Worldwide Evolution of ISO 9001 and 14001 Certified Companies: an Exploratory, Comparative Ten-Year Study

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Abstract

The evolution of emissions certifications over the last ten years evidences a concern for aspects related to the quality of Brazilian company environmental management services, considering the ISO 9001 and 14001 norms from a worldwide perspective. The objective of this study is to provide evidence of the consolidated information based on evolutionary analysis per continent from 2000 to 2009 of the certifications awarded in order to identify visibility in conjunction with stakeholders of worldwide environmental quality and management systems. This study is bibliographic in nature, as well as documental, descriptive, and exploratory, given the investigation carried out, using a qualitative and quantitative approach. The results of this study identify the evolution of certification and provide evidence there is visibility from the current number of company certifications. Further, this study verifies that companies utilize certification as a prerequisite to improving competitive and innovation indicators, thus eliminating the barriers imposed upon importing and exporting countries. In so doing, they guarantee the quality of products and services through the importance of conformity of their internal and external processes, where they concentrate their business among a majority of globalized companies.

Keywords: certification evolution; quality management system; environmental management; companies; continents.

1 Introduction

Studies that provide evidence towards the impact of conducts and attitudes in fulfilling environmental and quality norms, together with economic agents which resound in policies and business strategies in the private sector are fundamental in the process of verifying company certification. On the other hand, the institutional fragility of organizations motivates towards a reevaluation of the currently recognized model for certification in hopes of evidence concerning quality management and environmental management policy, which conciliates the irremovable role of client interests with consumer demands in all their reach. As to competition among companies and countries it provides a decisive role in improving quality and environmental management system strategies in productive operations among emerging economy countries. Such countries have denoted advances in terms of universalizing required certification. The current economic-technological scenario imposes the need for continual changes upon organizations in the way they operate and generate their business in order to adequate themselves to newer realities in which they maintain themselves competitive (Oliveira, Serra, 2010).

Certification demands as a voluntary form of business sustainability management have contributed in an effective manner towards defining parameters which establish well-defined principles in attending these norms. One verifies that pressure from diverse entities which exercise power through inspection structures and are responsible for confirming certification claims. The large number of legal norms concerning the environmental and quality question from stakeholder pressure has indicated to diverse authors the difficulties of its application. However, there is academic consensus concerning motives towards implementing Quality Management System (QMS), which seems motivated among the majority of organizations through external factors such as stakeholder pressures and interests to improving the

company's image. Other organizations are especially motivated through internal factors, such as improved products or services, reduced costs associated to a lack of quality and improving the company's internal efficiency (Casadesus, Heras, 2005, Shannon, Robson, Sale, 2001).

The objective of this study is to provide evidence for and to discuss consolidated information based on evolutionary analysis of certification per continent from 2000 to 2009 in order to provide visibility together with stakeholders of quality and environmental management systems all over the world. The terms of investigation which guided the development of this study are defined with respect to the following question: How can one provide evidence and discuss the evolution of quality and environmental management systems in relating them to worldwide certification emission? However, demonstrating the importance of continental progression of worldwide certification based on data available in the ISO 9001 and 14001 series norms, which are responsible for the international control system policy for company quality and environmental management. Such control may provide evidence towards the level of evolution of worldwide certification emission in a consolidated fashion as an indicator of competitiveness and innovation, demands which have grown both in internal and external markets. Headquarters are located in Geneva, Switzerland, since 1946. The abbreviation ISO refers to the Greek word, "iso", meaning equality. The International Organization for Standardization contains more than 159 member states. The ISO works with 180 Technical Committees (TC) and hundreds of subcommittees and workgroups. It is fundamental to show the relevance of certification evolution based on the database from a competent organization responsible for company environmental and quality management evaluation policy as a reference for competitiveness, innovation, and attending the demands of the market. For Lelis and Seiffert (2008) the dissemination of environmental management practices certainly has contributed to greater awareness within society and a maturity in management which has produced positive effects on company behavior and stimulated pro-active attitudes in favor of quality and environmental management. With respect to the QMS, the impact its implementation in companies is evidenced in academic literature, thus reflecting the fact that this system has offered benefits to diverse sectors. However, there is also a variety concerning its application in indicating product and service quality policy. Evidence related to the connection between ISO 9001 and ISO 14001 is fundamental to research which shows that companies which have adopted ISO 9001 are more likely to adopt the ISO 14001 (Delmas, 2002, Potoski, Prakash, 2004), while other analyses haven't found a consistently positive relationship between both norms (King et al, 2005). This article presents the following structure: methodological procedures, environmental management, quality management system, results and discussion and conclusion.

2 Methodological Procedures

This study is classified as qualitative and quantitative with respect to the object of the study. The nature of this study is classified as applied, with a descriptive and exploratory approach. Gil (2010) adds that exploratory and descriptive research utilizes inductive and deductive methods. The data were presented in graphs and tables, within the outline of the two thematic axes, as seen in Figure 1:

As to the data collection procedures, this study is carried out based on secondary data and thus is characterized as bibliographic and documental. To Marconi and Lakatos (2007), such research involves empirical investigation seeking to formulate questions or a problem in order to describe an intervention within the real context in which the fact occurs. In axis 1, the qualitative nature of the study is presented, based on the bibliographic selection of scientific articles and periodicals with the objective of identifying and exposing the theory in an objective form within the theme under study: environmental management, environmental management systems, and quality management systems.

As to axis 2, the quantitative character of the study is revealed in gathering consolidated information surrounding the ISO 9001 and 14001 norms given the acquisition of the database supplied by the ISO – International Organization for Standardization, entity responsible for overseeing and disclosure of all the certified companies in the world. This study was carried out through data analysis of graphs which show the number of certified companies per country, continent, and other classification. The objective was to

identify the evolution of quality and environmental management systems among companies based on the certification reports from 2000 to 2009. However, it is exactly this characteristic in which the limitation of this study resides, as it is based on information made available from the ISO 14001 database.

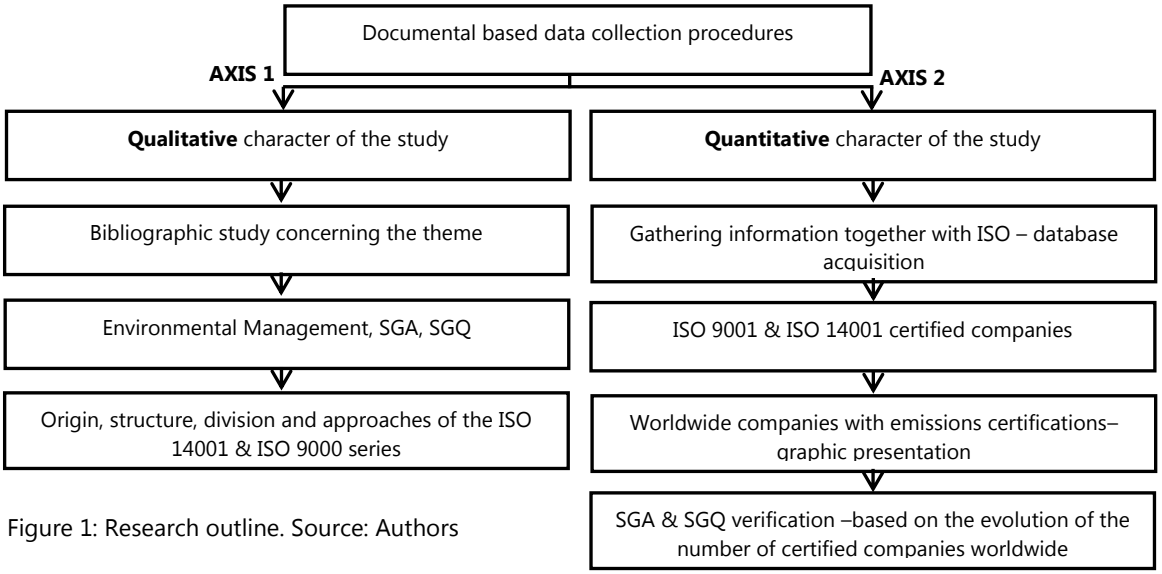

Figure 1: Research outline. Source: Authors

3 Environmental Management

In this approach, the terms of investigation related to the question which will guide its development in the theoretical foundation are defined: environmental management, environmental management system, environmental certification, evolution of worldwide emission certifications. While the principle objective of a company is its own profitability environmental questions have become more and more important with regard to increased consumer consciousness and its growing interest in the form of the products and services produced, utilized, and discarded, as well as their effect on the environment; from demands from large partner organizations towards cleaner production practices and towards internationally recognized certification; from exhausting natural resources.

Environmental consciousness is opening paths towards developing new business opportunities. With this, it also facilitates the inclusion of Brazilian companies in the international market (Silva, Medeiros, 2004). However, many of them have not sufficiently perceived the benefits and difficulties of the ISO 14001 implementation, certification, and systems management process. However, scientific studies developed to better understand this reality and to promote their disclosure and use are needed. Beyond this, social factors (consumer demands and non-governmental actions) and economic and political factors (imposed restrictions, fines, and new legislation) exercise additional pressure in introducing company environmental management. An environmental management system can be described as a methodology in which organizations act in a structured fashion concerning their operations in order to secure environmental protection. They define the impacts of their activities and thus propose actions to reduce them. Environmental Management (EM) however, seeks to continually control and reduce these impacts (Rowland-Jones, Cresser, 2005).

It is in the creation of legislation and systems which may identify opportunities to reduce material and energy use as well as improve productive process efficiencies (Chan, Wong, 2006). In this sense, the success obtained cannot overshadow the inherent difficulties to a theme of recent visibility. To the more skeptical, it is defined as a fad. The large number of legal norms due to stakeholder interests involved in environmental questions creates difficulties towards its application. A company's Environmental

Management System (EMS) may be used to plan, implement, and manage environmental policy. It includes interdependent elements such as organizational structure, the division of responsibilities, planning the necessary practices, procedures, processes, and resources to determine the policy in question and its objectives (Melnyk et al., 2002, Fortunski, 2008). Among studies and research concerning adopting EMS across diverse countries, we highlight the following: Hong Kong (Hui et al., 2001), Germany (Morrow, Rondinelli, 2002), USA (Babakri et al, 2003), Australia (Zutshi, Sohal, 2004), Canada (Boiral, 2007), Switzerland (Lundberg et al, 2007), Japan (Nakamura et al., 2001),England (Bernardo et al., 20110), China (Zeng, Tian, 2009), Italy (Franceschini et al, 2010, 2011), Espanha (González et al, 2008), Brazil (Albuquerque, 2009, Souza, 2009, Seiffert, 2008, Jabbour 2010, Trierweiller et al., 2011, Peixe et al., 2011), and others.

For Harrington and Knight (2001, p. 34), an environmental management system is "part of the global management system which includes organizational structure, planning activities, procedures, processes, and resources to be developed, implemented, acquires, critically analyzed, and to maintain the company environmental policy." This evidence permits the company to have a management system structured under various perspectives, conducive to adopting efficient and effective management.

Integrating concepts provides a comparative market recognized and valued difference for the company in question. However, it cannot be represented nor directly measured in a single measurement. Rather, its evaluation is considered through a set of attributes which may evidence competitive advantage and innovation. Certified EMS have gained highlight (Link, Naveh, 2006, Viadiu et al., 2006, Albuquerque et al., 2007, Salomone, 2008). Under the normative perspective, ISO 14001:2004, defines an EMS as a set of inter-related elements, part of a company's management system utilized to develop and implement its environmental policy in managing its environmental aspects. Implementing an EMS with ISO 14001:2004 not only strengthens some guarantees to the environment, but performance and credentials also offers a manner of demonstrating these external achievements to interested parties (Trevor, 2007). Nascimento et al. (2008, p. 208-209) defines an EMS as, "the set of procedures which will help the company to understand, control, and diminish the environmental impacts of its activities, products, and/or services." The Management System implementation process consists of 4 (four) phases: (1) defining and communicating the project; (2) EMS planning; (3) installing the EMS; (4) registry and evaluating the company's EMS policies. Many approaches in recent years have been presented by (Lagodimos et al, 2007, Specchiarello, Giagnorio, 2009, Bodas, 2009), in order to better understand the diffusion of studies through the most varied research concerning environmental management norms from ISO 14001:2004, due to its growth around the world. The most commonly known norms are: (1) EMAS, (2) BS 7750, and (3) ISO 14001. The European Union Eco-Management and Audit Scheme (EMAS) were adopted by the European Council (EC) in June of 1993. It has been open to voluntary company participation since April of 1995. Its primary objective is to promote continued improvements in environmental performance of industrial activities based on establishing and implementing environmental policies, programs, and management systems among organizations; of systematic, objective, and periodical performance analysis of the elements contained in the regulations; of the information provided to the community about a company's environmental performance. A list of all the units registered is published annually in the EC official journal. Such a registry could be considered, however, to be a "certificate" of good environmental performance to the company who earns it. The EMAS, on the other hand, has a principle difference from other systems. It demands for presentation an environmental, auditing, and eco-management self-declaration as regulated by the European Community (EC) through official publication in the EC's official journal (Shigunov Neto, et al, 2009).

The BS 7750 arose in the United Kingdom in 1994. As the norm from the British Standard Institute, it presents specifications for EMS development, implementation, and maintenance in order to secure and demonstrate conformity with the declarations companies make concern with their policies and environmental goals. The BS7750 served as inspiration for the ISO (*International Organization for Standardization*) in 1996 to release the ISO 14001, the most famous among EMS norms. It is an international environmental norm from the ISO 14001:2004 series which specifies the relative requirements of a EMS. As such it permits the company to formulate its policy and objectives, taking into account the legal and informational requirements referring to significant environmental impacts which

must be comprehended by everyone in the company who participate in the EM, involving the stakeholders (Martins, Laugeni, 2006). A company typically seeks certification when: (1) it feels compelled to do so for economic reasons or market-based demands; (2) it possesses a high capacity and the necessary competencies to obtain such certification; (3) it possesses adequate knowledge of the norm, of the impacts of its activities (internal and external), and identifies certification to be a strategic action for the company (Melnik et al, 2003)

4 Quality Management System

Since its introduction in 1987, the ISO 9001 series for quality norms has implanted itself the world over. An indirect sign of the popularity of these patterns is the large number of scientific articles in academic literature directed to them. Some of the more relevant concerns are founded on the following points: (1) analysis of the motivation for certification (Poksinska et al, 2002, Douglas et al, 2003, Magd and Curry, 2003, Williams, 2004, Heras, 2006, Heras et al, 2006); (2) analysis of the benefits to certification, the evolution of organizations, perceptions of such benefits, and advantages/ disadvantages of certification (Gotzamani and Tsiotras, 2002, Llopis and Tari, 2003, Tari and Sabater, 2004, Casadesus and Karapetrovic, 2005a, Boiral and Roy, 2007, Zeng et al, 2007, Karapetrovic et al, 2010); (3) the impact of quality certification on an organization, and company financial performance (Alvarez et al, 2002, Chow-Chua et al, 2003, Conca et al, 2004, Casadesus and Karapetrovic, 2005b, Dick et al, 2006); (4) the possibility for integration and/or competition between quality certification and TQM (Dwyer, 2002, Martinez-Lorente and Martinez-Costa, 2004, Karapetrovic et al, 2006), and (5) analysis and preview of the diffusion of certification (Franceschini et al, 2004, 2006, Albuquerque et al, 2007, Franceschini et al, 2008, 2010). Sampaio et al. (2009) further add in their corroboration of their studies with contributions concerning the aforementioned topics in this outline rather punctually with a recent literature review surrounding this theme.

In this sense, a worldwide analysis points out two indications that make necessary distinctions: (1) one verifies that in recent years the number of certified companies in Eastern countries such as China and India have quickly increased – compared to European countries at the end of the previous century (Corbett, 2008). A representative example is Pakistan (Malik, Yezhua, 2006); (2) the tendency for saturation and/or decline was observed in countries where certifications were traditionally more widespread in terms of percentages of certified organizations (International Organization for Standardization, 2009). There is the future tendency of this occurring in other European countries in which certification is popular and widespread, such as Belgium, France, Germany, and Sweden (International Organization for Standardization, 2009; Franceschini et al., 2010). One observes possible reasons for this initial decline to be: (1) the perception of little incentive for the majority; (2) the bureaucratic weight of application for the ISO 9001 norms; (3) the apparent lack of advantages for an organization with a well-defined culture of quality. However, a more detailed explanation becomes necessary at this point, when one presents the relevant literature review carried out for this theme (Casadesus, Karapetrovic, 2005a, Marimon et al, 2009). The basic instruments of this model are: (1) to create the conditions for autonomous norm diffusion growth; (2) credibility of the quality management certification system; (3) to create interest in certification among countries where it seems to have diminished; and (4) to favor the effective application of quality management (Karapetrovic et al, 2010).

There is debate in scientific literature concerning the benefits of quality certification (Corbett et al, 2002). The benefits of quality management certification are classified with respect to ISO 9001 and ISO 14001, as there are differences in the scope of responsibility. ISO 9001 has become a norm for organizations which intend to certify its service quality management practices, procedures, and products. ISO 9001 seeks to improve quality and facilitate business objectives. ISO 14001 seeks to improve environmental performance and to improve stakeholder relationships, not only market relationships, but also non-commercial public interests, such as regulating agencies and non-governmental organizations. The benefits have been identified to be: (1) Internal-(productivity improvements, product defect rate decreases, quality awareness improvements, definition of the personnel responsibilities and obligations,

delivery time improvements, Internal organization improvements, Access to new markets Productivity improvements), (2) external – (access to new markets, Corporate image improvement, ISO 9001 certification as a marketing tool, Customer relationship improvements, market share improvement, customer satisfaction, customer communication improvements) (Sampaio et al, 2009).

One verifies that with the globalization process, international commercial relationships have provided for the appearance of some strategic aspects which should be taken into account when observing systematic evaluation of the mechanisms for certification. For the mass of society, one observes a large number of clients who demand certification from their suppliers for their products/services as a demonstration of its qualification, as well as a guarantee of the best customer services towards contractual requirements and other pressures from different parties interested in the certification process (Szyzka, 2001). For Coscarelli (2004, p. 79) "[...] new forms of promoting the protection of internal markets have arisen, the so-called technical barriers [...]. It is in this context of quality and competition that the technical question becomes a strategic question, that the theme of Conformity Evaluation [...] is found to be inserted and gains notoriety". With the heterogeneity of evaluation, even with training, the rules given for accrediting to authorities and periodical controls, it is not so rare to observe heterogeneity and a lack of objectivity on behalf of the audits/ evaluations (Karapetrovic, Willborn, 2002, Franceschini et al, 2007).

5 Results and Discussion

Since the release of the first versions of ISO 9001 and 14001, one perceives a consistently growing number of certified companies worldwide (Bansal, 2003, Balzarova, Castka, 2008). The demand for conformity as a voluntary form of quality and environmental management has contributed in an effective manner towards defining parameters which establish defined principles towards attending these norms. There are also ever increasing studies which have investigated the global spread of this norm (Corbett, Kirsch, 2001, Ávila, Paiva, 2006, Gavronski et. al., 2008, Salomone, 2008). One verifies that the number of certifications prior to 2009 was 1,064,785 for companies with ISO 9001 and 223,149 companies with ISO 14001 certification.

5.1 Worldwide Certification Evolution

One can see in Figure 2 that from the period of 2000 to 2009, the norms present a growing number of certifications, considering the evolution of the dominion in percentages for continents such as: Australia/New Zealand (265.76%), North America (115.14 %), Europe (53.83%), Central / South America (29.56%), Africa / West Asia (26.07%), and Far East (20.57%).

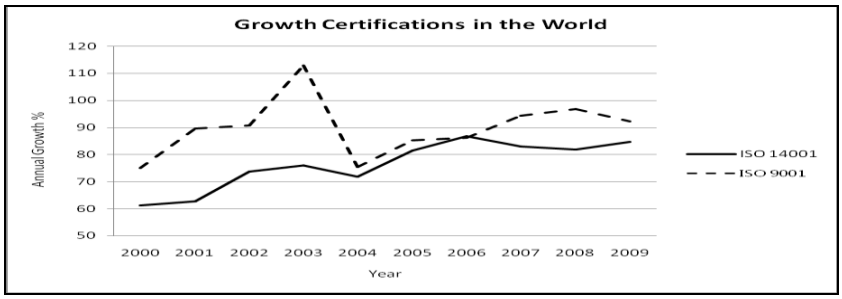

Figure 2: ISO 9001 and 14001 Certifications. Source: Data from the ISO series (2009)

The general growth over all continents was 43%, which offers evidence that the norms in the period analyzed grew at percentages which indicate and evolution of the ISO 9001 certifications. From 2000 to 2009, norm ISO 14001 certifications presented a percentage growth, considering the evolutions on continents like: Australia / New Zealand (68.52%), North America (22.91%), Central / South America (14.17%), Central / South America (12.29%), Africa / West Asia (7.39%), and Far East (7.02%). One verifies that the percentage growth over this period was 10.24%.

It was not possible to compare relative numbers, as there are approximately 5 times more ISO 9001 certifications in use than ISO 14001 certifications. For every ISO 14001 issued, there are approximately 5 ISO 9001s issued. The graphs expose percentages in order to offer a more specific perspective on the evolutionary nature of the comparative growth of the norms. Another aspect which deserves note is during the period of 2002 and 2003, which presents an accentuated peak of growth for both norms, in terms of certification received, showing predominance of the ISO 9001 norm over the ISO 14001s.

5.2 Evolution of ISO 9001 and ISO 14001 – Certification per Continent

The evidence suggests that the Far East and Europe were the continents that most grew. The remaining continents did not offer a growth indication, which reveals stability among ISO 9001 certification confirmation. It is important to highlight that the continents which stood out presented a tendency for growth as of 2003, in other words, the Far East and Europe, as shown in Figure 3:

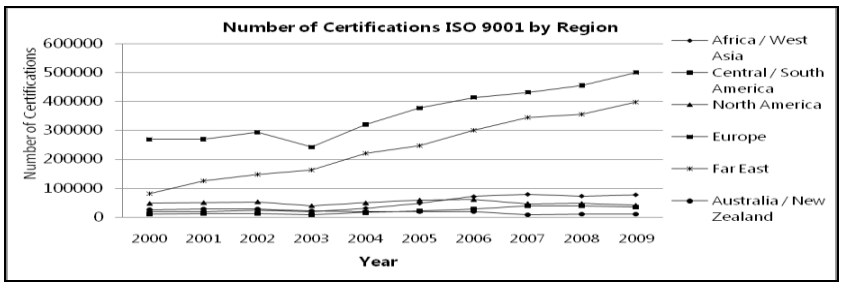

Figure 3: ISO 9001 Certifications by Region. Source: Data from the ISO series (2009)

Figure 4 gives evidence that the continents which grew most were the Far East and Europe. In fact, between 2006 and 2007, the Far East passed Europe. The remaining continents presented indications of stability in ISO 14001 certification emission. It is important to highlight that the continents which did the best presented a tendency for growth as of 2006.

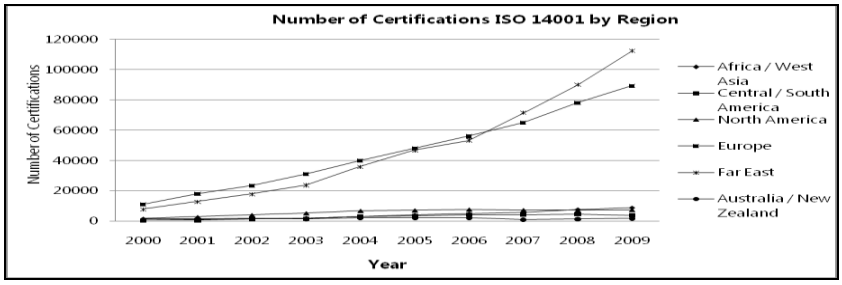

Figure 4: ISO 14001 Certifications by Region. Source: Data from the ISO series (2009)

Table 1 presents the countries with highlighted growth, as can be seen below. It becomes clear that the Russian Federation leads the increased growth in certification and countries like Spain and the USA had reduced levels of growth among the certification process in 2008 and 2009, even while presenting overall growth with respect to the remaining countries highlighted for their growth in this area.

Table 1: Rank Certifications ISO 9001 by Countries

Rank	Countries	No. of Certificates ISO 9001 in 2009	Growth over 2008 (%)
1	China	257,076	12.63
2	Italy	130,066	9.04
3	Japan	68,484	8.38
4	Spain	59,576	-15.37
5	Russian Federation	53,152	69.80
6	Germany	47,156	-2.48
7	United Kingdom	41,193	0.10

8	Índia	37,493	-1.22
9	USA	28,935	-11.98
10	Korea, Republic of	23,400	1.56

Source: Data from the ISO series (2009)

Table 2 provides the ranking of countries with highlighted growth, as can be seen below. It is clear that the Czech Republic and China lead the growth for ISO 14001 certification and countries like Spain, Germany, and the USA had smaller percentage growth among the certifications received in their respective countries during 2008 and 2009. However, overall growth was shown with respect to the remaining countries highlighted in this ranking.

Table 2: ISO 14001 Certification Ranking by Countries

Rank	Countries	No. of Certificates ISO 14001-2009	Growth over 2008 (%)
1	China	55,316	29.14
2	Japan	39,556	10.07
3	Spain	16,527	0.51
4	Italy	14,542	11.14
5	United Kingdom	10,912	13.35
6	Korea, Republic of	7,843	9.05
7	România	6,863	43.41
8	Germany	5,865	2.66
9	USA	5,225	4.80
10	Czech Republic	4,684	29.16

Source: Data from the ISO series (2009)

5.3 Growth Sectors for the Period Analyzed

The sectors that showed the greatest growth in ISO 9001 certification during the period under study were motor vehicles, motorcycles, personal, household goods civil construction, construction, Basic metal and fabricated metal products, with their respective percentages highlighted in the ranking. The sector which grew the least during the period studied was Machinery and equipment. Such evidence indicates that the increased demand for certification is related to economic growth, especially among emerging economies such as China, Brazil, and others, as seen in Table 3.

Table 3: ISO 9001 Certification ranking by Sector

Rank	Sectors	No. of Certificates ISO 9001 - 2009	Growth over 2008 (%)
1	Construction	116,672	65.18
2	Basic metal, fabricated metal products	107,253	60.15
3	Electrical and optical equipment	85,357	49.91
4	Machinery and equipment	63,523	47.75
5	Wholesale, retail trade; repairs of Motor vehicles, Motorcycles, personal and Household goods	63,015	73.28

Source: Data from the ISO series (2009)

The sectors which most grew in terms of ISO 14001 certifications during the period were Vehicles, motorcycles, personal and household goods, Basic metal, fabricated metal products, and Rubber and plastic products, with their respective percentages highlighted within their ranking. The sector which least grew was Construction over the period of this study, as seen in Table 4. Such evidence indicates that the increased demand for certification is generally related to economic growth, especially in emerging countries such as China, Brazil, and others.

Table 4: ISO 14001 Certification ranking by Sector

Rank	Sectors	No. of certificates ISO 14001-2009	Growth over 2008
1	Construction	28,711	33.77
2	Basic metal & fabricated metal products	18,728	56.10
3	Electrical and optical equipment	17,660	52.88
4	Wholesale, retail trade; repairs of motor Vehicles, motorcycles, personal and household goods	11,632	67.26
5	Rubber and plastic products	10,397	53.25

Source: Data from the ISO series (2009)

The company environmental management evaluation process, considering the evolution of certificate emissions in recent years, serves as a parameter of the indication of EMS improvements. It demonstrates the importance of the evolution of certification, based on a database from the organization responsible for company environmental management evaluation policies as a reference for competitiveness for the growing demand, both from the market and from society in general.

6 Conclusion

The evolution of worldwide certifications per continent from 2000 to 2009 has been presented here in a country ranking that is highlighted by company receipt of appropriate certification. The fundamental question guiding the development of this study was to consider the evolution of concepts concerning quality and environmental management with the authors consulted and studied in order to briefly and objectively present the state of the art in terms of this analysis. Thus, this study characterizes the analysis of the data consolidated within the quality and environmental management system, as it was possible to identify and visualize the principle points outlined in the general objective of this structured study.

The results of this study identified the evolution of certification and provided evidence that there is visibility concerning the current stage of the number of company certificates. One verifies that companies utilize the certifications as a prerequisite to improving their competitive and innovation indicators, thus eliminating the barriers imposed by importing and exporting companies. As such, they guarantee the quality of products and services through the importance of conforming to internal and external processes, where their business is concentrated, as most of the companies are globalized.

The objective of this study was to provide consolidated information as evidence based on the evolutionary analysis of certifications given per continent from 2000 to 2009 in order to identify visibility together with the stakeholders of quality and environmental management systems worldwide. It is evident that the evolution of certification presents relevant contributions to better understanding the business scenario, considering that countries which have more certified companies under each of the norms. One point that proved itself to be interesting within the period analyzed was the tendency for growth among ISO 14001 certification and the tendency for slowed growth among ISO 9001 certifications during the period under study. We expect these trends to continue in the near future. It is important to highlight that there is current concern for the ISO 14001 certification, which goes beyond market questions and into environmental responsibility on behalf of the company, as has been evidenced in studies and data from the ISO and ratified in the literature studied herein. In the evaluation process of comparing companies' EMS and QMS, it became clear that increased growth of the certification emission system gives greater visibility to stakeholders. However, this study did not seek to examine all the possibilities of research due to the richness of the data available which may be analyzed under diverse aspects, according to the interest of the researcher.

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