ISO certification influences negatively the internationalization of companies interested in the Chinese market. In fact, the rapid growth of the Chinese economy affected the strategy of many companies in Europe and in the United States as well. One of these companies is KEMA Quality. KEMA Quality is a business unit of KEMA NV and its operations are directed towards preserving and improving the quality of products and processes. Clients of KEMA Quality are multinationals in high-end markets in the semi-conductor, electronic, electrotechnical and software industries like Philips, Motorola and Atos Origin, but also many local organizations ranging from industrial, health, construction and governmental organizations.

Many customers of KEMA Quality have become increasingly multinational, and have moved their production facilities, among others, to China. These customers have initially been served from Business Teams in Europe (Netherlands, Poland, Italy, and Czech) and the USA. But, due to the high costs, the urgency for local presence became progressively more significant. Therefore, KEMA Quality has established offices and some testing laboratories in Hong Kong, Guangzhou, Shanghai, Shenzhen and Wenzhou. These offices are engaged in testing and product certification as well as in system certification.
The business line Quality Management Systems and Inspections (KEMA Quality Systems) is an integral part of the global KEMA Quality organization and focuses on system certification, like for example ISO certification. The business line is represented in China with offices in four different cities (figure 1.1); however, its activities are more or less ad hoc and are not profitable enough.

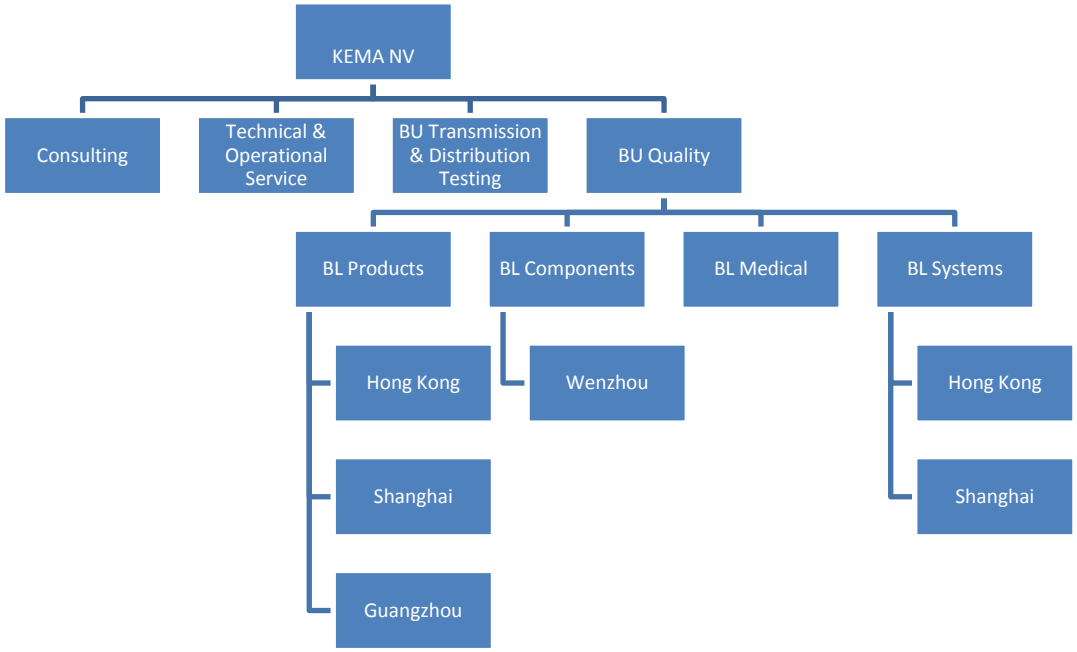

Figure 1.1 Organizational chart KEMA Quality with offices in China

KEMA Quality is in the middle of the process of deciding on the strategy to adopt in China for its quality system certification activities. In order to decide on the strategy for KEMA Quality Systems it is important to know how Chinese companies experience system certification and what their motives are for becoming certificated.

As stated previously, KEMA Quality Systems' focus is on dedicated clients in the high-end segments of the market. These clients choose KEMA Quality because of their willingness to improve the quality of their systems. However, a review of the literature shows that there are also other reasons for companies to obtain system certification, like international trade and consumer pressure (see e.g. Albuquerque, 2007; Prakash and Potoski, 2006). Little is known about the perception of ISO certification in China, especially for the industries which KEMA Quality Systems is interested in. The drivers for ISO certification influence the selection procedure of companies with regard to the certification body; therefore it is possible that KEMA Quality has to adapt its strategy to the circumstances of the market if it wants to do business in China.

1.2 Objectives

The purpose of the assignment is to determine how system certification, ISO in particular, is perceived by Chinese companies in terms of motivations, barriers and benefits.

The research should include a description of the Chinese context and its role in the system certification process. This will be, where necessary, segmented per type of ISO certification.
The research will also include a description of the different drivers and benefits, and their importance for Chinese firms in the semi-conductor industry, the electronic and electrotechnical industries and the software industry.

The information can be used by KEMA Quality Systems to make well funded decisions about the strategy to adopt in China.

1.3 Problem formulation

Based upon the background of the research and the formulated objective, the research question is defined as follows:

Which elements can be defined as drivers and barriers for ISO certification
and which are the perceived benefits in Chinese companies?

The delimitations of the research are the following:

- The ISO certifications discussed in the report are only the ISO 9000 series, the ISO 14000 series and, the non-ISO standard, OHSAS 18000 series.
- The Chinese companies on which the research focuses are active in the semi-conductor industry, the electronic and electrotechnical industries and the software industry.

1.4 Theoretical background

The types of ISO certifications that are discussed in this paper are the ISO 9000 series, the ISO 14000 series and the non-ISO standard OHSAS 18000 series.
The International Organization for Standardization (ISO) is a non-governmental organization that develops standards for products and management systems. The adoption of ISO standards is entirely voluntary, and certification is not mandated by legislation. ISO 9000 and ISO 14000 are generic management system standards (ISO, 2008). The first one is a sequence of requirements for the quality of management systems and the second one is a sequence of requirements about the environmental system in a company. The OHSAS 18000 series

concern the occupational health and safety in companies, they are structured in the same way as the ISO 9000 and ISO 14000 series.

As stated above certification of the ISO standards is not mandated, companies can use them also without controls from third parties. However, almost 900.000 ISO 9001:2000 certificates have been issued up to the end of December 2006 and, according the statistics, this number is increasing every year (The ISO survey – 2006). Also Albuquerque et al. (2007) believe that ISO certification will expand more, due to the globalization that causes an increasing density of interfirm networks. If the standards are not imposed and certification is not essential, there have to be other motivations that explain the success of the ISO standards and the certification of them. So the question is what drives firms to adopt the ISO management standards and which results do they observe.

In answering the main question it is important to know which drivers and benefits for ISO certification are described in the literature and what their relative weight is. It is also relevant to review in which way the government, or other institutions, influence the system certification market. These two different elements will provide a framework to which the Chinese system certification market can be assessed.
Companies pursue ISO certification for different reasons. The reason can be of economical nature, such as trade and export (Albuquerque et al., 2007; Guler, et al., 2002; Prakash and Potoski, 2006; Christmann, and Taylor, 2001), or of a managerial nature, such as improving the quality of management (Zeng et al., 2002; Anderson, 1999) or improving environmental performance (Fryxell and Szeto, 2002; Raines et al., 2002). Other aspects can also play a role in the decision process like geographical issues (Albuquerque et al., 2007; King et al., 2005), cultural issues (Albuquerque et al., 2007; Prakash and Potoski, 2006) or market related issues, such as reputation (Fryxell and Szeto, 2002; Anderson, 1999), green marketing (Raines et al., 2002) and previous experience with ISO (Prakash and Potoski, 2006) or other standards (King et al, 2005; Delmas and Montiel, 2008).
Companies experience also different benefits after ISO certification is obtained. These benefits can relate to the internal processes of the company (Gotzamani and Tsiotras, 2002; Santos and Escanciano, 2002) or the managerial procedures (Santos and Escanciano, 2002). Also the benefits can be of an economical nature, such as increased competitiveness (Singels et al., 2001).

Various institutions support system certification, particularly the ISO standards, and encourage the diffusion of it. The Chinese government promotes ISO 9000 (Ross, 1998) and the WTO promotes standardization among their members through the 'Agreement on technical barriers to trade' (ISO/IEC Information Centre, 2008). Initially this agreement was meant only for product standards, but is now also used for standards for management systems. According to Potoski and Prakash (2004) the level of involvement in non-governmental organization networks influences the number of ISO 14001 certificates. From this perspective it is possible to define the institutions as a mediating factor for companies when deciding for ISO certification. They play a proactive role in promoting international standard setting because of the benefits for international trade, but do not force companies to certification.

Apart from the academic research, practical experiences of KEMA Quality employees suggest that an important feature in choosing certification is that suppliers are requested to be ISO certificated in order to guarantee a minimum level of quality.

1.5 Research questions

The literature reveals a relation between the government and other institutions and the adoption of ISO certification. In order to explore the Chinese context in relation to ISO certification, the following research question is formulated:

1. *What are the characteristics of the Chinese context in relation to ISO certification?*
   1a. What is the attitude of the Chinese government towards ISO certification?
   1b. What is the attitude of NGOs present in China towards ISO certification?

Once the Chinese context is known, the drivers and barriers and their relative importance for Chinese companies can be identified. Therefore the following research question is formulated:

2. *How do the different elements described in the literature affect the decisions concerning ISO certification in Chinese companies?*
   2a. According certificated Chinese firms.
   2b. According experts.
   2c. Are there more and different drivers in China?

Next the perceived benefits and their relative importance for Chinese companies can be identified. Therefore the following research question can be formulated:

3. *Which benefits of ISO certification described in the literature are perceived by Chinese companies?*
   3a. According certificated Chinese firms.
   3b. According experts.
   3c. Are there more and different benefits in China?

The results of the first three research questions can be reflected to the strategy for KEMA Quality when expanding in the Chinese market. Therefore the following research question is formulated:

4. *How do the previous findings influence the strategic decisions of KEMA Quality?*
   4a. What are KEMA Quality unique selling points and what is their importance in the Chinese certification market?

1.6 Research methodology

The aim of the research is to determine which motivations for ISO certification are relevant in the Chinese market and which benefits are perceived by Chinese companies; therefore, it is inductive of nature. The research has as starting point the motivations and benefits for companies to gain an ISO certificate described in the literature, these are often country or industry specific and not generalized. It is, thus, possible that the Chinese context offers different insights then already known. The research can be defined as a testing study: the insights highlighted in the existing literature are examined in a different context. A literature research is in this case not sufficient because of the lack of specific information for the Chinese industries on which the research focuses. Therefore, is chosen to conduct a case study, which is appropriate *"to explore those situations in which the intervention being evaluated has no clear, single set of outcomes"* (Yin, 2003, p. 15). Yin (2003, p.13-14) gives the following technical definition of a case study:

"A case study is an empirical inquiry that investigates a contemporary phenomenon within its real-life context, especially when the boundaries between phenomenon and context are not clearly evident. The case study inquiry copes with the technically distinctive situation in which there will be many more variables of interest

than data points, and as one result relies on multiple sources of evidence, with data needing to converge in a triangulating fashion, and as another result benefits from the prior development of theoretical propositions to guide data collection and analysis."

This definition clarifies the intention to intentionally cover contextual conditions and the need for an all-encompassing method. In order to analyze the different perspectives of the subject a multiple case study will be carried out, in which various groups will be interviewed. These groups are, as described above, ISO certificated companies and experts. In this way the advantage of triangulation is applied, like described by Yin in the definition of a case study. Triangulation compares different perceptions of the same behavior (Dooley, 2001). In addition to the case study, a survey is carried out. The goal of the survey is to gather as much different data as possible and thereby have the possibility to test the literature in the most reliable way possible.

The data collection occurs by interviews, observations and a questionnaire, and hence, provides quantitative data as well as qualitative data.

1.7 Research structure

The first part of the research is an introductory chapter in which the background, objectives research questions and methodology are highlighted. Next, a literature review is conducted to create a framework in analyzing the research topic. Recent studies in the field of system certification, especially motivations and barriers in seeking ISO certification and perceived benefits, are explored in order to gain insight in the problem and the applicability for the Chinese market. The data collection and analysis are carried out based on the interviews and a survey. The findings are discussed and conclusions are drawn in order to answer the main question of the research and suggestions for further research are made. Finally, the meaning of the conclusions can be reflected to the company. The research structure can be schematized as follows (figure 1.2, adapted from Yin, 2003, pp. 50):

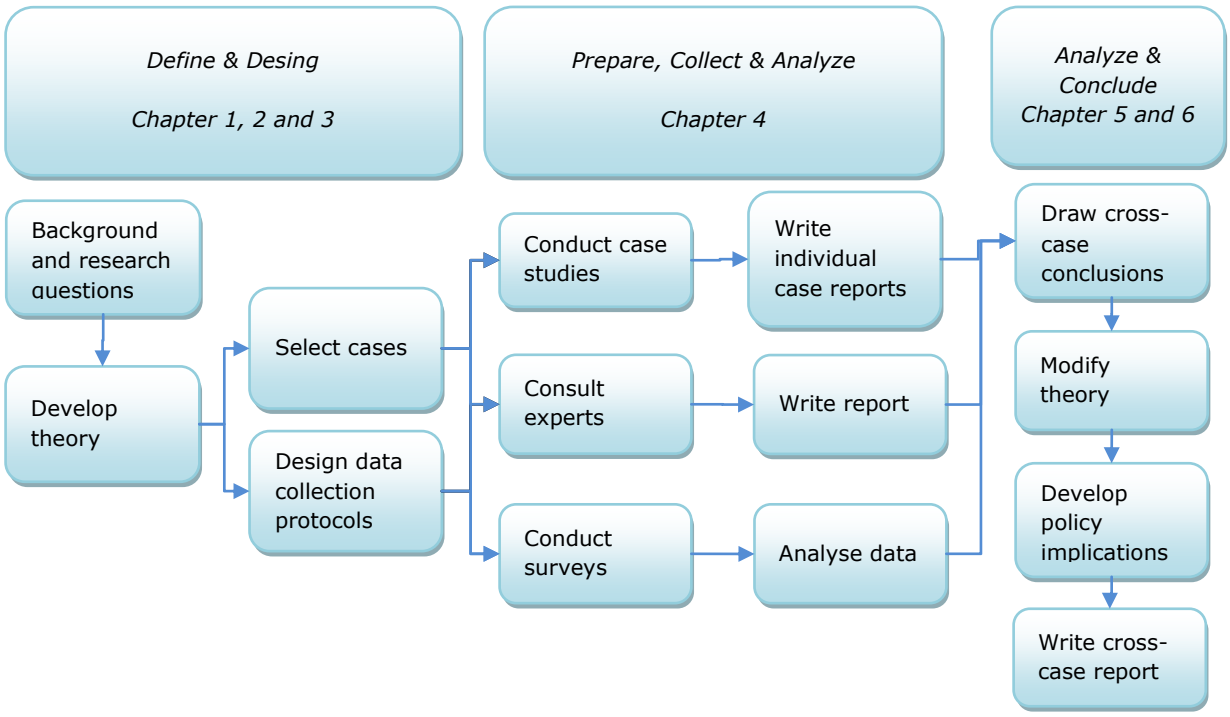

Figure 1.2 Research structure

2. Theoretical framework

The goal of the chapter is to construct a model of the motivations, barriers and benefits for ISO 9000 and ISO 14000 certification to test in the Chinese context. Therefore, this chapter starts with giving some background information about the country of interest of the research (section 2.1), and about ISO certification in general (section 2.2). Next, the literature is examined about the motivations for ISO certification (section 2.4); the barriers for ISO certification (section 2.5) and the benefits of ISO certification (section 2.6). Finally, in section 2.7, the relation between the different types of motivations and different types of benefits is described.

2.1 China

It is impossible these days to imagine a world economy without China. In 1978 Deng Xiaoping started to focus on a market oriented economic development and, by 2000, the output had quadrupled (CIA World Factbook, 2008). The open-door policy of China has encouraged a tremendous inflow of foreign direct investment together with the related technology and management know-how (Chin et al., 2001).

The country has the second highest export rate ($ 1,220 billion in 2007) after Germany and before the United States (CIA World Factbook, 2008). China ranks also second in terms of GDP ($7,099 billion in 2007), after the United States and before Japan. However, because of the large population, the GDP per capita ($ 5,400) is low compared to the United States ($ 45,800) and Germany ($34,100).

The country has an enormous manufacturing power, due to the efficient factories, access to human capital and cheap labor (Block, 2008). Manufactured goods account for 94.5% of exports; two decades ago this was only 50%. The manufacturing power concentrates on a vast number of industries: from automobiles to toys and from textile to satellites. Of course also the electronic, telecommunications equipment and ICT industries are present in China. The industrial developments are manly concentrated on the coastal areas. However, the government is trying to distribute the industry more equally among the country, developing the infrastructure in the coastal zones and concentrating in these areas on the development of high-tech and innovative production facilities.

China is putting great efforts in changing the image of the ‘made in China’ mark, which in the past often evocated ideas about cheap products with questionable quality. China recognizes the importance of quality for export products and the government plays a directive role in shaping the context and institutional structure of Chinese enterprises in order to promote higher quality (Chin et al., 2001). Unfortunately, China still reaches the international press at times because of a lack of quality. Recent examples are the case of Mattel recalling 18 million toys in 2007, and the ‘milk powder scandal’ in October 2008.

2.2 Standardization and ISO

The case of China indicates how the internationalization of the markets influences the need for standardization, especially when it concerns quality. Due to the increasing international trade, product standards became more and more important. The same goes for standards regarding management processes. Companies and international organizations attach credence to standardized management standards which aim to preserve a continuous quality of the output. The globalization enhances this believe because companies interact more a more with each other and are becoming themselves ‘global’. In order to communicate with each other on equal terms, standardization is required. This counts especially for quality issues because different interpretations of the concept of quality and being a constant quality not obvious in many parts of the world.

One way to address the quality issue is certification of the management system of the enterprise by an independent body. The ISO standards lend themselves perfectly for this purpose because they are internationally recognized and the implementation of the ISO standards guarantee a minimum level of a quality management system.

2.2.1 ISO

The ISO management standards are developed by the non-governmental organization ISO (International Organization for Standardization), established in 1947 in Geneva. The goal of the organization was to *"facilitate the international coordination and unification of industrial standards"* (ISO, 2008). In the beginning the organization focused only on standards specific to a particular product, material or process. However, due to the increasing international trade during the 1980s, ISO concentrated on a new aspect, quality management standards. The ISO 9000 series was born and were followed, in 1996, by the ISO 14000 series, which concentrated on environmental management. They are applicable to any kind of organization, due to the generic character of the standards. Certification of the standards is not necessary, but when a company decides for certification this has to occur by an accreditated certification body. KEMA Quality is accreditated by a member of the International Accreditation Forum, in the Netherlands the 'Raad van Accreditatie', and is, thus, authorized to give out certificates worldwide.

The ISO 9000 standards concern quality management and focus on the customer requirements and satisfaction, regulatory requirements and the continual improvement of the organization's performance (ISO, 2008). The standards consists of ISO 9000, 9001, 9002, 9003 and 9004 (Tummala and Tang, 1994-1995; Ho, 1995). ISO 9000 describes the guidelines for use of a particular standard whereas ISO 9004 describes the guidelines for establishing an internal quality management system within the broad and general context of Total Quality Management (Tummala and Tang, 1994-1995; Ho, 1995). The core module of ISO 9000, ISO 9001, provides quality systems for design, development, production, installation and services (Sun and Cheng, 2002; Ho, 1995). ISO 9002 concerns product conformance through production and installation and ISO 9003 concerns the quality assurance in final inspections and has a much narrower scope than others (Ho, 1995; Rajan and Tamimi, 2003).

The ISO 14000 family addresses various aspects of environmental management (ISO, 2008) and provides a framework for a facility to develop an Environmental Management System (Fryxell et al., 2004). Like the ISO 9000 family, the ISO 14000 family is applicable to a wide range of organizations. The standard builds on ISO 9000 (Prakash and Potoski, 2006) and there is a high degree of compatibility between them in order to facilitate their implementation by users, either as side-by-side systems or as integrated management systems (ISO, 2008). ISO 14001 is the only standard for which facilities receive certification (Potoski and Prakash, 2004; Fryxell and Szeto, 2002); it does not require firms to demonstrate improvements in environmental performance, only seeks their commitment to do so (Potoski and Prakash, 2004; Ross, 1998). An alternative for ISO 14000 is EMAS (Eco-Management and Audit Scheme). However, this last one applies only for companies established in the EU and instead of a certificate there is made use of a public registration (Albert Diedering, KEMA).

Besides these two families of standards there is also a family which concentrates on occupational health and safety, the non-ISO series OHSAS 18000. Twice, in 1997 and in 2000, the ISO members turned down the proposal of creating an occupational health and safety management system under the designation of ISO

18000, or any other designation. The main stakeholders demonstrated little support for developing standards in this field (ISO, 2008 and ISO, 2008). The OHSAS (Occupational Health and Safety Assessment Specification) is developed by the British Standards Institute and is applicable in parallel to the ISO standards (Perry Johnson Registrars, 2008). OHSAS 18001 does not focus on the product chain, but focuses only on the occupational health and safety on the specific site of the organization, were the standards enable to control the risks and improve performance (Jørgensen, 2007). KEMA Quality carries out audits also for OSHAS 18001, besides the ISO norms.

According to Jørgensen et al. (2005; Jørgensen, 2007), and as stated above, the standards for management systems are developing towards a higher degree of compatibility and organizations increasingly integrate these systems. Jørgensen et al. (2005; Jørgensen, 2007), describe three different levels of integration: correspondence, generic and integration. While the first level reduces duplication of paperwork and confusion between demands of different standards, the last level concerns the creation of a culture of learning, stakeholder participation and continuous improvement of the performance.

2.2.2 Trends

ISO certification provides companies a good tool in demonstrating the international validity of their quality and environmental management systems. The first years after the introduction of the ISO 9000 family, the standard was mainly adopted in Europe. Due to globalization, the need for standardization is increasing. This is reflected by the growing number of ISO certificates issued in the past years. Both non-governmental organizations, such as the WTO, as well as local governments promote the ISO standards. This results in a growing number of ISO certificates in more countries. From December 2002 to December 2006 the total of ISO 9001:2000 certificates increased with 437%, from 167,124 to 897,866. In 2006 the certificate was present in 170 countries and economies, against the 133 in 2002 (The ISO survey-2006, 2007).

The ISO 14000 family is relatively new; therefore not a lot of measurements are carried out yet. However, it is observable that the global trend of greening business and an awareness concerning sustainable business is increasing; this is reflected by a growing number of ISO 14001:2004 certificates. In 2006, 129.199 ISO 14001:2004 certificates were issued in 140 countries and economies, a growth of 16% in a year (The ISO survey – 2006, 2007).

China was in 2005 and 2006 the country with the most ISO 9001:2000 certificates and the number of certificates is growing the most with respect to other countries, except for Japan. China is also second to Japan with regard to the number of ISO 14001:2004 certificates, but realized the highest growth (The ISO survey-2006, 2007). The European and Far East regions are without a doubt world leaders with both ISO 9000:2001 certificates (respectively 46.24% and 33.51% of share) and ISO 14001:2004 certificates (44.05% and 41.24% of share).

The electrical and optical equipment sector is the third industry with the most ISO 9001:2000 certificates, and the industry with the most ISO 14001:2004 certificates. A large part of the certificates in this industry is issued in China: 37% of the ISO 9001:2000 and 26.5% of the ISO 14001:2004 certificates (The ISO survey – 2006, 2007). The electronic and communication sector has 71% of the ISO 14000 certificates issued in China in 2001 (Zeng and Wang, 2002).

2.2.3 KEMA

KEMA Quality started its operations in the Netherlands and has expanded globally, through a network of own offices, partner offices and auditors which can be sent all over the world. The global focus of system

certification lies mostly on the electronical and related sectors, while in the Netherlands the company has expanded its focus auditing also, for example, the social service sector.

2.3 Previous research on drivers, deterrents and benefits of ISO certification

The popularity of the ISO standards can be explained to a certain extent by the necessity for standardization and for documenting a minimum level of quality management. But, as the literature suggests, there are more reasons for companies to implement the ISO standards.

Much research is carried out in order to find out which motives drive companies to aim for ISO certification and which benefits they perceive after certification is obtained. As Pan (2003) points out it is remarkable that, although ISO certification stands for international standardization, much of the research on ISO certification is done on a national level and little research is carried out on a global scale. Some cross-country research is carried out concerning the diffusion of ISO certification: Guler et al. (2002) investigated the spread of ISO certification in 34 different countries; Corbett (2006) focused on the role of supply chains in the diffusion of ISO certificates in nine countries; Albuquerque et al. (2007) studied the diffusion of ISO 9000 and ISO 14000 certification in 56 countries; Delmas and Montiel (2008) concentrated on a large number of countries, but only on one industry and Potoski and Prakash (2004) focused on the diffusion of the environmental standard in 59 countries. These researches consider only the *diffusion* of ISO certificates, and help to explain some drivers for certification, but not all. Moreover they do not provide insight in the perceived benefits.

Research that concerns the experiences of companies with ISO, including motivational factors and perceived benefits, is, thus, mainly carried out in single countries. Concerning the ISO 9000 series Zeng (Zeng et al., 2002; Zeng et al., 2005) focuses in his studies mainly on the construction industry in China; Brown and van der Wiele (1996) and Terziovski et al. (2003) did research in Australia; Lee's (1997) survey was carried out in Hong Kong; Sun and Cheng (2002) analyzed Norwegian SMEs and large firms and Jang and Ling (2008) carried out their research in Taiwanese companies.

The same goes for the ISO 14000 series: Gavronski et al. (2006) investigated ISO in the Brazilian chemical, mechanical and electronic industries; Quazi et al. (2001) carried out their research in the electronical and chemical industries in Singapore; Morrow and Rondinelli (2001) focused on the domestic gas industry in Germany and Fryxell et al. (2004), Zeng and Wang (2002) and Christmann and Taylor (2001) all studied Chinese companies.

The local nature of the studies is presumably the cause of some differences in the outcomes; this can be an indication of the fact that the context in which the company is situated plays an important role. The specific differences are pointed out there were relevant in this chapter. The framework which is tested in this research seeks to include divergent points of view, in order to analyze which are relevant in the Chinese context.

2.4 Motivations

Companies decide to pursue ISO 9000 and ISO 14000 certification for different reasons. Of course they acknowledge the role that the adoption of ISO plays in the quality or environmental performance of the company, and even decide to use ISO as a complement/start for their TQM process. But it must also be recognized that ISO certification has other advantages, like the facilitation of international trade, enhance the reputation of the company and cost reduction. Therefore, Boiral and Roy (2007, p. 227) define ISO as *"…both a commercial tool and an internal management system."* The most common segmentation of the motives for ISO certification follows this logic and makes a distinction between internal and external motivations (see e.g.

Boiral and Roy, 2007; Juang and Lin, 2008; Ruzevicius et al., 2004). The internal motivations reflect an aspiration for certification driven by the desire of quality or environmental performance improvement. External motivations are related to pressures from outside the organization, mostly related to customers or commercial factors.

Quazi et al. (2001) make a distinction between push and pull factors, in which the push factors are directive in nature and the pull factors are voluntary in nature. In the main the push and pull factors listed are similar to, respectively, the external and the internal factors, although there are some differences. In fact, Quazi et al. (2001) define the internal factor 'top management' a push factor, while it is clearly an internal issue.

Bansal and Roth (2000) distinguish three basic motivations for corporate ecological responsiveness: competiveness, legitimation and ecological responsibility. Competiveness arises from the goal of improve long-term profitability and gain competitive advantage. Legitimation is a reaction on external rules, regulations and beliefs. Ecological responsibility is driven by truly ecological awareness, and therefore this motivation can also be named ethical (Gonzáles-Benito and Gonzáles-Benito, 2005).

The most detailed classification of motivations is made by Gavronski et al. (2008) for ISO 14000 certification. They describe four sources of motivation: reactive, proactive, internal and legal motivations. The first two can be seen as external motivations, one aims to respond to an external situation, the other aims to prevent potential problems with external stakeholders. The third one corresponds to the internal motivations described above. The last ones help to comply with current or future legislations, in this sense it can be seen as an external factor, but regards only the institutional area.
The model used in this research is the result of the combination of the basic motivations of Bansal and Ruth (2000) and those of Garvonski et al. (2008), with a distinction between the internal and the external motivations (figure 2.1). Both models refer to ISO 14000 certification, but seem to be applicable also for the ISO 9000 series, because, as Corbett and Kirsch (2001) suggest, the drivers of the two have significant overlap. Legitimation is defined by Gonzáles-Benito and Gonzáles-Benito (2005) as relational motivations, because they do not only respond to the legal and institutional rules, but also to the main stakeholders. Therefore, legitimation is mainly reactive, to external pressures or regulations, and can be described as a push factor. Competiveness pays greater attention to the cost factor, in order to improve market position; therefore, it can be either a push or pull factor, dependent on the position of the company in the industry. As state above 'top management' is an internal motivation, but Quazi et al. (2001) refer to it as a push factor, because the management imposes its will. The same goes for practices of the parent company. Therefore, can be stated that internal motivations are mainly pull factors, but with some exceptions.

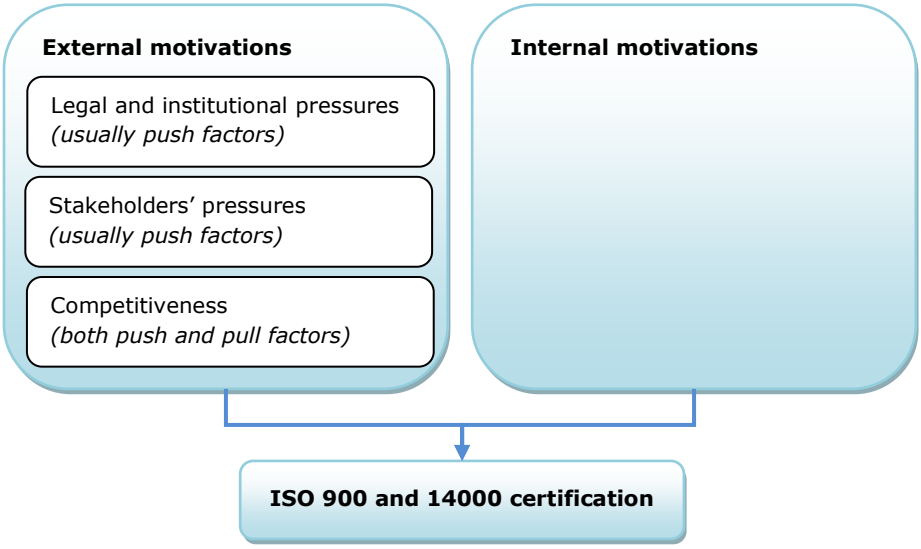

Figure 2.1 Types of motivational factors for ISO certification.

2.4.1 Internal motivations

The main objective of ISO certification is to improve, and especially to safeguard, the quality or environmental performance of the company. Companies can integrate ISO with TQM practices; ISO 9000 in this case has the function of preserving achieved results with TQM (Chin et al., 2001). Internal motivations generally deal with a genuine desire of the organization to improve management practices in order to gain improved quality or improved environmental performance. This desire can start at the ambitions of the top management (Quazi et al., 2001; Zeng and Wang, 2002) or can be attributed to the management in general (Zeng and Wang, 2002). Internal motivations differ from a general desire of improving quality or environmental management (Fryxell and Szeto, 2002; Lee, 1998; Zeng et al., 2002; Zeng et al., 2005) to more specific goals, such as improve operations control, product improvement, enhance service quality, create more stability, consistency and effectiveness (Boiral and Roy, 2007; Lee, 1997; Ruzevicius et al., 2004).

Internal motivations also arise in relation to competitors' strategy. Generally this applies for early adopters who want to distinguish themselves based on quality or as an environmental leader (Anderson et al., 1999; Summers Raines et al., 2002). In fact, research points out that large facilities with extensive research are usually early adopters of the standard and that the implementation of the ISO norms can lead to innovative solutions (King and Lenox, 2001; Morrow and Rondinelli, 2002). This does not apply to firms that compete on basis of process or product innovation, because of the efforts of documenting every process (Anderson et al., 1999). Companies already involved in TQM or an EMS can use ISO certification as a mechanism for communicating their efforts (King et al., 2005). Followers usually implement ISO because of the worldwide acceptance of the standard and the definition of a minimum quality standard (Anderson et al., 1999; Bellesi et al., 2005).

The objective of ISO implementation can also be the reduction of costs (Anderson et al., 1999). Companies implementing ISO 9000 can reduce costs because of a more efficient manufacturing process and a better customer focus (Boiral and Roy, 2007; Ho, 1995; Ruzevicius et al., 2004; Sun and Cheng, 2002). Companies implementing ISO 14000 reduce costs because of waste minimization, energy reduction, less imposed fines and

penalties (Fryxell et al., 2004; Gonzáles-Benito and Gonzáles-Benito, 2005; Morrow and Rondinelli, 2002; Quazi et al., 2001). Cost savings can also be the result of a reduction in the costs in procurement of suppliers, because of the reduction of information asymmetries between suppliers and buyers (Anderson et al., 1999).

In the choice for ISO certification the role that the employee fulfills in the company sometimes plays a role. Some companies pursue ISO implementation in order to motivate and inspire employees or to ensure their involvement with TQM (Anderson et al., 1999; Boiral and Roy, 2007; Gavronski et al., 2006; Morrow and Rondinelli, 2002). Others want to capture employees' knowledge by documenting processes or enhance the capability of personnel (Fryxell et al., 2002; Pan, 2003; Jang and Lin, 2008).

There seems to be a relation between the adoption of ISO 9000 certification and ISO 14000 certification. The first one to suggest this were Corbett and Krisch (2001), their findings were confirmed by subsequent research (Bellesi et al., 2005; Delmas and Montiel, 2008; Prakash and Potoski, 2006). This can be explained by the fact that ISO 14000 adoption is easier for organizations that have already adopted ISO 9000, due to the compatibility between the two.

2.4.2 External motivations

In the definition of Boiral and Roy (2007) the commercial aspect of ISO certification is emphasized. Motivations of economical nature are frequently named in the literature. One of the most recurrent drivers is the pressure from customers. Probably one of the first researches to notice this is Wittington (1989) and after him many others tested the role of the customer. Lee (1997) and Sun and Cheng (2002) both find out that especially small and medium firms are customer driven. Others too recognize the importance of customer influence in seeking ISO 9000 certification (Pan, 2003; Terziovski et al., 2003; Zeng et al., 2002; Zeng et al., 2005) and ISO 14000 certification (Christmann and Taylor, 2001; Fryxell and Szeto. 2002; Quazi et al., 2001).

Another motivational factor often highlighted in the literature is trade. Guler et al. (2002) found evidence that countries involved in trade networks with economies with a high number of certificates, show more tendency to certification then countries that are not. Albuquerque et al. (2007) refer to the diffusion of ISO through trade as 'vertical contagion', because of the buyer-seller relation. In this sense it can be connected to the previous motivation, customer influence (usually in the case of business to business (Anderson et al., 1999)). In fact, Prakash and Potoski (2006) found that bilateral trade, instead of structural trade, influences the adoption of ISO 14000 certification. These findings are confirmed by Albuquerque et al. (2007) for ISO 9000 certification, they acknowledge that ISO certification follows export flows. Christmann and Taylor (2001) find a positive relationship between the export to developed countries and the adoption of ISO 14000 certification; Bellesi et al. (2005) recognize that ISO 14000 certification can facilitate the export of organizations to Europe and Japan, but plays a minor role for export to the United States. There are also studies that reject a relation between export and the adoption of ISO certification (Delmas and Montiel, 2008; Ruzevicius et al., 2004), but this can, at least in one case, be explained by the fact that, in the involved sector, ISO 14000 certification was adopted early (Delmas and Montiel, 2008). Not being certificated can also act as a barrier to trade (Quazi et al., 2001).

Various commercial reasons for ISO certification are market related. Companies seek ISO certification because of competitive advantage with respect to non-certified competitors (Anderson et al., 1999; Quazi et al., 2001; Sun and Cheng, 2002). The competitive advantage can be achieved through cost savings or through marketing

instruments. Lower waste and standardized production reduces the production costs, therefore products with lower prices can be putted on the market. Some companies use ISO certification in order to increase firm reputation by giving a public signal of quality or of 'green marketing' (Anderson et al., 1999; Fryxell and Szeto, 2002; Summers Raines et al., 2002).

As stated earlier ISO certification is voluntary, so governments usually do not impose them to organizations, although is known that in some specific industries ISO certification is a government requirement (Corbett and Krisch, 2001). However, the role of institutions is various in the adoption of ISO certification. Influence can be exercised locally: some governments encourage certification. Ross (1998) affirms that the Chinese government actively promoted ISO 9000 certification. Zeng (Zeng et al., 2002; Zeng et al., 2005) recognizes the role of the Chinese government, but insists on the low importance of this aspect as driver for certification. Only a small group of his respondents say to seek ISO certification in order to respond to 'government's appeal' (Zeng et al., 2002). On the contrary, in a later study this variable was of higher importance, but this result is probably the consequence of the fact that all surveyed organizations were state owned enterprises (Zeng et al., 2005). Others affirm that the high diffusion of certificates in European countries is due to the efforts of the European Union (see e.g. Guler et al., 2002). In fact, the European Union indicated ISO 9000 as a faster and easier way to get access to their markets (Quazi et al., 2004).
The role of the state, or of intergovernmental organizations as the EU, is twofold and can be indirect or direct: at one side the state administers the legislative environment of the company; on the other side the state can act as a consumer and as a producer of goods and services (Guler et al., 2002). There are different policies government can adopt in order to promote certification, especially for environmental management and clearer production (Zeng and Wang, 2002). Mandatory policies can be addressed through the legal system to organizations as well as to the population, in order to stimulate public consciousness. Encouraging policies can be implemented in the form of tax exemptions or subsidies. Supporting policies can be for example offered in the form of information provision, training courses and seminars.
Potoski and Prakash (2004) deny the role of intergovernmental organizations but recognize that of nongovernmental organizations, in the case of ISO 14000 adoption. Nongovernmental organizations contribute in shaping the values and norms, and, therefore, influence the buying behavior and environmental awareness.

Although the legislative environment is barely the major direct motivation for an organization to pursue certification, it can act a trigger. In fact, ISO certification can assure regulatory compliance and increase legal certainty (Corbett and Kirsch, 2001; Fryxell and Szeto, 2002; Fryxell et al., 2004; Morrow and Rondinelli, 2002; Vastag, 2004). ISO adoption is attractive for firms when it creates a fit with existing regulations (Potoski and Prakash, 2004). This seems to be the case especially for environmental regulations: because of the recent global attention given to environmental issues, governments create new legislation in order to stimulate companies to become environment-friendly.
The impact of legislation is twofold: on the one side it forces organizations to examine their management systems in relation to environmental issues. ISO 14000 serves as a tool for this examination, and can help in reaching the desired environmental performance, even if performance is not a goal of certification (Quazi et al., 2001). On the other side, companies that are already environmentally involved because of the regulations can easily implement ISO 14000, to enhance firm reputation (King et al., 2005). The approach with respect to environmental issues and quality certification varies strongly across countries: European countries and Japan (because of its limited resources) are more environmental conscious than developing countries and the United

States (Anderson et al., 1999; Bellesi et al., 2005). There is, thus, a correlation between ISO 14000 and national environmental attitudes (Albuquerque et al., 2007; Corbett and Kirsch, 2001; Vastag, 2004).

ISO certification can also be stimulated by the practices of the parent company, in particular when the company is a multinational (Christmann and Taylor, 2001; Guler et al., 2002; King et al., 2005; Summers Raines et al., 2002; Sun and Cheng, 2002; Quazi et al., 2001).

Many investigated other factors influencing ISO certification, but from a different points of view or, sometimes, with conflicting results. These factors are not directly related to the drive for companies in seeking ISO certification, but can be described as circumstantial. Geographic distance was not found to be relevant in terms of neighboring country, but was found to be relevant in terms of distance to buyers (King et al., 2005; Prakash and Potoski, 2006). Size does matter. Large organizations are more inclined to ISO certification because of economies of scale (see e.g. Bellesi et al., 2005). King et al. (2005) also state that corporations with many facilities and foreign-owned facilities are more incline to seek certification.

Some research investigated the relative importance of the drivers for ISO certification. In general external motivations are considered to be the most significant (Lloyd's study in Ruzevicius et al., 2004; EC research in Ruzevicius et al., 2004; Anderson et al., 1999; Fryxell and Szeto, 2002; Pan, 2003; Ruzevicius et al., 2004), but some research contradicts this assumption. For example Zeng et al. (2005) did research in China in 48 certified design organizations, all state-owned. The main motivation for implementing ISO 9000 was 'to improve management', only a small group did it 'to satisfy client's requirement' and none of them implemented ISO to enhance reputation. A similar result was given by the research of Zeng et al. (2002) for the construction industry in China. However Lee (1997) found that construction firms in Hong Kong mainly pursued ISO certification in order to satisfy customer demand. On the contrary, manufacturing and service firms had as primary reason the improvement of management, or control operations in manufacturing plants in China (Lee, 1997). The survey of Summers Raines et al. (2002) points out that the majority of Chinese firms seek ISO 14000 certification because of environmental issues and not commercial and the survey of Morrow and Rondinelli (2002) among German firms also shows a commitment to the environment. Also the researches of Zeng and Wang (2002) and Quazi et al. (2001) indicated internal motivations in Chinese companies as most important. It is also substantiated that large companies are more incline to implement ISO standards for internal and marketing reasons, whereas SMEs are more customer driven (Lee, 1997; Sun and Cheng, 2002). This can be connected to the need of large firms for innovation.

The different observations are included in the framework and summarized in figure 2.2:

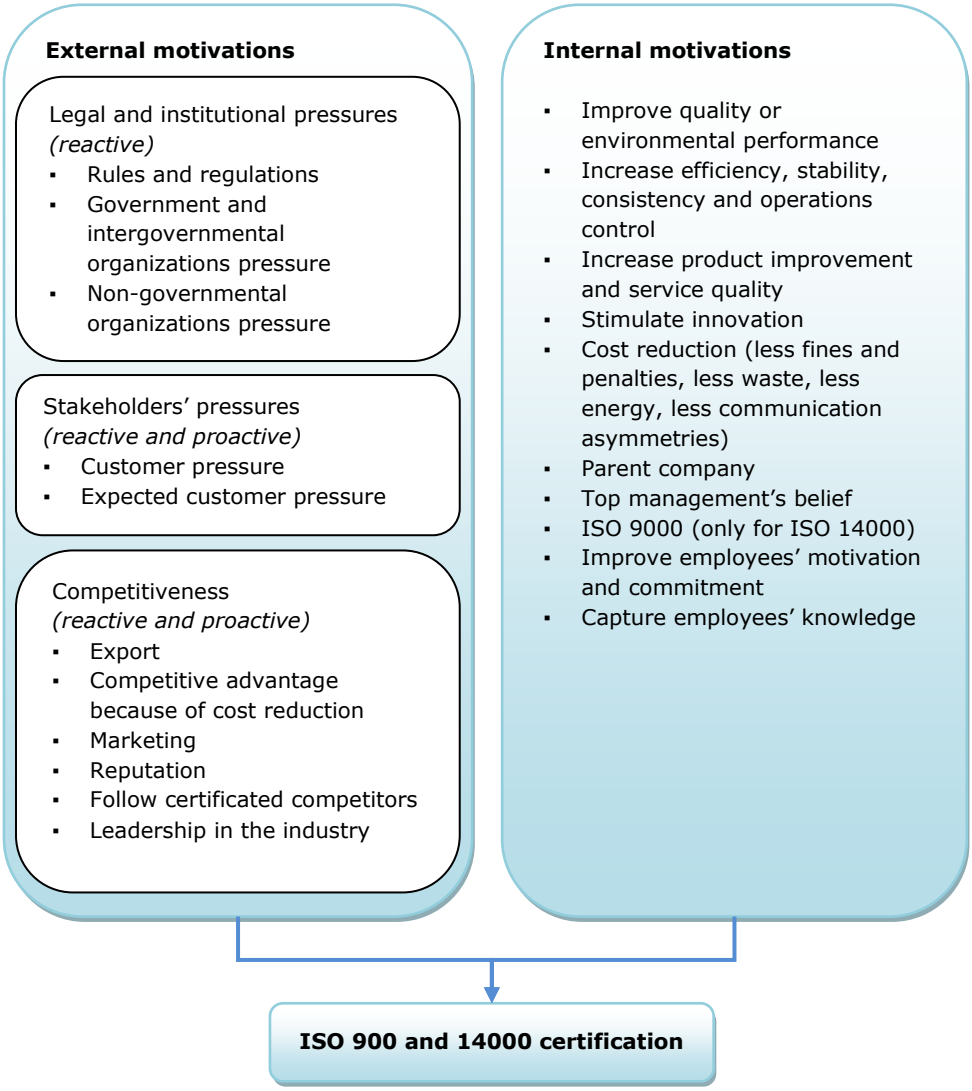

Figure 2.2 Motivational factors for ISO certification

2.5 Barriers

Companies deciding for ISO certification consider naturally also the negative aspects of ISO implementation. These barriers sometimes outweigh the motivations and inhibit organizations from implementing the ISO standards. The literature does not pay great attention to the deterrents to certification; Anderson et al. (1999) summarize previous, sporadic, literature on deterrents. They distinguish three major arguments against ISO certification: the existence of better alternatives, the high costs of certification and the risk of competitive disadvantage (Anderson et al., 1999).

Better alternatives can manifest in various ways, depending on the reason for certification. Firms seeking ISO certification for regulatory compliance can find other ways for meeting requirements or avoid rules and regulations when choosing the location for their production facilities (Anderson et al., 1999). Customer

requirements can be circumvented through clear contracts with customers about the quality of products, or stable and long-term supplier relationships (Anderson et al., 1999). In this case, trust, openness and a specific formulation of expectations are very important. Alternatives for ISO certification in communicating quality do exist in the form of quality awards, an established reputation for quality products or warranty provisions (Anderson et al., 1999).

The cost of certification varies depending on the initial state of the quality control system and the manufacturing operations (Anderson et al., 1999). Delmas (2002) considers three types of costs and concluded that the design costs of the ISO 14000 system are a more important constrain than the registration costs and the annual cost of maintaining the ISO certificate. This can be related to the initial state of the quality control system. Also the size of the organization plays a role. As stated in the analysis of the motivations for ISO certification, large firms have lower costs of certification per unit of output because of economies of scale. According to Melnyk et al. (2003), who investigated ISO 14001 certification in the United States, for some firms the costs of certification did not outweigh the highly uncertain benefits.

The risk of competitive advantage can be related to the effort spent in the implementation of ISO certification: companies can perceive this as a waste of time, which could be used for more important improvements (Anderson et al., 1999). Delmas (2002) also recognizes the efforts as constrains for adopting ISO 14000, companies have a lack of time and of personnel to implement the ISO 14000 standards. Companies competing on basis of process or product innovation are less interested in standardization, in order to avoid technology lock-in in rapidly changing environments (Anderson et al., 1999).

Delmas (2000; 2002) recognizes the role of the institution as a deterrent for ISO 14000 adoption in the United Stated. This because US companies are, among other things, uncertain about the behavior of environmental regulatory agencies. Delmas (2000; 2002) gives various examples of how companies perceive the institutional environment as a constr aining feature: regulatory violations, or non-compliance, can be discovered during the implementation. These findings might lead to additional costs, in the form of legal penalties, or might be used as incriminating evidence in future legal procedures (Delmas, 2000; Delmas, 2002). Therefore, she proposes that regulatory agencies should allow some regulatory flexibility (Delmas, 2000).

The deterrents to ISO certification can be classified as follows (figure 2.3):

Aternatives
- Other way for meeting requirements
- Other location production facilities
- Other way of communicate quality

Costs
- Design costs
- Registration costs
- Maintaining costs
- Penalties because of new discoveries (ISO 14000)
- Costs do not outweigh the benefits

Competitive advantage
- Obstructs innovation
- Lack of time
- Lack of personnel

Regulatory inflexibility
- Risk of discovering regulatory violations
- Risk of 'creating' incriminating evidence

Figure 2.3 Deterrents for ISO certification

2.6 Benefits

Following the examination of the drivers for ISO it is interesting to discover if organizations, after implementation of the ISO standards, perceive any benefits of the system, and if this benefits differ from the expectations organizations initially had. Beattie and Sohal (1999) categorize the benefits as operational or strategic, this corresponds with the more widely used distinction between internal and external benefits (Poksinska et al., 2002; Santos and Escanciano, 2002; Singels et al., 2001). Internal benefits generally refer to improvements in the (production) process, quality and costs, or related to the human resource area, while external benefits are mostly related to market performance or to the contact with customers (Singels et al., 2001). Different studies make a further distinction in the benefits. Zeng et al. (2005) list three groups: internal operations, market effects and effectiveness improvements; Gozamani and Tsiotras (2002) differentiate between internal/operational benefits, quality improvements, external/competitive benefits, productivity improvements. Santos and Escanciano (2002) identified four groups of benefits for ISO 9000 certification namely benefits related to the human element and managerial procedures; benefits related to the internal efficiency; benefits related to the improvement of the competitive position in the market; and, lastly, benefits related to the external orientation and attraction of the organization. The first two groups are of an internal nature whereas the other two are external.

Most of the studies about the benefits of ISO certification refer to the 9000 series and little on the 14000 series. This can be explained by the fact that the ISO 14000 series is a relative recent norm and benefits of the implementation are difficult to measure. However Gavronski et al. (2008) studied the benefits perceived by

Brazilian companies in the chemical, mechanical and electronic industries. They identified four groups of benefits: productivity benefits (from an operations perspective); financial benefits; societal benefits and market benefits.

Comparing the two classifications a few remarks can be made. Both recognize the impact of ISO certification for the internal operations, even if Santos and Escanciano (2002) put more emphasis on the human resource benefits. The financial benefits described by Gavronski et al. (2008) are not costs savings because of the improved internal efficiency, but financial advantages because of the access to special credit, the opportunity to obtain investment funds from governmental organizations and the reduction of insurance premia. This financial benefits are specific to the ISO 14000 series and, therefore, not applicable to the ISO 9000 series. The societal benefits named by Gavronski et al. (2008) are related to environmental benefits in relation to external stakeholders such as the government and the society and not customers. The relationship with business relations, such as customers, is a market benefit according to Gavronski et al. (2008). Also Santos and Escanciano (2002) rank this as a market related benefit, but consider the benefit of having a better knowledge of customers' expectations as external orientation. Gavronski et al. (2008) see the improvement of the corporate image as a societal benefit, whereas Santos and Escanciano (2002) see this as a benefit related to the external orientation.

The model used in this research is a combination of the two models described above (figure 2.4), because these models appear to be the most complete in the literature on ISO certification. The classifications made by the researchers partly overlap: the interpretations of the internal benefits is mainly the same, but more elaborated by Santos and Escanciano (2002). Gavronski et al. (2008) identified two additional external groups of benefits that are specific for the ISO 14000 series. Factors ranked differently by the researchers are categorized where considered most appropriate. An example is the improvement of the image of the company which is ranked under 'external orientation' because it applies for both ISO 9000 series ISO 14000 series (see figure 2.5).

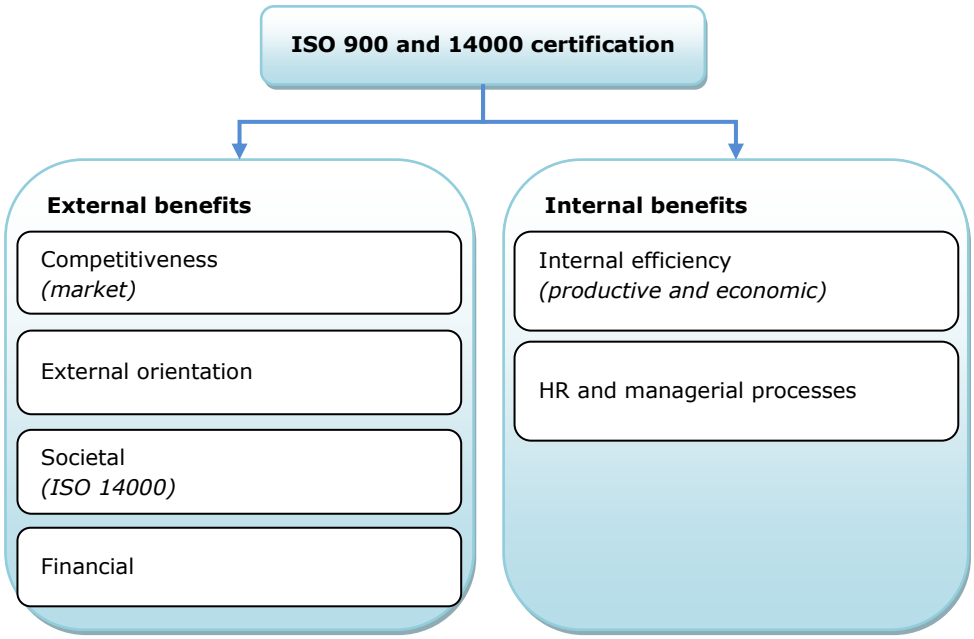

Figure 2.4 Types of benefits of ISO certification.

2.6.1 Description of the benefits

Internal efficiency refers to both productivity as to the economic effects (Gavronski et al., 2008; Santos and Escanciano, 2002). Overall the awareness about procedural problems and quality grows in the organization when implementing ISO certification (Buttle, 1997; Chow-Chua et al., 2003). Organizations report an improved effectiveness (Zeng et al., 2005) or efficiency (Buttle, 1997). ISO leads to the improvement of internal procedures, which is sometimes viewed as the most important benefit (Gotzamani and Tsiotras, 2002; Poksinska et al., 2002). Obviously when an organization manages to improve its internal procedures this affects various aspects. Organizations experience a reduced number of defects and errors and an elimination of redundancy of work (Casadesús and Giménez, 2000; Chow-Chua et al., 2003; Gotzamani and Tsiotras, 2002; Jones et al, 1997; Ruzevicius et al., 2004; Santos and Escanciano, 2002). A better management of work orders leads to a reduction of the lead time (Casadesús and Giménez, 2000), an increased on-time delivery (Poksinska et al., 2002) and a better bottom line (Chow-Chua et al., 2003). Even if the ISO standards are designed in order to safeguard and assure a constant level of product quality, it is reported that the adoption of ISO norms have a positive effect on the delivered quality of products and services (Gotzamani and Tsiotras, 2002; Poksinska et al., 2002). ISO implementation provides a better documentation and standardization of the work procedures, which provide better guidelines and clearer work instructions (Chow-Chua et al., 2003; Casadesús and Giménez, 2000; Jones et al., 1997; Zeng et al., 2005). The standardization of documentation and operations is favorable especially for organizations with multiple sites because it creates consistency (Buttle, 1997).
Economic benefits of the implementation of ISO have different nature. On one side organizations experience a reduction of waste and therefore savings in production costs (Casadesús and Giménez, 2000; Quazi, 1999; Santos and Escanciano, 2002; Taylor et al., 2001). On the other side they experience an increased productivity and profitability (Chow-Chua et al., 2003; Corbett et al., 2005; Gotzamani and Tsiotras, 2002; Llopis and Tarí, 2003; Santos and Escanciano, 2002). Rajan and Tamimi (2003) also found that ISO certificated companies have a better stock performance.

Studying the benefits of ISO certification it is remarkable that great attention is given to the effects related to HR and managerial processes, while this aspect is not much considered by companies when they choose for certification. In general organizations experience a development of a quality culture, employees become more quality aware (Gotzamani and Tsiotras, 2002; Santos and Escanciano, 2002). Employees have a better understanding of job responsibilities and obligations (Casadensús and Giménez, 2000; Chow-Chua, 2003; Ruzevicius et al., 2004; Santos and Escanciano, 2002). As a consequence employees experience a better linkage to other functions (Acharya and Ray, 2000).
Communication improves between employees (Gotzamani and Tsiotras, 2002; Ruzevicius et al., 2004) as well as between management and employees (Casadensús and Giménez, 2002; Gotzamani and Tsiotras, 2002). This leads to a management able to exercise better control (Acharya and Ray, 2000; Buttle, 1997) and better relations between management and employees (Santos and Escanciano, 2002). Communication also improves towards the customers (Gotzamani and Tsiotras, 2002; Santos and Escanciano, 2002), leading to a more customer oriented way of thinking.
Employees do also perceive an improvement in the work environment (Santos and Escanciano, 2002) and feel that they are more involved in work (Casadensús and Giménez, 2000). They are therefore more satisfied and more motivated (Buttle, 1997; Casadensús and Giménez, 2000; Gotzamani and Tsiotras, 2002; Santos and Escanciano, 2002).
ISO certification also stimulates employee training (Santos and Escanciano, 2002) and the development of teamwork (Gotzamani and Tsiotras, 2002).

Competitiveness refers to the position of the company in the market. Companies experience an increased competitiveness after the implementation of ISO 14000 (Taylor et al., 2001) as well as ISO 9000 (Gotzamani and Tsiotras, 2002). The increased competitiveness can be perceived as increased sales or improved market share (Casadensús and Giménez, 2000; Gotzamani and Tsiotras, 2002; Santos and Escanciano, 2000). Companies report a positive influence on exports after ISO implementation, like a growth of the export rate (Chow-Chua et al., 2003; Santos and Escanciano, 2002) and access to new markets (Casadensús and Giménez, 2000; Gotzamani and Tsiotras, 2002). Some companies also indicated that they became more advantageous in tendering (Ruzevicius et al., 2004; Zeng et al., 2005). A company reinforces its competitive position also when, as a result of ISO implementation, it gains new customers (Santos and Escanciano, 2002) and increases customer loyalty (Casadensús and Giménez, 2000; Santos and Escanciano, 2002).

A company's external orientation reflects the attractiveness of a company, how the external environment perceives the company's performance. ISO certificated companies profit from an improvement of their image in the market (Gavronski et al., 2008; Poksinska et al., 2002; Santos and Escanciano, 2002; Taylor et al., 2001) and use ISO as a promotional tool (Buttle, 1997). As state above companies experience an improvement of the quality of the service or product, this leads to an improved customer satisfaction and reliance (Buttle, 1997; Casadensús and Giménez, 2000; Gotzamani and Tsiotras, 2002; Poksinska et al., 2002; Ruzevicius et al., 2004; Santos and Escanciano, 2002; Zeng et al., 2005) and less complaints and returns (Casadensús and Giménez, 2000; Gotzamani and Tsiotras, 2002; Jones et al., 1997; Ruzevicius et al., 2004). The contact with the customers improves: there is an improvement in customer service and less need for quality audits by customers (Buttle, 1997; Casadensús and Giménez, 2000). There is also more awareness and knowledge of the expectations of the customers (Casadensús and Giménez, 2000; Santos and Escanciano, 2002).

The societal benefits described by Gavronski et al. (2008) are related to the advantage of having ISO 14000 in relation to external stakeholders. Benefits they name are a reduced environmental liability and an improved cooperation from environmental authorities. Also Taylor et al. (2001) found that ISO 14000 certification leads to a reduction of the potential for legal liability.

Financial benefits, other than cost reductions, are perceived by companies after ISO 14000 implementation (Gavronski et al., 2008). These benefits are mostly related to the attraction of capital or reduction of costs. Companies can experience better access to special credit, with reduced interest rates or have the opportunity to obtain investment funds from governmental organizations (Gavronski et al., 2008). Some companies obtain a reduction of the insurance premia (Gavronski et al., 2008) ad get less fines .Rajan and Tamimi (2003) also found that ISO certificated companies have a better stock performance.

The different factors are included in the framework and summarized in figure 2.5:

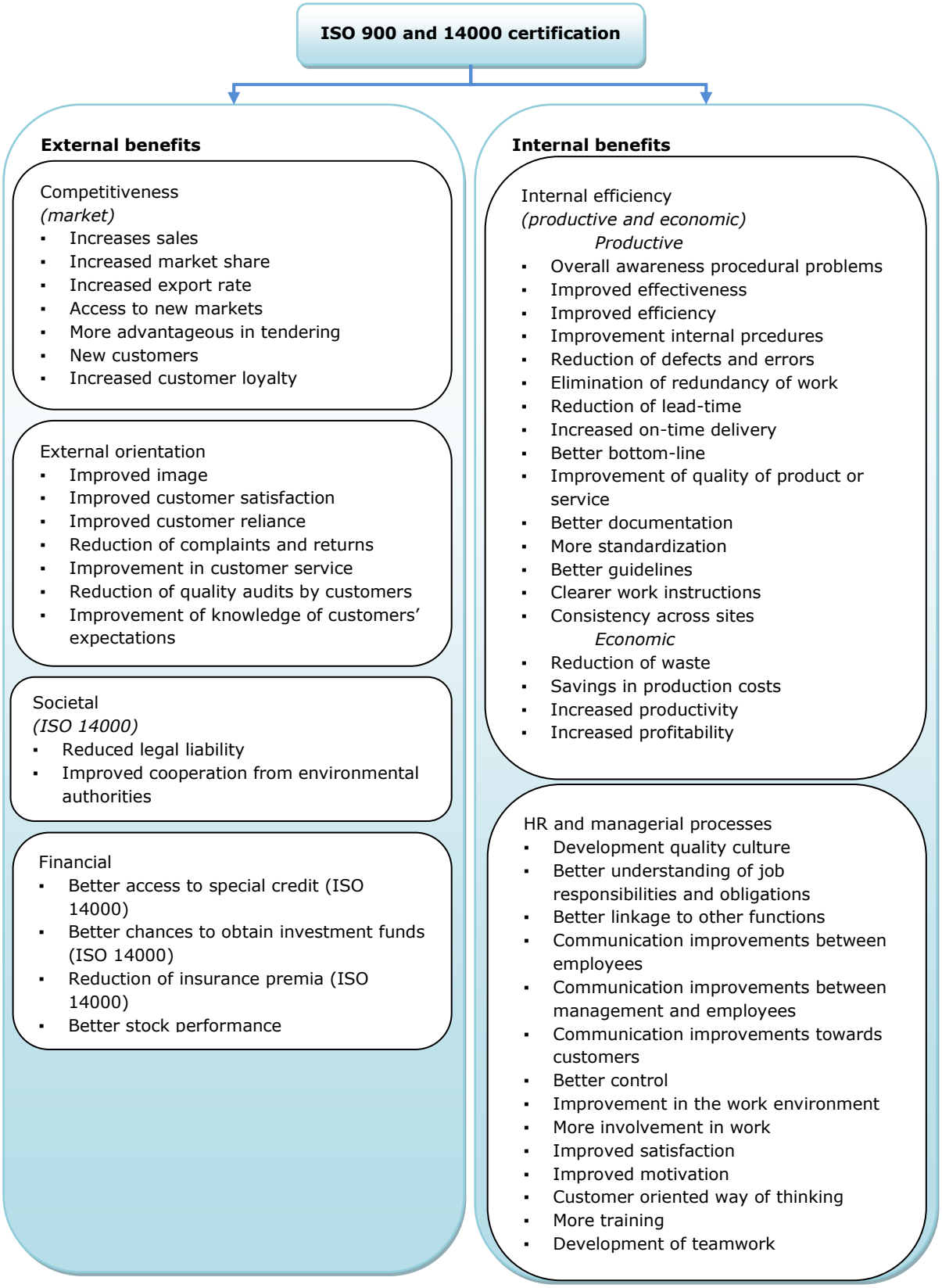

Figure 2.5 Benefits of ISO certification

2.7 Relation between drivers and benefits

Combining the model of the motivations and that of the benefits results in the model below (figure 2.6):

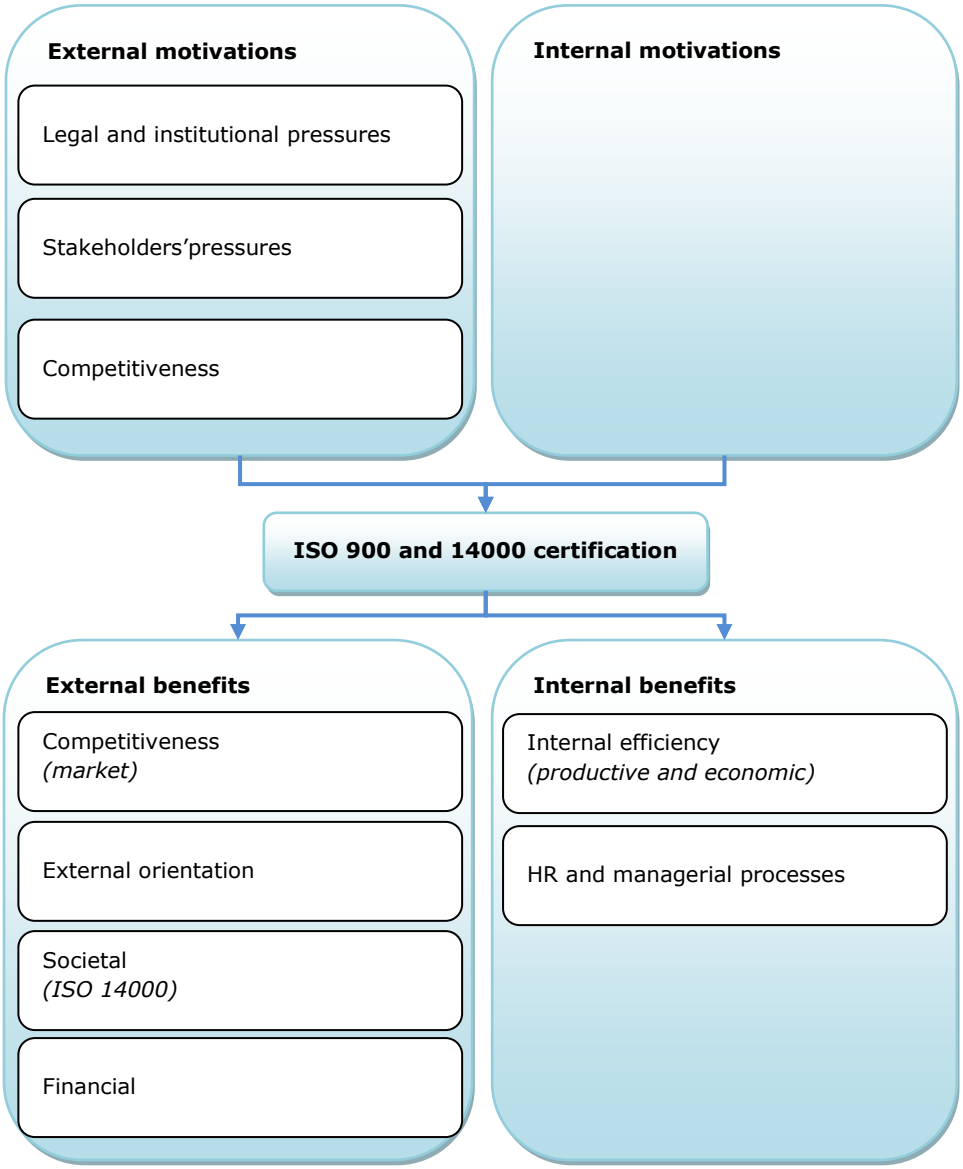

Figure 2.6 Motivations and benefits for ISO certification

However, the model is not applicable straightforwardly to ISO certificated companies. In fact, not all companies have the same motivations when they decide to pursue certification, and not all perceive all the possible benefits after obtaining certification. Research shows that the attitude of the company influences the results of ISO certification and recognizes the importance of the nature of the drivers for ISO certification when evaluating the impact of certification on the company (e.g. Gavronski et al., 2008; Jones et al., 1997; Llopis and Tarí, 2003; Lo and Chang, 2007; Pan, 2003, Poksinska et al., 2002; Poksinska et al., 2006). Terziovski and Power (2007, p. 142) state that *"… organizations that pursue ISO 9000 certification willingly and positively across a*

broad spread of objectives are more likely to report improved organizational performance than those organizations that are pursuing ISO 9000 certification in a reactionary mode due to customer pressure". Thus, companies driven by pull factors (proactive attitude) do experience more diversified benefits than companies driven by push factors (reactive attitude). Terziovski and Power (2007) developed a model in which is clear that the performance growths when the approach to quality is driven by continuous improvement (figure 2.7). Part of this models shows that a pro-active approach to ISO adoption leads to a better performance.

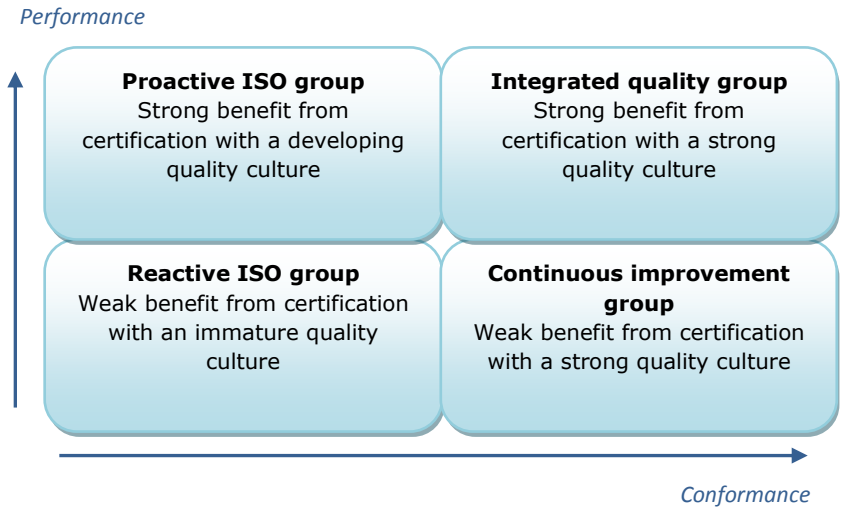

Figure 2.7 Four-quadrant model for ISO-certified organizations (adapted from Terziovski and Power, 2007)

Generally is substantiated that internal motivations are linked to internal performances, whereas external motivations link to external benefits.
Gotzamani an Tsiotras (2002) state that companies with ISO 9000 certificates driven by quality improvement (internal or ethical reasons) experience internal/operational benefits (internal efficiency and HR and managerial procedures), quality improvements (internal efficiency) and other improvements (competitiveness and external orientation). Companies driven by their quality strategy (internal motivation) experience internal/organizational benefits and companies driven by external pressures/competitive advantage (stakeholders pressure and competitiveness) experience only external competitive benefits.
Huarng et al. (1999) found evidence that, in the case of ISO 9000 adoption, active motivational factors (internal drivers) lead to more types of benefits, in this case quality benefits (internal efficiency), internationalization benefits (competitiveness) and cost benefits (internal efficiency). International motivations (competitiveness) lead to international and sales benefits (competitiveness). Passive motivation (legal and institutional pressures, stakeholders pressures) lead only to sales benefits (competitiveness).
Gavronski et al. (2008) examined the relations between motivations and benefits for ISO 14000 certified companies. According to them, internal motivations lead to internal benefits (internal efficiency and HR and managerial procedures). Legal motivations lead to financial and societal benefits. And, finally, societal benefits lead to market benefits (competitiveness).

Because the model developed in this paper is a result of different theories, the relations found by other authors are not applicable directly on the model. Therefore, an analysis is made of the items related to the definition, or groupings, of the different authors and these are compared to the items and the groupings made in this

report. The corresponding groups are named after the groups used by the author, in most cases the items in the group overlap but there are some small divergences. Because of the little amount of divergences these are not further relevant. The relations found are schematized in the following figure (figure 2.8):

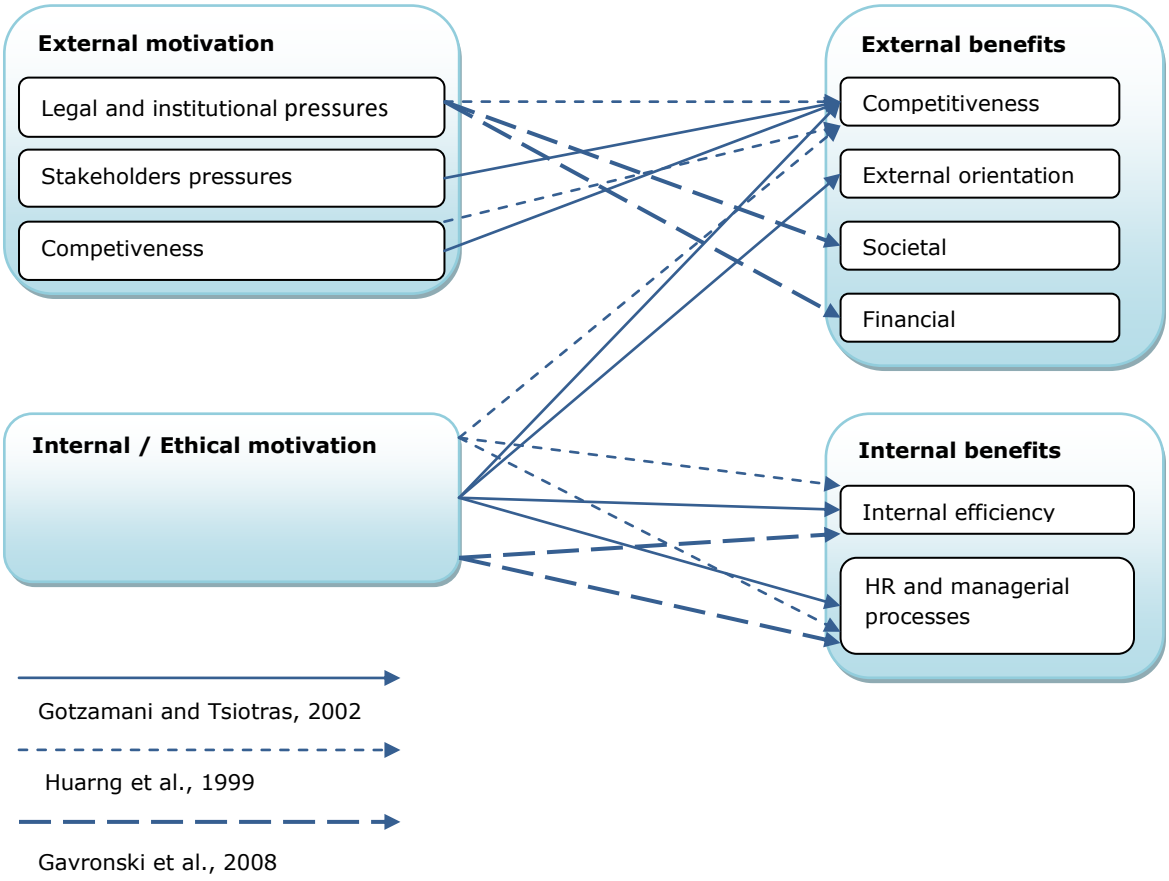

Figure 2.8 Relation between subgroups of motivations and groups of benefits

In the model is clearly visible that internal motivations lead to broader results than external motivations, which only lead to external benefits.

2.8 Conclusion

In this chapter a model is constructed that reproduces the relation between different subgroups of motivations, or drivers, for ISO certification and different groups of ISO certification (figure 2.8). The literature reveals different items of drivers, as well as barriers. The literature research also reveals a basis for clustering the drivers in two main groups (external and internal motivations); the external motivations can be clustered in different subgroups (legal and institutional pressures; stakeholders' pressures; competitiveness) as shown in figure 2.2. Also the benefits of ISO certification can be divided into external and internal benefits. The first type of benefits knows four different subgroups (competitiveness; external orientation; societal and financial) and the second type of benefits knows two different subgroups (internal efficiency and HR and managerial processes). Figure 2.5 shows which items of benefits belong to which group or subgroups. Section 2.5 deals

with the deterrents for ISO certification, these are not included in the final model, but are kept in mind during the analysis.

3. Methodology

The research aims to clarify the perceptions of Chinese companies about ISO certification. The theoretical framework developed in chapter 2 (figure 2.8) functions as basis for the data collection concerning motivations, barriers and drivers for ISO certification in China. The variables defined by the theory are tested for Chinese companies in the electrotechnical and software industries. The outcomes of the data collection are reflected on the relations between motivations and barriers.

Starting the research I choose to perform a multiple-case study with in dept interviews in order to assess the experiences of Chinese companies in relation to ISO certification. However, during the process it became clear that in designing the research the difficulty of getting in contact with Chinese companies was underestimated. This because of various reasons, first of all the Chinese culture is very closed and companies are not used to participate in (academic) research and are, therefore, more hesitant about opening up their internal operations to scrutiny. Even customers of the KEMA Quality offices in China did not demonstrate willingness to contribute to the research by an interview. This can also be caused by a poor understanding of the English language and fear of failure because of not comprehending the questions during a conversation. A third deterrent for the interviews is the high staff turnover, which makes it difficult to contact the right person in the company with knowledge about the quality management system. The quality manager on duty often does not know why his predecessor (or those before him or her) did choose to implement the ISO standards and which benefits are perceived since. Contacting the director in the company is, in the majority of the cases, not an option because they are usually not so much involved in the processes of the company.
Due to the observed difficulties in realizing a representative number of case studies, I choose, during the research, to complete the data gathered by the interviews with quantitative data by means of a survey.
The data collection became a slow process. However, I can state that all possible attempts are undertaken, within the framework of the time limitations and my possibilities as a student, in order to make the data collection as productive as possible.

3.1 Case studies

The research is partly qualitative in nature and is carried out by means of a multiple-case study and therefore various groups have participated. The multiple case design is chosen because its *"evidence…is often considered to be more compelling, and the overall study is therefore regarded as being more robust"* (Yin, 2003, p. 46). The replication logic follows the logic of multiple experiments, the replication logic can have one of the following two underlying assumptions: to predict a similar result or predict contrasting results, but for predictable reasons. The selection of the cases must happen keeping in mind these two assumptions (Yin, 2003). The theoretical framework offers, in this case, good possibilities to select cases that predict divergent results. Therefore, different groups of cases are selected: on the one hand a number of Chinese companies are selected and on the other hand some experts are approached. The different types of participants enable to analyze different perceptions on the same behavior; this is also called triangulation (Dooley, 2001).

3.1.1 Design instruments case studies

The instruments used in order to gather the data in the case studies are interviews, questionnaires and observations. All the instruments provided qualitative data which contributed to both the understanding of the

Chinese context in relation to the ISO standards and the perceptions of Chinese companies about the standards.

Interviews provide rich and detailed information and are, therefore, suitable for case studies. The type of interview chosen to collect data is the moderately structure interview, in which *"…the major questions to be asked are decided upon before the interview is conducted, these do not have to be posed in a set, pre-ordained sequential order. Rather they can be asked in the context of a more natural style of interaction"* (Millar et al., 1992, p. 10). The major questions are open questions and are based on the main research question. Open questions permit a great freedom in possible responses (Millar et al., 1992, p. 129) and are therefore supported by some probing questions which encourage further expansion of the response (Millar et al., 1992, p. 129). This combination of types of questions is chosen in order to not influence the answers of the interviewee; asses, through the probing questions, the variables resulting from the literature and gain more in dept information by using examples. A copy of the interview protocol can be found in appendix I.

The questionnaire presents a set of open questions as well, for the same reason as for the interview. However, being the purpose of the questionnaire different, the questions differ to a certain degree from those in the interview protocol. In fact, while the interviews are directed to the Chinese companies, the questionnaires are meant for the experts. Experts are in this case people with knowledge about the topic in the Chinese context. Therefore the questions are not only based on the main research question as in the interviews, but are also addressed in order to get better understanding of the Chinese context. A copy of the questionnaire can be found in appendix II.

3.1.2 Response

The interview protocols were sent, accompanied by a request letter explaining the purpose of the research and practical information about the interview, by email to three types of contacts. First of all a research on the internet provided a list of email addresses of Chinese companies in the sectors indicated in section 1.3. These addresses were mainly gathered through general trading websites and in a second stage confronted with the email address on the official website of each company. The result was a list of 43 email addresses. To all these companies a general email was sent with as attachments the request letter and the interview protocol.

Secondly, the offices of KEMA Quality in China were approached in order to provide a list of contacts. 122 email addresses was the result of this. To all the companies a personal email was sent, with as attachment the request letter and the interview protocol, requiring their participation in the research. Also individual employees of KEMA Quality were asked if they knew any companies suitable for the research.

Lastly, a list of email addresses was gathered through the internet site of a fair in Munich, 'electronica 2008', with as result a list of 219 email addresses. A general email was sent addressed to the 'electronica 2008 visitor', accompanied by the request letter and the interview protocol, explaining the possibility to take the interview at the fair.

Of the first group 18 emails were undeliverable (because of a non-existing email address, exceeded quota or other reasons), no email was replied. Of the second group 19 emails were undeliverable; no emails were replied from companies wishing to collaborate. However, 4 companies filled in the interview protocol giving answers to the open questions. Of the third group 8 emails were undeliverable, the other companies did not respond and one company was willing to participate in an interview on the fair. An employee of KEMA Quality provided contact information of one company, the director of the company was willing to participate.

A second request to the companies searched on the internet and the companies participating at the fair did not provided better results. The contacts of KEMA were asked to participate with the survey.

The experts were approached mainly inside the company, 20 questionnaires were sent by email to employees of KEMA Quality. Four questionnaires served as backup for an interview with employees of KEMA Quality. Through the agency of the EVD (Economische Voorlichtingsdienst, the Dutch agency for international business and cooperation), nine questionnaires were sent to the Dutch Embassy in Beijing, the economic departments of the Dutch Consulates General (Shanghai, Guangzhou and Hong Kong) and the five Dutch Business Support Offices (NBSO).
Of the questionnaires to the KEMA employees 6 were filled in (some of them after 3 reminders); others responded to the email but did not filled in the questionnaire because of a lack of knowledge; some employees did not reply the email at all. The questionnaires sent through the EVD were all replied.

There are no strict rules concerning the number of replications. Indication for choosing the number of cased is given by Yin (2003) who states that it is a matter of discretionary, judgmental choice, the sense of complexity of the area of external validity. The number of the units of analysis depends in this case also on the responses and availability of the companies. However, the number of case studies is for this research not sufficient. Therefore, also a survey was developed and carried out.

3.2 Survey

A survey allows collecting a large amount of data from a sizable population (Saunders et al., 2003). Data are standardized because of the use of a questionnaire, which permits easy comparison (Saunders et al., 2003). Surveys can be used for both descriptive and exploratory purposes (Babbie, 2004) and are, therefore, suitable for this research. According to Babbie (2004, p. 243) are surveys *"excellent vehicles for measuring attitudes and orientations in a large population"*.

3.3.1 Design instrument survey

The surveys are self-administered and are partly returned by email and partly delivered by hand to each respondent and collected later (Saunders et al., 2003). Most of the questions in the survey are rating or scale questions, because these are mostly used to collect opinion data (Saunders et al., 2003). A four- and five-point Likert-scale is used and the same order of response categories is kept in order to avoid confusing respondents (Dillman, 2000; cited by Saunders, 2003). The statements are based on the items resulting from the theoretical research. In order to reduce the apparent length of the survey, the items are summarized in a table, whit instructions on how to answer the questions given prior to the table (Saunders, 2003). Thanks to the table the length of the survey fitted into the advised length of four to eight pages (Saunders, 2003). Besides the rating questions some other types of closed questions are used, such as category and quantity questions (Saunders, 2003), in order to gain some general information about the company and the role of the respondent. Filter questions are incorporated in order to make it easier for the respondent to fill in the survey (Saunders, 2003). A copy of the survey can be found in appendix III.

3.3.2 Response

The surveys were developed in order to distribute them on the fair in Munich. During four days 80 surveys were delivered personally to Chinese companies on the fair, explaining the purpose of the research and asking whether the company was willing to participate, had time for it and understood the questions. 47 surveys were collected; however of 10 only the first part was filled in.
The surveys were also sent to 103 contacts of KEMA Quality, using the same list as for the interviews minus the email addresses of the undeliverable emails. 5 emails were undeliverable (either at the first request or at the

reminder). 22 companies replied the email (or the reminder), of these 16 had filled in the survey, the others did not want to, had no time or no knowledge about the issue.
In total 51 surveys were filled in properly and included in the data analysis.

3.3 Limitations

The limitations of the research are mostly related to the Chinese context and culture, however also other limitations must be acknowledged. The following limitations are recognized:

- Chinese companies are reluctant to participate in research. Long term relationships are important and it is difficult to get in contact with a company.
- The high staff turnover in Chinese companies makes it difficult to find the right person who can provide the necessary information.
- The risk of collecting unreliable data because of respondents giving socially desirable answers.
- The language barrier is responsible for communication problems and limits the selection of the companies that can participate in the research.
- The number of companies in which in-depth interviews are performed is not representative.
- Companies with an attitude towards good quality are more willing to participate.
- All companies are engaged in export; therefore, the sample may not be representative for all Chinese companies.

Most of the limitations, but not the scale of them, were known starting the research and preventive measures were taken in order to avoid those limitations to affect the results of the research:

- Companies were approached making use of the network of KEMA Quality's offices.
- Requests were addressed to contact persons, requiring passing on the request or survey to the quality manager or general manager of the company. There were no contact person was known the email was addressed to the general manager of the company.
- The in-depth interviews were prepared accurately, recorded in order to reduce bias and to be used to learn for future interviews.
- The language is kept as simple as possible; recapitulations were made during the conversation and regularly was verified whether the respondent understood the intention of the research, interview or survey.
- The combination of in-depth interviews, expert opinions and surveys increases the representativeness of the research.

4. Data collection

4.1 Case studies

4.1.1 Case 1

The first case study is a company specialized in the design and the manufacture of timers, security systems, low-voltage lighting, night lights, and corded products. The company exists for 30 years and produces 40000 different products, sold in Europe, the United States and Australia. Main customers are businesses which sell the products under their own name and importers. Among the customers there are some big firms in the United Stated and Europe. The headquarter is situated in Taipei, Taiwan. Other offices are located in the Netherlands, in the United States and in Canada. All five production facilities are located in China since 15 years. In 2001 also the R&D moved from Taiwan to Dongguan, China.
The CEO of the company decided to apply for ISO 9000 certification eight years ago, ever since all the factories have been ISO certificated. The factories are not ISO 14000 or OHSAS 18000 certificated. The main reason for choosing certification was the requirements of customers. According to the CEO ISO certification was at that time *"a hype"* and every buyer required ISO certification before purchasing the products. There was no pressure or inducement from part of the government to acquire ISO certification. Obstacles before and during the implementation process were high costs of certification and the time spent in order to get the certificate. The CEO does not know whether the costs are recovered by additional sales of the products. The products were selling well without ISO certification, so it is difficult to assess if certification has affected the sales. Concerning the improvement of internal processes the CEO did not perceive radical changes. The company already had well working internal processes and there were no changes in terms of effectiveness or efficiency.

In this case the following items can be said to play a role in choosing for ISO certification: customer pressure, export, marketing, reputation, follow leadership in the industry (hype). The barriers in choosing for ISO certification are the design costs, implementation costs, maintaining costs, time and the fact that the costs do not outweigh the benefits. The major benefit, or the only benefit, perceived by the company is that of keeping its customers.

4.1.2 Case 2

The second case study is a company which develops and manufactures LCD, LCM, touch panels and related products for various applications, depending on customer requirements. The company was founded in 2004 and in that year it also acquired the ISO 9001:2000 certificate, in 2008 it acquired the ISO 14001 certificate. The company has four production facilities and approximately 2300 employees. Products are sold to other businesses, local and overseas. Customers are, for example, NIKE, Adidas, Thomson, Yamaha, Canon, Hisense and Lampex. The sales are about 54 million USD. Besides ISO the company adopts some other quality management tools, like the PDCA circle, but not TQM.
The marketing manager reveals as the main reason for pursuing ISO certification, ISO 9000 as well as ISO 14000, customer requirements. Therefore, when starting operations the company decided to include ISO certification into the marketing plan. The second reason for implementing the standards is because it provides a framework, internationally recognized, for managing a quality system. However, the marketing manager observes, "*ISO is a minimum, a basic, something to start upon to do extra in order to use it for quality*

enhancement". Both local customers and overseas customers do require ISO, because the customers in China might ultimately export their products overseas. ISO certification is mainly important for business to business, there are no rules or regulations from part of the government to stimulate ISO certification.
In the eyes of the quality manager the costs of ISO implementation are not to be considered to be a deterrent anymore, because it is not expensive. He can not name a specific prohibiting factor for the implementation of the ISO standards. However, the knowledge of employees on the operational level is not adequate in order to work with the different quality improvement tools the company operates. The use of quality tools is not part of the common knowledge of employees, especially at the operational level. For this reason it is not a difference (and thus additional costs) between training new employees to work according the ISO standards and training them to understand the quality policy of the company. It is important to have employees with the right attitude, who understand that "*what you say, what you write and what you do must be the same"*.
The major benefits of ISO experienced by the company are the recognition from customers and the fact that the quality manager has a document to use as a steppingstone in order to check and monitor the processes. This document can be used to control suppliers and the companies own processes by the customer and by the managers themselves. In fact, the company controls the incoming products and adopts a quality rating for suppliers.

In terms of the items found in the literature the motivations for choosing ISO certification can be said to be: customer pressure, export, marketing, reputation and improve quality and environmental performance or at least, guaranteeing a minimum quality level. Barriers in implementing the ISO standards are not so much the costs as the lack of time and the lack of personnel. The knowledge level of employees is also an obstructing factor. Benefits of ISO implementation can be found in the sphere of competitiveness and in the sphere of external orientation. Also some items of internal benefits are evident; such as more standardization, better guidelines, clearer work instructions, overall awareness of procedural problems, better understanding of job responsibilities and obligations, better control and more involvement in work.

4.1.3 Differences between the cases

It is remarkable that the two companies experience ISO certification in a very different way. One seems to be experience it as a burden and does not perceive many benefits of the implementation of ISO certification while the second company has a more positive attitude towards ISO certification and is aware of the benefits, external as well as internal, that the implementation offers. The difference in perception of the ISO standards and ISO certification can be explained by the fact that one company feels it has already its management system in place and the implementation of ISO standards did not contribute significantly in improving the quality of the management system. Instead, it rather did cost time and money. The other company just stared to implement a management system and perceives the ISO standards as a valuable tool to do so; therefore, the costs and time involved in certification are not seen as a big deterrent, but as necessary. The ISO guidelines are in this case a good start point in setting up a management system.

4.2 Experts

4.2.1 EVD

The EVD (Economische Voorlichtingsdienst) is an agency of the Dutch Ministry of Economic Affairs. It mediated in obtaining information from the Dutch governmental bodies in China, including the Embassy, the Consulates General and the NBSOs (Dutch Business Support Office).

The Dutch governmental bodies in China generally agree on the fact that certification is done mostly in order to meet customer requirements, especially when doing business overseas. The NSBO in Wuhan states that ISO certification *"gives companies a good image"*. However, this is contested by the NSBO in Nanjing which thinks the image and creditability is contestable because there seems to be *"a problem with companies simply buying (fake) certificates"*. Also in a report of KPMG (2006, p. 26) on corporate responsibility in China is mentioned that *"It is suspicious how many companies have such a certification (referring to ISO and SA certification). This can be explained by the fact that you can just buy them on the street"*. The NBSO in Dalian recognizes that it is not difficult to get a certificate because certification bodies are *"more flexible in China"*. There are more than 170 organizations that can issue an ISO certificate (Beijing Embassy), in the Hubei province there is a lot of competitions between certification bodies, therefore they lower their costs (NBSO Wuhan).
On the contrary, the Beijing Embassy is of the opinion that understanding and recognition of the ISO standards have improved since the standards appeared in China more than fifteen years ago.
Very little information is given about the barriers for ISO certification. Only the Consulate General of Shanghai recognizes for large companies the managerial changes as a barrier and for smaller companies the costs of implementation and maintenance.
The role of the Chinese government with regard to ISO certification differs from province, or at least this is the impression from the questionnaires. The NBSO in Dalian states that certification is not compulsory and the government does not actively encourage companies to adopt ISO. The Beijing Embassy does not mention ISO certification to be obligatory, but it indicates some laws of interest for management certification (the Standardization Law of the People's Republic of China, the Product Quality Law of the People's Republic of China and the regulations of the People's Republic of China on certification and accreditation).
On the other hand, the NBSOs in Wuhan and Nanjing state that the government does encourage the adoption of ISO certification; however, there are no legal requirements (NBSO Nanjing). The local government in Hong Kong established in 1989 a non-profit certification body, the Hong Kong Quality Assurance Agency, to encourage local companies to adopt ISO certification. The certification body now operates internationally. The NBSOs in Jinan and in Tianjin both recognize that the government encourages export oriented companies to adopt ISO certification and to this end the local governments subsidize local companies. In the Shandong province the amount of the subsidy can mount up to 70% of the costs of certification (NBSO Jinan). In Tianjin this percentage is 50%, up to a maximum of 80,000 RMB (NBSO Tianjin).

4.2.2 KEMA

René Hendriksen, Manager Components, Products Arnhem
Chinese companies have ISO only because of customer requirements. For KEMA customers in China this is the case, all these companies are engaged in export. It is not known if companies producing for the local market are as well interested in ISO certification. ISO is experienced by Chinese companies as 'deadweight'. Companies with origins in Taiwan and Hong Kong are more involved with quality. However, the expectation is that the

Chinese attitude towards quality will change, because of the many Chinese students in foreign countries. In choosing the certification body there are two important aspects: price and branding.

Beat Kreuter, Board of Directors, Shanghai

Every company in China wants to have an ISO certificate, but very few are interested in following the ISO requirements. For the majority of the companies, especially small companies, an ISO certificate is just another piece of paper they can show off, a recognition from a third party which says that the quality is good. They are not really interested in having ISO as a quality improvement tool. ISO is not only interesting for companies engaged in export, also domestic companies are interested because of the scandals involved with quality (e.g. the milk powder scandal).

The government is encouraging Chinese companies to improve quality and therefore supports ISO. In China it is not called ISO 9000, but 'GB standard' and has become a national standard.

The perceived benefits are mainly limited to benefits related to recognition from outside. Only those companies who seriously implement ISO are able to use it as a quality improvement tool, and eventually as a cost reduction tool as well. But often people in a factory are not aware of the fact that there is a procedure existing for the process they are doing. This can be because of the high fluctuation of employees, which requires a lot of training that companies do not want to offer because of costs and time. However, Chinese companies do not experience ISO as a burden because it is a certificate they can show off.

Chinese companies do employ other methods for quality improvement, like TQM and Six Sigma, which is very popular. But also in this case it is not clear why they employ it, probably again to show off. They monitor quality by checking the quality of products at the end of the process.

Attention for the environment is growing and there are regulations that induce companies to employ environmental sound processes. A lot of companies do already have ISO 14000, mainly to demonstrate that a third party established that the processes are in place.

There is also a growing interest for occupational health and safety, with some pressure for retailers with the production in China and large multinationals which import from China. However, there are some unresolved issues with the government about OSHAS 18000, like the fact that foreign certificators are not allowed to audit for OHSAS 18000.

Chinese companies that do not consider certification to have an added value are probably not hesitant about switching certification body. This will depend first of all on pricing, and secondly on branding. Branding plays a role especially for exporting companies, because of recognition by customers. Local certification bodies are very strong on the domestic market.

Warron Wang, Laboratory Manager, Products Wenzhou

About 90% of the Chinese factories are ISO 9000 certificated, for most of them (approximately 60%) it is just a piece of paper to show to their customers. However, a large part of the companies and managers is serious about management certification and do think it is important for the quality of their products. The first group experiences ISO as costly, and costs are important in choosing a certification body. For the second group the quality of the certification body is important in the first place, the costs are secondary. The government does not focus on ISO, when local governments want to improve the average quality of a province the focus lies more on product certification.

Even if environmental conditions and occupational health and safety are seen as important issues by the Chinese government, as well as by Chinese companies, the certification concerning these issues is not that important.

Other employees

Some KEMA employees were requested to give their opinion about the perceptions of ISO certification by email. All of them agreed on ISO being implemented by Chinese companies mainly because of customer requirements and marketing purposes. This applies especially for export oriented companies (Wendy Yang, Concon). Eric Dirven states that in general Chinese companies are not very interested in ISO 9000 certification. Many management systems are in very poor state even if certified (either by a local or an international certification body). Taiwanese companies (independently of the location) have qualitative better management systems, companies from Hong Kong are in between.

According the employees of KEMA Quality the government encourages the adoption of ISO certification, but there are no legal requirements. The Chinese government is interested in good audits, as a consequence already one certification body is banned, as far as known (Evert Bosch).

4.2.3 Others

Albert Stekelenburg, Chairman and Chief Executive Officer All-Line Inc.

ISO certification is done by Chinese companies because of customer pressure. However, ISO was a rage, product certification is in his eyes much more important. An example is the new directive RoHS, which states that *"new electrical and electronic equipment put on the market does not contain any of the six banned substances"* (RoHs, 2008). Customers are not requiring ISO certification anymore, instead they ask for product certification.

There are a lot of certification bodies on the Chinese market, both foreign and local. The local firms are preferred by most companies because their prices are lower and there is no language barrier. Internationalization of the certification body is not that relevant in the case of ISO certification; in the case of product certification this is different: international recognition plays in this case a role.

4.3 Surveys

Discussing the relation between motivations for ISO certification and the benefits companies perceive, the model clearly shows that internal motivations lead to a broader spectrum of benefits (including internal and external benefits) than external motivations do (figure 2.8). In order to test the relation between motivations for ISO certification and benefits of ISO certification in Chinese companies the data gathered through the surveys were analyzed.

The various items were clustered with as a result ten variables. Figure 2.2 shows which items are recognized as a motivational factor for ISO certification, the figure also suggests how these items can be clustered in four different subgroups. These subgroups are in the analysis the independent variables:

- Legal and institutional pressure
- Stakeholders pressure
- Competitiveness DE (Driver External)
- Internal

Figure 2.5 shows which items are recognized as benefits of ISO certification, and how the items can be clustered in six different subgroups.

These subgroups are in the analysis the dependent variables:

- Competitiveness BE (Benefit External)
- External orientation
- Societal
- Financial
- Internal efficiency
- HR and managerial processes

There are two variables named competitiveness, in order to indicate the difference between the two is decided to add the letters DE (Driver External) to the independent variable and the letters BE (Benefit External) to the dependent variable.

It can be assumed that the items clustered into a variable are, in fact, measuring that particular variable because this is controlled looking at the frequencies and making a reliability analysis. The internal consistency is measured by calculating chronbach's α, a commonly used measure of the internal consistency reliability in surveys. The internal consistency of a variable is considered to be good with a chronbach's $\alpha > 0.8$; however, a chronbach's $\alpha > 0.6$ was considered to be acceptable as well. In four cases chronbach's α was between 0.6 and 0.8; deleting one or more items did not contribute considerably to increase chronbach's α and, therefore, in all cases all items were included in the variable (appendix IV).

Multiple regression analysis
After clustering the items a multiple regression analysis is made for each dependent variable, in order to investigate which independent variables have a positive effect on the dependent variables.
The external benefits are grouped into four variables, only two of these show a relation with the independent variables. The multiple regression analysis for 'competitiveness BE' reveals that two independent variables influence the dependent variable significantly. Excluding the other two can be said that:

Competitiveness BE = 0.680 + 0.314 Stakeholders + 0.454 Competitiveness DE (N=51; R^2=0.265).

The second dependent variable representing the external benefits, 'external orientation', is also influenced significantly by two independent variables:

External orientation = 0.668 + 0.491 Competitiveness DE + 0.339 Internal (N=51, R^2=0.405).

The dependent variable, 'societal', applies only for those companies who have ISO 14000 and therefore the population is smaller (N=31). There was no significant relation found between the dependent variable, which can be attributed to the small population. Also the variable 'financial' (N=51) is not significantly related to any of the independent variables.
The internal benefits are grouped into two different variables: 'internal efficiency' and 'HR and managerial procedures'. The first of these shows a high correlation with three of the four independent variables; however, only one of these influences the variable significantly. It can be said that:

Internal efficiency = 0.905 + 0.590 Internal (N=51, R^2=0.451).

The same applies to 'HR and managerial procedures':

$$\text{HR and managerial procedures} = 1.066 + 0.462 \text{ Internal } (N=51, R^2=0.235).$$

More information about the multiple regression analysis can be found in appendix V. Using the model of chapter 2 (figure 2.8), the results of the multiple regression analysis can be summarized as follows (figure 4.1):

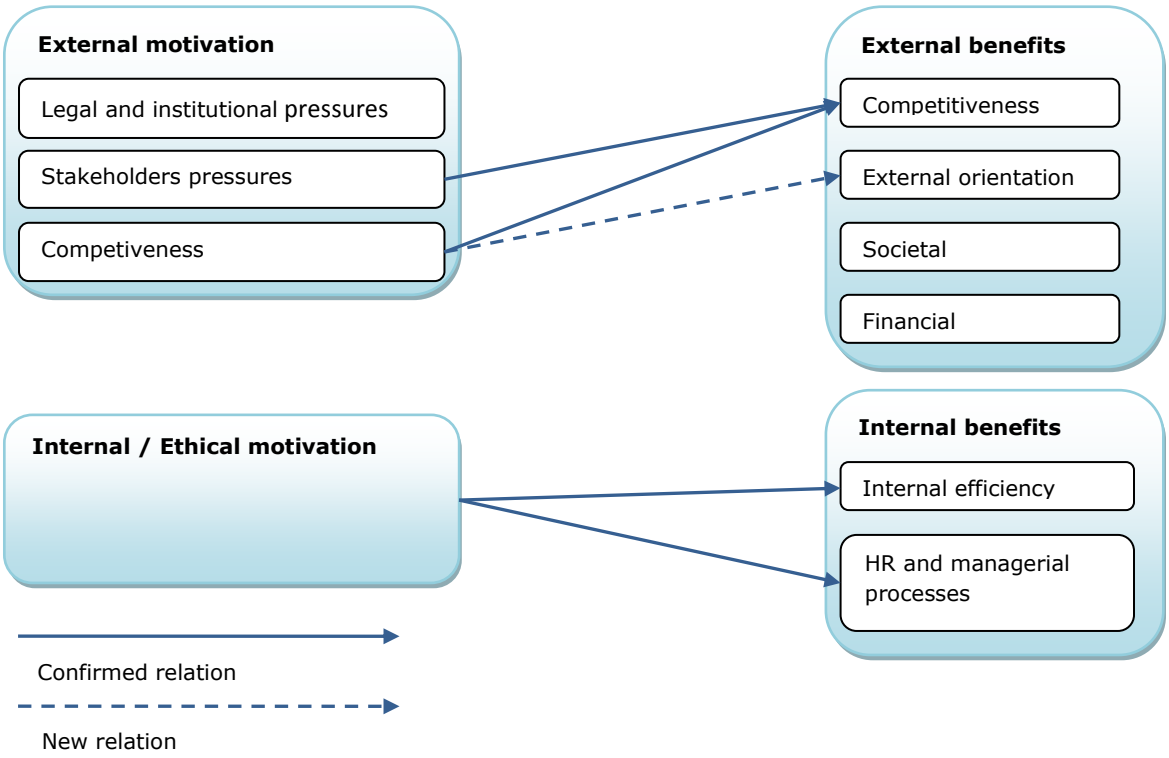

Figure 4.1 Relations between drivers and benefits according the survey

The results of the survey confirm just four causal relations of the fifteen predicted based on the literature, and reveals one new relation (between Competitiveness DE and External orientation) The results also confirm a clear distinction between the internal variables (drivers as well as benefits), but do not confirm the assumption which states that internal motivation cover a broader spectrum of benefits than external motivations do.

5. Conclusions and recommendations

The conclusions and recommendations outlined in this chapter are based on the qualitative and quantitative data collection and the experience gained during the research process. The conclusion aims to answer the main research question:

Which elements can be defined as drivers and barriers for ISO certification and which are the perceived benefits in Chinese companies?

In order to provide the most complete answer to the main research question several sub questions were formulated. The answers to these questions form a basis for describing the perceptions of ISO certification in Chinese companies. Drawing the conclusions the first three sub questions are taken into account.

1. *What are the characteristics of the Chinese context in relation to ISO certification?*
2. *How do the different elements described in the literature affect the decisions concerning ISO?*
3. *Which benefits of ISO certification described in the literature are perceived by Chinese companies?*

The conclusions will provide the basis for answering the fourth research question which will result in several recommendations to KEMA Quality. In fact, in the recommendations the fourth research question will be answered:

4. *How do the previous findings influence the strategic decisions of KEMA Quality?*

5.1 Conclusions

The Chinese government stimulates the adoption of ISO 9000 certification and ISO certification is never compulsory; yet the degree of involvement differs in the different provinces. Some provinces do not actively encourage companies to adopt ISO certification while other provinces even provide subsidies to companies in order to get ISO certificated. The support is demonstrated by the fact that ISO 9000 is adopted as a national standard with another name: the 'GB standard'. NGO's are not actively encouraging the spread of ISO certification in China. Concerning the environmental standard, ISO 14000, and the occupational health and safety standards, OHSAS 18000, no information was found in relation to the attitude of the government. However, it is reasonable to think that also these standards will gain some popularity since the issues are of growing interest also in China.

Major drivers for ISO certification in China have to be recognized in the external drivers, such as customers' pressure and export. This point of view emerged particularly analyzing the qualitative data collection, the surveys show a more nuanced point of view in which, on average, the stakeholders, the competitiveness and the internal motivations are all considered to be drivers for ISO certification to approximately the same extent (appendix IV). The focus of many companies on ISO certification for external reasons can be explained in two ways, depending on the type of company. In either case ISO certification is not considered to be as the ideal tool for improving the quality system.

In the first case, companies use other tools for monitoring the quality of the management system which guarantees them a high level of quality. In fact, their management systems exceed the quality level provided by the ISO standards. These types of companies have ISO certification because it is an international recognized quality standard for system management, which is often required by customers. For these companies, the ISO certificate is very easy to acquire; however, the costs involved in getting certificated can act as a barrier for

these companies. Not as much the design and maintaining costs, as well as the registration costs. Another barrier is the time spent getting a certificate; think for example of time used in making adaptations in the documents and time spent in audits.
In a second case companies do have ISO certification only to show a piece of paper to their customers and are not so much interested in improving the quality of the management system. In fact, the literature, as well as the qualitative research and the quantitative research, do not provide evidence of a relation between the external motivations for ISO certification and actual improvements in the process or the product (internal benefits).
ISO certification is supposed to be an indication of a minimum level of quality of the management system; however, the level of quality can vary substantially from company to company even if all ISO certified. This explains the increasing interest of customers for product certification (see e.g. section 4.2.3).

The main deterrents for ISO certification are the costs involved and the time and energy put into implementing and maintaining the certificate. Especially this last point seems to be present more in China than other countries, because of two reasons. First, there is a high turnover of employees; this means that employees with knowledge leave the company on a very high speed. Secondly Chinese employees do not have a lot of knowledge about quality systems, so they have to be trained. Companies investing in quality will train the employees anyway, not just for maintaining the ISO system. But companies not interests in the quality of the management system will experience this time and money spent in training as a lost.

The literature predicted a relation between the motives for pursuing ISO certification and the benefits perceived after certification is obtained. The qualitative and the quantitative research both confirm that companies which gain ISO certification because of external reasons are more likely to obtain external benefits. The companies that implemented ISO certification because of customer requirements did, in fact, experience benefits related to the market share, sales, export rates and in the sphere of external orientation. It is also true that there is a relation between the internal reasons for choosing ISO certification and the internal benefits perceived by the company. This seems to be true especially for those companies which use the ISO standard as a start for improving the quality of the management system.
No evidence is found to confirm the statement of Terziovski and Power (2007) and the prediction of the model in chapter 2 (figure 2.8), in which the internal motivations lead to a broader spectrum of benefits, including external as well as internal benefits.

5.2 Recommendations

The conclusions give reason to think that Chinese companies approach ISO certification in various ways, some of them are driven by a genuine goal of improving their quality, other companies are driven by factors coming from the market, especially the requirements of customers. KEMA Quality focuses its services on companies which are dedicated to improve their overall quality by improving their management systems. In order to be successful in China, KEMA Quality should discover the niche in the market; those companies who recognize the importance of optimizing their management system. A way of doing this is to focus on companies close to academic institutions. The quality awareness in Chinese companies is not always comparable to European standards, especially on lower levels in the company. Therefore, it is expected that companies employing high educated people will be more quality aware than others.

KEMA Quality pretends to deliver an added-value, other than other certification bodies. This added value is difficult to describe and thus, difficult to understand for aspirant clients. KEMA Quality should put aside vague terms and euphemistic terms and name concrete unique selling points, were possible expressing these points in money. This is difficult because it will increase the expectations of the clients; however, it's possible to give some examples from the excising clients in order to illustrate the success of the approach used by KEMA Quality.

It is not clear which role branding plays in China. According to some it is a very important aspect of doing business in China, while others remark that the choice of the certification body is mainly price driven. The impression is that branding is important mainly in product certification, not as much for management system certification. This is especially true for companies engaged in export; international reputation of the certification body is more an issue for product certification. However, KEMA Quality can use its reputation for companies related to the Netherlands. It is also possible of using the connection with the partners of KEMA in different countries to expand this network.

Getting in contact with Chinese companies has demonstrated over and over again to be very difficult. One way of facilitating this is to use the connections of the existent KEMA Quality clients, of KEMA Quality Products as well as Systems. Many clients of KEMA Quality have production facilities in China; each facility has different suppliers which are requested by the clients of KEMA Quality to be certificated. It should be explored if it is possible for KEMA Quality to be the certification body to do this. Several advantages are in it for the suppliers, who, for example, can reduce the audits performed by the company they supply to (as happens currently).
KEMA Quality should also promote ISO certification in the companies where they provide the product certification.

Being quality an issue in China, ISO is expected to play a role in this; however, the impression is that product certification is much more important than management system certification. Probably because product certification really guarantees a certain quality of the product, while the influence of ISO certification is much more dependent on the way the company experiences management system certification. However, there is globally also an increased interest for environmental responsibility. Therefore, KEMA Quality should use the existing and future networks in order to inform and promote the environmental standards. Also in this case concrete benefits for the companies can be used in order to illustrate the success of the KEMA Quality approach and the benefits of ISO certification for the company.

An important obstacle in doing business in China is the language. KEMA Quality should adapt their staff further in order to be able to reduce as far as possible the gap between the European and the Chinese culture. One method is to employ Chinese people with knowledge of both cultures, for example those who studied and lived in Europe for an extended period of time.

5.3 Reflection on the model

The model drawn based on the theory (figure 2.8) shows a clear distinction between internal and external motivations for ISO certification and between internal and external benefits. This distinction clearly influences the relation between the motivations and benefits. In fact, the model suggests that companies that implement ISO certification mainly for external reasons, such as customer pressure, are more likely to experience only

external benefits. On the other side, companies that choose to implement ISO certification mainly for internal reasons are more likely to perceive a broader spectrum of benefits, internal as well as external.
The gap between internal and external items (drivers as well as barriers) is confirmed by this research (see e.g. figure 4.1). However, the fact that internal motivations result in a wider range of benefits is contestable even if the case studies show that is not unreasonable to think this is indeed the case. The case studies suggest that the maturity of the management system can influence the reasons for ISO implementation and the results of this implementation.

5.4 Limitations of the study

The research knows several limitations. Most of these are similar to the limitations named in section 3.3 and deal mainly with the Chinese context and culture. However, some additional limitations can be named. The research regards only the electrotechnical and ICT industries; therefore, it can not be extended to all Chinese companies. Different sectors can experience ISO certification in different ways and the sector can influence the way in which management system certification is experienced.

5.5 Further research

The research provides different motives for further research. One area that can be explored more in dept is the added value provided by ISO certification. Some companies treat this just as a document to show to customers, while others consider it to be redundant because they have optimized their quality management system and are able to preserve and improve quality sufficiently without external audit. Which role does ISO certification play in guaranteeing, preserving and enhancing the quality of the management system?

It is also valuable to explore more in dept the relation between internal and external drivers and internal and external benefits. Taking into consideration also the maturity of the existing management system can give valuable information about the optimal moment for considering ISO certification and gaining the most benefits.

Another interesting relation to explore is that between ISO certification and actual improvements in the quality of the product. Which factors do really contribute to enhance product quality?

At the moment the standards for Occupational Health and Safety (OHSAS 18000) are not known well internationally. Research in this field on a global level would provide more insight in national methods of dealing with occupational health and safety.

More generally it is worthwhile to explore the concept of quality in China and its importance in future developments. This can be done monitoring the development of methods for improving the management system (like ISO certification, TQM and other tools). It can also be done monitoring the developments in specific sectors, dealing with sector specific standards.

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Appendix I. The interview protocol

Interview protocol

Part 1. Background

Brief information about the company and the interviewee

1. What is the core business of the company?
2. Is the company related to other enterprises, in terms of ownership?
3. How many production facilities does the company have?
4. What are the annual sales and profit of the company?
5. How many people are currently employed?
6. To whom does the company supply (e.g. business to business, business to consumer, export)?
7. What is the role of the interviewee in the company?

ISO certification

8. When did the company start to take into consideration ISO certification?
9. Which certificates for system certification are held by the company at the moment, and for which production facilities?
10. Does the company apply other tools for quality management?
11. How did you experience the implementation process?

Part 2. Drivers and barriers for ISO certification

Drivers for ISO certification

12. What were the main reasons for implementing the ISO standards?
13. Were there any other, secondary, reasons for implementing the standards?

Barriers to ISO certification

14. What major barriers did you encounter when deciding for ISO implementation?
15. Which other deterrents can you name for ISO certification, from your own experience?

Part 3. Benefits of ISO certification

16. What are the major benefits perceived after ISO implementation?
17. What are the secondary benefits perceived after ISO implementation?
18. Are any of these benefits measured?

Part 4. General remarks and conclusion

19. Do you have any other comments with respect to the implementation of ISO certification in your company?
20. How do you experience, generally speaking, the ISO standards?

Appendix II. The questionnaire

Chinese Market survey questionnaire

KEMA Quality, one of the operating companies of KEMA, is mainly concerned with certification and auditing. Within this, KEMA Quality Systems is a business line that focuses on system certification (for example the ISO series). Here attention is paid foremostly to the electrotechnical and ICT industries.

KEMA Quality Systems is present in China because of their European and American customers that have located factory plants in China. Therefore KEMA Quality is now interested in expanding their activities. To this end I am carrying out research for Jan H. van Lochem, Business Line Manager Medical Device & Systems Certification, KEMA Quality.

The research consists of two parts: an analysis of the perceptions of Chinese companies concerning ISO certification and a market scan of the sectors in which KEMA is interested in.

Concerning the perception of ISO certification it is useful to know the attitude of the government towards ISO certification. The ISO certificates KEMA Quality is interested in are: ISO 9000 series (Quality); ISO 14000 series (environment) and OHSAS 18000 series (Occupational health and safety).

The focus of the market scan lies on the regions in order to gather more information about the possibilities, and associated conditions, around such an expansion of the activities in a specific region of China.

I have already some information on China as a whole, but in order to be more specific geographically I produced this questionnaire with which I try to get a picture of each region. I would like to know whether you can collect this information for your region.

ISO certification

Role of the government

1. What is the role of the (local) government concerning the adoption of ISO 9000 certification, ISO 14000 certification and OHSAS 18000 certification?
2. Which legal requirements are there concerning system certification?

General perceptions

3. Is there any insight in the drivers (or barriers) for ISO certification, and the perceived benefits obtained after implementation?

Market scan

The markets of interest are production companies of electrotechnical and electronic devices (such as household equipment), semiconductors, software and telecommunication equipment.

4. Which of these sectors are represented in the region?
5. Is there any specialization of the region in one, or more, of the sectors?
6. Is this specialization influenced in any way by the government or other factors (for example presence of universities, raw materials)?
7. Which trends are observable (or predicted for the future) concerning these industries?

Are the following market indicators available?

8. Number of companies per sector
9. Number of companies divided by size per sector
10. Number of foreign owned companies per sector
11. Revenue (EUR) of companies by size per sector
12. Export revenue (EUR), and to which countries
13. Growth (trend recent years and forecast)
14. Staff (FTE)
15. R&D expenditure (EUR as % of revenue)
16. Personnel turnover

To get as complete an overview as possible for the most important economic regions in China, This questionnaire is send also to:
- the economic department of the embassy in Beijing
- the economic department of the Consulate-General in Shanghai
- the economic department of the Consulate-General in Guangzou
- the economic department of the Consulate-General in Hong Kong
- the NBSO in Nanjing
- the NBSO in Jinan
- the NBSO in Tianjin
- the NBSO in Wuhan
- the NBSO in Dalian

I would like to thank you in advance for any effort you are willing to put into answering this questionnaire.

Looking forward hearing from you,

With kind regards,

Monica Pibia

Appendix III. The survey

Survey: Perceptions of Chinese companies about ISO certification

PART 1. Background information about the company

1. What is the core business of the company?
   - ☐ Electronical devices
   - ☐ Electrotechnical devices
   - ☐ Telecommunication equipment
   - ☐ Software
   - ☐ Semiconductors
   - ☐ Other, namely: ……

2. Is the company related to other companies, in terms of ownership?
   - ☐ No
   - ☐ Yes: it is a Mother company
   - ☐ Yes: it is a Daughter company with foreign funds in Hong Kong, Macao and Taiwan
   - ☐ Yes: it is a Daughter company with foreign funds elsewhere
   - ☐ Other, namely ……

3. How many production facilities does the company have?
   - ☐ ……

4. What are the annual sales of the company (in US Dollars)?
   - ☐ $ ……

5. To whom does the company supply?
   - ☐ Business to Business
   - ☐ Business to Consumer

6. How much % of the company's output is addressed for export?
   - ☐ 0 to 25%
   - ☐ 26 to 50%
   - ☐ 51 to 75%
   - ☐ 76 to 100%

PART 2. Background information about ISO certification

7. When did the company start to take into consideration ISO certification, even if not implemented?

Never *(PLEASE GO TO **PART 6**)*

- ☐ Starting the company: ……. year ago
- ☐ Starting export activities: ……. years ago
- ☐ ……. years ago

8. Which certificates for system certification are held by the company at the moment? *(more answers are possible)*

- ☐ ISO 9000 series
- ☐ ISO 14000 series
- ☐ OHSAS 18000 series
- ☐ None of these *(PLEASE FILL IN ONLY **PART 3**, **PART 4** AND **PART 6**)*

9. Does the company apply other tools for quality management?

- ☐ No
- ☐ TQM, before implementing ISO
- ☐ TQM, after implementing ISO
- ☐ Others, namely ……

PART 3. Drivers for ISO certification

10. To what extend were the following elements drivers for ISO certification? *(please put an **X** in the preferred option)*

Drivers and motivators (1)	**Not at all a driver**	**To a certain extent a driver**	**Clearly a driver**	**To a high extent a driver**
Rules and regulations				
Government and intergovernmental organization pressure				
Non-governmental organization pressures				
Customer pressure				
Expected customer pressure				
Export				
Cost reduction - *as competitive advantage (e.g. easier communication with buyers)*				
Marketing related activities				
Improve reputation				
Following certificated competitors				
Leadership in the industry				
Improve quality or, for ISO 14000, environmental performance				
Increase efficiency				
Increase stability				
Increase consistency				
Increase operations control				

Drivers and motivators (2)	Not at all a driver	To a certain extent a driver	Clearly a driver	To a high extent a driver
Stimulate innovation				
Cost reduction – *in the production process*				
Parent company requirements				
Top management devotion				
Improve employees commitment and motivation				
Drivers and motivators (3)				
ONLY FOR ISO 14000 CERTIFICATED COMPANIES:				
Cost reduction - *because of less fines and penalties, less waste/energy*				
Having ISO 9000 stimulated the adoption of ISO 14000				

PART 4. Barriers for ISO certification

11. To what extent where the following elements obstacles in choosing for ISO certification? *(please put an **X** in the preferred option)*

Obstacles and barriers	**Not at all an obstacle**	**To a certain extent an obstacle**	**Clearly an obstacle**	**To a high extent an obstacle**
There are better alternatives for meeting requirements of external parties				
There are better alternatives in communicating quality (for example, relation with customers or branding)				
Design costs				
Implementation costs				
Maintaining costs				
Costs do not outweigh the benefits				
Obstruction of the innovation process				
Lack of time				
Lack of personnel				
ONLY FOR ISO 14000 CERTIFICATED COMPANIES				
Fear discovering unknown regulatory violations				

12. Are there any other motivations/drivers?

- ☐ No
- ☐ Yes, namely ……

13. Are there any other obstacles/barriers?

- ☐ No
- ☐ Yes, namely ……

PART 5. Benefits of ISO implementation

14. To what extent does your company experience the following benefits of ISO implementation? *(please put an **X** in the preferred option)*

Benefits (1)	**Not at all a benefit**	**To a certain extent a benefit**	**Clearly a benefit**	**To a high extent a benefit**	**Don't know**
Increased sales					
Increased market share					
Increased export rate					
Access to new markets					
More advantageous in tendering					
Acquisition of new customers					
Increased customer loyalty					
Improved image					
Improved customer satisfaction					
Improved customer trust					
Reduction of complaints and returns					
Improvement in customer service					
Reduction of quality audits by customers					
Improved knowledge of customers' expectations					
Better stock performance					
Overall awareness procedural problems					

Benefits (2)	Not at all a benefit	To a certain extent a benefit	Clearly a benefit	To a high extent a benefit	Don't know
Improved effectiveness					
Improved efficiency					
Improved internal procedures					
Reduction of defects and errors					
Elimination of redundancy of work					
Reduction of lead-time					
Increased on-time delivery					
Better bottom-line					
Improvement of quality of product or service					
Better documentation					
More standardization					
Better guidelines					
Clearer work instructions					
Consistency across sites					
Reduction of waste					
Savings in production costs					
Increased productivity					
Development of a quality culture					

Benefits (3)	Not at all a benefit	To a certain extent a benefit	Clearly a benefit	To a high extent a benefit	Don't know
Better understanding of job responsibility and obligations					
Better linkage to other functions					
Communication improvements between employees					
Communication improvements between management and employees					
Communication improvements towards customers					
Better control of operations					
Improvement in the work environment					
Improvement in the involvement in work					
Improved satisfaction of employees					
Improves motivation of employees					
More customer oriented way of thinking					
Increased training					
Increased teamwork					
Benefits (4)					
ONLY FOR ISO 14000 CERTIFICATED COMPANIES					
Reduced legal liability					
Improved cooperation from environmental authorities					

Benefits (4)	Not at all a benefit	To a certain extent a benefit	Clearly a benefit	To a high extent a benefit	Don't know
ONLY FOR ISO 14000 CERTIFICATED COMPANIES					
Better access to special credit					
Better chances to obtain investment funds					
Reduction of insurance premia					

15. Are there any other benefits?

- ☐ No
- ☐ Yes, namely ……

PART 6. Closing remarks

16. What is your function in the company?

- ☐ Director
- ☐ General Manager
- ☐ Quality Manager
- ☐ Other, namely ……

17. Do you have any additional remarks?

……
……
……
……
……
……
……
……

Thank you for participating!

For more information or questions please feel free to contact me.

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Appendix IV. Variables

Reliability Statistics

Variable	Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
Legal and institutional pressures	,679	,676	3
Stakeholders pressure	,814	,815	2
Competitiveness (DE)	,723	,722	6
Internal	,911	,913	12
Competitiveness (BE)	,905	,902	7
External orientation	,806	,808	7
Societal	,685	,686	2
Financial	,684	,701	3
Internal efficiency	,901	,900	18
HR and managerial processes	,944	,944	14

Statistics

	DELegal	DEStakeholders	DE Competitiveness	DI
Valid	51	51	51	51
Missing	0	0	0	0
Mean	2,1078	2,6667	2,4784	2,5486
Std. Deviation	,70224	,66833	,58832	,60048

	BECompetitiveness	BEExternalorientation	BESocietal	BEFinancial	BIEfficiency	BIHR
Valid	51	51	31	51	51	51
Missing	0	0	20	0	0	0
Mean	2,6422	2,7441	2,5968	2,6405	2,7407	2,8082
Std. Deviation	,78908	,70515	,89833	1,13303	,64297	,79219

Appendix V. Multiple regression analysis

DECompetitiveness

Descriptive Statistics

	Mean	Std. Deviation	N
BECompetitiveness	2,6422	,78908	51
DEStakeholders	2,6667	,66833	51
DECompetitiveness	2,4784	,58832	51

Correlations

		BECompetitiveness	DEStakeholders	DECompetitiveness
Pearson Correlation	BECompetitiveness	1,000	,416	,456
	DEStakeholders	,416	1,000	,443
	DECompetitiveness	,456	,443	1,000
Sig. (1-tailed)	BECompetitiveness	.	,001	,000
	DEStakeholders	,001	.	,001
	DECompetitiveness	,000	,001	.
N	BECompetitiveness	51	51	51
	DEStakeholders	51	51	51
	DECompetitiveness	51	51	51

Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
1	,515[a]	,265	,234	,69043	,265	8,654	2	48	,001

a. Predictors: (Constant), DECompetitiveness, DEStakeholders

b. Dependent Variable: BECompetitiveness

ANOVA[b]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	8,251	2	4,125	8,654	,001[a]
	Residual	22,882	48	,477		
	Total	31,132	50			

a. Predictors: (Constant), DECompetitiveness, DEStakeholders

b. Dependent Variable: BECompetitiveness

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	,680	,482		1,412	,164
	DEStakeholders	,314	,163	,266	1,925	,060
	DECompetitiveness	,454	,185	,339	2,453	,018

a. Dependent Variable: BECompetitiveness

Residuals Statistics[a]

	Minimum	Maximum	Mean	Std. Deviation	N
Predicted Value	1,8374	3,6758	2,6422	,40622	51
Residual	-1,23056	1,89054	,00000	,67648	51
Std. Predicted Value	-1,981	2,544	,000	1,000	51
Std. Residual	-1,782	2,738	,000	,980	51

a. Dependent Variable: BECompetitiveness

BEExternal orientation

Descriptive Statistics

	Mean	Std. Deviation	N
BEExternalorientation	2,7441	,70515	51
DECompetitiveness	2,4784	,58832	51
DI	2,5486	,60048	51

Correlations

		BEExternalorientation	DECompetitiveness	DI
Pearson Correlation	BEExternalorientation	1,000	,594	,551
	DECompetitiveness	,594	1,000	,644
	DI	,551	,644	1,000
Sig. (1-tailed)	BEExternalorientation	.	,000	,000
	DECompetitiveness	,000	.	,000
	DI	,000	,000	.
N	BEExternalorientation	51	51	51
	DECompetitiveness	51	51	51
	DI	51	51	51

Model Summary[b]

					Change Statistics				
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	R Square Change	F Change	df1	df2	Sig. F Change
1	,634[a]	,402	,377	,55672	,402	16,108	2	48	,000

a. Predictors: (Constant), DI, DECompetitiveness

b. Dependent Variable: BEExternalorientation

ANOVA[b]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	9,985	2	4,992	16,108	,000[a]
	Residual	14,877	48	,310		
	Total	24,862	50			

a. Predictors: (Constant), DI, DECompetitiveness

b. Dependent Variable: BEExternalorientation

Residuals Statistics[a]

	Minimum	Maximum	Mean	Std. Deviation	N
Predicted Value	1,7466	3,8066	2,7441	,44688	51
Residual	-1,46606	1,25059	,00000	,54547	51
Std. Predicted Value	-2,232	2,378	,000	1,000	51
Std. Residual	-2,633	2,246	,000	,980	51

a. Dependent Variable: BEExternalorientation

BESocietal

Descriptive Statistics

	Mean	Std. Deviation	N
BESocietal	2,5968	,89833	31
DELegal	2,1344	,71027	31
DEStakeholders	2,7097	,61609	31
DECompetitiveness	2,5613	,57710	31
DI	2,5834	,58841	31

Correlations

		BESocietal	DELegal	DEStakeholders	DECompetitiveness	DI
Pearson Correlation	BESocietal	1,000	,271	-,083	,187	,285
	DELegal	,271	1,000	,105	,385	,375
	DEStakeholders	-,083	,105	1,000	,513	,311
	DECompetitiveness	,187	,385	,513	1,000	,656
	DI	,285	,375	,311	,656	1,000
Sig. (1-tailed)	BESocietal	.	,070	,328	,156	,060
	DELegal	,070	.	,287	,016	,019
	DEStakeholders	,328	,287	.	,002	,044
	DECompetitiveness	,156	,016	,002	.	,000
	DI	,060	,019	,044	,000	.
N	BESocietal	31	31	31	31	31
	DELegal	31	31	31	31	31
	DEStakeholders	31	31	31	31	31
	DECompetitiveness	31	31	31	31	31
	DI	31	31	31	31	31

Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
1	,383[a]	,147	,015	,89139	,147	1,117	4	26	,370

a. Predictors: (Constant), DI, DEStakeholders, DELegal, DECompetitiveness

b. Dependent Variable: BESocietal

ANOVA[b]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	3,551	4	,888	1,117	,370[a]
	Residual	20,659	26	,795		
	Total	24,210	30			

a. Predictors: (Constant), DI, DEStakeholders, DELegal, DECompetitiveness

b. Dependent Variable: BESocietal

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	1,735	,933		1,859	,074
	DELegal	,222	,254	,176	,875	,390
	DEStakeholders	-,310	,310	-,213	-1,001	,326
	DECompetitiveness	,113	,425	,073	,266	,792
	DI	,363	,373	,238	,974	,339

a. Dependent Variable: BESocietal

BEFinancial

Descriptive Statistics

	Mean	Std. Deviation	N
BEFinancial	2,6405	1,13303	51
DELegal	2,1078	,70224	51
DEStakeholders	2,6667	,66833	51
DECompetitiveness	2,4784	,58832	51
DI	2,5486	,60048	51

Correlations

		BEFinancial	DELegal	DEStakeholders	DECompetitiveness	DI
Pearson Correlation	BEFinancial	1,000	,143	-,122	,113	,264
	DELegal	,143	1,000	,199	,433	,501
	DEStakeholders	-,122	,199	1,000	,443	,150
	DECompetitiveness	,113	,433	,443	1,000	,644
	DI	,264	,501	,150	,644	1,000
Sig. (1-tailed)	BEFinancial	.	,158	,197	,214	,031
	DELegal	,158	.	,081	,001	,000
	DEStakeholders	,197	,081	.	,001	,147
	DECompetitiveness	,214	,001	,001	.	,000
	DI	,031	,000	,147	,000	.
N	BEFinancial	51	51	51	51	51
	DELegal	51	51	51	51	51
	DEStakeholders	51	51	51	51	51
	DECompetitiveness	51	51	51	51	51
	DI	51	51	51	51	51

Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
1	,313[a]	,098	,019	1,12210	,098	1,245	4	46	,305

a. Predictors: (Constant), DI, DEStakeholders, DELegal, DECompetitiveness

b. Dependent Variable: BEFinancial

ANOVA[b]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	6,268	4	1,567	1,245	,305[a]
	Residual	57,919	46	1,259		
	Total	64,187	50			

a. Predictors: (Constant), DI, DEStakeholders, DELegal, DECompetitiveness

b. Dependent Variable: BEFinancial

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	1,978	,882		2,241	,030
	DELegal	,070	,266	,043	,263	,794
	DEStakeholders	-,286	,271	-,169	-1,056	,297
	DECompetitiveness	-,009	,399	-,005	-,022	,982
	DI	,510	,373	,271	1,367	,178

a. Dependent Variable: BEFinancial

BIInternal efficiency

Descriptive Statistics

	Mean	Std. Deviation	N
BIEfficiency	2,7407	,64297	51
DELegal	2,1078	,70224	51
DECompetitiveness	2,4784	,58832	51
DI	2,5486	,60048	51

Correlations

		BIEfficiency	DELegal	DECompetitiveness	DI
Pearson Correlation	BIEfficiency	1,000	,407	,446	,635
	DELegal	,407	1,000	,433	,501
	DECompetitiveness	,446	,433	1,000	,644
	DI	,635	,501	,644	1,000
Sig. (1-tailed)	BIEfficiency	.	,002	,001	,000
	DELegal	,002	.	,001	,000
	DECompetitiveness	,001	,001	.	,000
	DI	,000	,000	,000	.
N	BIEfficiency	51	51	51	51
	DELegal	51	51	51	51
	DECompetitiveness	51	51	51	51
	DI	51	51	51	51

Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
1	,644[a]	,415	,377	,50743	,415	11,092	3	47	,000

a. Predictors: (Constant), DI, DELegal, DECompetitiveness

b. Dependent Variable: BIEfficiency

ANOVA[b]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	8,568	3	2,856	11,092	,000[a]
	Residual	12,102	47	,257		
	Total	20,670	50			

a. Predictors: (Constant), DI, DELegal, DECompetitiveness

b. Dependent Variable: BIEfficiency

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	,905	,346		2,617	,012
	DELegal	,103	,120	,112	,860	,394
	DECompetitiveness	,046	,162	,042	,286	,776
	DI	,590	,165	,551	3,577	,001

a. Dependent Variable: BIEfficiency

Residuals Statistics[a]

	Minimum	Maximum	Mean	Std. Deviation	N
Predicted Value	1,8140	3,5690	2,7407	,41396	51
Residual	-1,12311	1,41401	,00000	,49197	51
Std. Predicted Value	-2,239	2,001	,000	1,000	51
Std. Residual	-2,213	2,787	,000	,970	51

a. Dependent Variable: BIEfficiency

BIHR and manegerial procedures

Descriptive Statistics

	Mean	Std. Deviation	N
BIHR	2,8082	,79219	51
DELegal	2,1078	,70224	51
DECompetitiveness	2,4784	,58832	51
DI	2,5486	,60048	51

Correlations

		BIHR	DELegal	DECompetitiveness	DI
Pearson Correlation	BIHR	1,000	,341	,358	,465
	DELegal	,341	1,000	,433	,501
	DECompetitiveness	,358	,433	1,000	,644
	DI	,465	,501	,644	1,000
Sig. (1-tailed)	BIHR	.	,007	,005	,000
	DELegal	,007	.	,001	,000
	DECompetitiveness	,005	,001	.	,000
	DI	,000	,000	,000	.
N	BIHR	51	51	51	51
	DELegal	51	51	51	51
	DECompetitiveness	51	51	51	51
	DI	51	51	51	51

Model Summary[b]

					Change Statistics				
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	R Square Change	F Change	df1	df2	Sig. F Change
1	,484[a]	,235	,186	,71479	,235	4,805	3	47	,005

Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
1	,484[a]	,235	,186	,71479	,235	4,805	3	47	,005

a. Predictors: (Constant), DI, DELegal, DECompetitiveness

b. Dependent Variable: BIHR

ANOVA[b]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	7,365	3	2,455	4,805	,005[a]
	Residual	24,013	47	,511		
	Total	31,379	50			

a. Predictors: (Constant), DI, DELegal, DECompetitiveness

b. Dependent Variable: BIHR

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	1,066	,487		2,188	,034
	DELegal	,150	,169	,133	,887	,380
	DECompetitiveness	,101	,228	,075	,442	,660
	DI	,462	,232	,350	1,988	,053

a. Dependent Variable: BIHR

Residuals Statistics[a]

	Minimum	Maximum	Mean	Std. Deviation	N
Predicted Value	1,9646	3,6301	2,8082	,38380	51
Residual	-1,42221	2,04870	,00000	,69301	51
Std. Predicted Value	-2,198	2,142	,000	1,000	51
Std. Residual	-1,990	2,866	,000	,970	51

a. Dependent Variable: BIHR