



Environmental performance indicators: a study on ISO 14001 certified companies



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ABSTRACT

Environmental management system has become one of the main tools used by companies to handle the environmental aspects and the impacts that their activities have on the environment. In this context, this work aims to demonstrate the results of a survey that identifies a set of indicators of environmental performance to continuously manage and improve the environmental and performance management of ISO 14001 certified companies in the Southern region of Brazil. This research is descriptive as well as quantitative and adopted two methods for factor analysis, the analysis of multiple correspondences and the principal components analysis as well as a method of classification, the cluster analysis. Several companies monitor the environmental and performance management of the industrial pulp and paper/furniture/wood and textile sectors using indicators of environmental performance. As expected, organizations from the services sector do not use such indicators. The results from cluster analysis also showed that legal and other requirements and environmental aspects are the both more representative requirements. Finally, there is a great concern for companies to meet the legal requirements as well as the conservation of environmental resources.

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1. Introduction

Since the beginning of the 1980s, environmental concerns have been incorporated into the strategic and operational decisions taken by companies. Pollution caused by operation activities is viewed as an undesirable consequence that is no longer endorsed by many organizations. While many businesses have traditionally resisted changes brought about by government legislation and pressure from the public, many firms, through reluctant adoption or willing change, have found that a pro-environment stance can enhance a number of goals (Inman, 2002).

As a consequence, the importance of managing environmental activities to prevent negative aspects and impacts on the environment has been highlighted. Among the diverse environmental management practices that firms have implemented in recent years

in this direction (e.g. cleaner production, eco-efficiency and life cycle assessment), the environmental management systems (EMS) have been the focus of much attention (Campos, 2012).

In the past two decades there have been a number of studies devoted to EMS and its diffusion. Some research has focused on motivations for the standard's implementation (Morrow and Rondinelli, 2002; Bansal and Hunter, 2003; González-Benito and González-Benito, 2005; Chan and Wong, 2006; Boiral, 2007; Gavronski et al., 2008; Prajogo et al., 2012), while others have concentrated on the effects that these systems have on firms' environmental, operational and financial performance (Klassen and McLaughlin, 1996; Melnyk et al., 2003). Studies have also emphasized that improvements in the organization's environmental performance are beneficial (Porter and Van der Linde, 1995; Bonifant and Ratcliff, 1994; Link and Naveh, 2006; Lopez-Gamero et al., 2010). These benefits are not only for the environment but also for the company's overall performance.

One particular research area that has drawn a lot of attention is the diffusion of ISO 14001 (To and Lee, 2014). A significant body of literature on this research area has been available, offering insights

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into 'how' ISO 14001 diffuses at the country level (Casadesus et al., 2008; Delmas, 2002; Lagodimos et al., 2007; Qi et al., 2011; Trierweiler et al., 2013), regional level (Delmas, 2002), and global level (Albuquerque et al., 2007; Corbett and Kirsch, 2001; Nishitani, 2010; Viadiu et al., 2006).

A second phase focused in studies devoted to the development of frameworks and methods to support EMS decision-making, namely the evaluation and selection of different EMS alternatives. To this end, different approaches have been proposed, such as multicriteria techniques (Hui et al., 2001; Petroni, 2001; Sambasivan and Fei, 2008), hybrid models combining mathematical programming, and other methods (Tsai and Chou, 2009; Celik, 2009). All of them are based on different sets of technical and economic criteria in order to support decision-making (Guerrero-Baena et al., 2014).

Even though research on EMS has an extensive literature, there is still lack of in-depth investigation of internal dynamics in maintaining ISO 14001 environmental management system (Balzarova and Castka, 2008). The deployment of an EMS does not assure the effectiveness of environmental management (Rondinelli and Vastag, 2000; Melnyk et al., 2003; Campos, 2012). The continuous monitoring of critical points of the system is also necessary, and these points are generally particular to each type of organization. Some studies (e.g. Poksinska et al., 2003; Balzarova and Castka, 2008) advocate that indicators of environmental performance are not directly linked to the maintenance of EMS. However, companies that do not use a set of EMS performance indicators may not be managing their own environmental system (Henri and Journeault, 2008; Nawrocka and Parker, 2009). Thus, they must continuously assess the environmental performance to assure success either in developed or developing nations.

The academic community has witnessed a strong interest in the BRICS - Brazil, Russia, India, China, and South Africa context. This justifies Brazil as focused of the present study. The country is considered one of the most promising developing nations, responsible for approximately 30% of Latin America's gross domestic product (GDP). BRICS' countries in general have been improving the number of companies certified by ISO 14001 from 1999 until 2010 (ISO, 2010) and, Brazil is the country with the most companies under the environmental management system ISO 14001 (2004) in Latin America. According to the same database (ISO, 2010), the number of certifications has grown year by year in the country (from 1999 to 2010). Likewise, the interested in research related to ISO 14001 diffusion in Brazil has also been disseminated (Silva and Medeiros, 2004; Oliveira et al., 2010; Jabbour, 2010, 2013b; Trierweiler et al., 2013; Ferenhof et al., 2014). By examining the Brazilian scenario, a study conducted by Silva and Medeiros (2004) also shows that the number of companies adopting environmental practices has increased each year. Nevertheless, most of these companies have insufficient knowledge about environmental management systems and do not evaluate their environmental performance.

In this context, this work aims to demonstrate a set of EMS indicators of performance used by companies certified by ISO 14001 in the Southern region of Brazil. This region was chosen because it is one of the most important and industrialized region of this country. A question in this sense is then proposed: what are the key environmental performance indicators used by companies to manage their EMS certification according to ISO 14001? To address this question, this work is organized as follows. Firstly, it provides a short literature review of environmental management systems and performance indicators. Secondly, research methods are described. Thirdly, survey results are presented and discussed and, finally, some conclusions are drawn and recommendations for future studies are offered.

2. Theoretical framework

Certified EMS have been highlighted in the literature among the various practices of environmental management adopted by major companies over the last years, such as (Link and Naveh, 2006; Viadiu et al., 2006; Albuquerque et al., 2007): cleaner production, eco-efficiency, and the evaluation of the life cycle of products, among others. An EMS is part of the management system of an organization that aims to manage the environmental aspects related to its activities, products and services (Perotto et al., 2008; Campos and Melo, 2008). From the normative point of view, ISO 14001 (ISO, 2004) defines an EMS as a set of inter-related elements, a part of an organization's management system, used to develop and implement its environmental policy and manage its environmental aspects. Standards and procedures can be used by the organization to put an EMS into operation. The three best-known standards are the EMAS, the BS 7750 and the ISO 14001 (ISO, 2004).

The BS 7750 was developed in the United Kingdom and published in 1994. It is a certification of British Standard Institute that presents specifications for the development, implementation, and maintenance of an EMS to ensure and demonstrate conformity with the statements of the company with regards to its environmental policy, objectives and goals. The BS 7750 served as a basis for the International Organization for Standardization (ISO) to launch the ISO 14001 in 1996. According to British Standard Institute website, since 2004 the BS 7750 was replaced by BS EN ISO 14001: 2004.

The European Eco-Management and Audit Scheme System (EMAS) was adopted by the European Union Council (EC) in June, 1993. It has been opened to volunteer participation by companies since April 1995. A new version of this standard was published in November, 2009 (EC – N° 1221/2009 of the European Parliament and Council). The primary objective of EMAS is to promote the continuous improvement of the environmental performance of industrial activities. It also aims to: (i) establish and implement environmental policies, management programs and organizational systems; (ii) conduct a periodical evaluation of performance of the elements that are part of the regulations; and (iii) to inform the community about the organization's environmental performance. It allows European Union companies that develop industrial activities to obtain registrations of their units with an EC commission. An official European Union document containing a list of all registered units is published annually. A registration is considered a "certificate" of good environmental performance for those companies that obtain it.

The ISO 14001 is an international environmental standard that specifies requirements related to an EMS to allow the organization to devise its policy and objectives while considering the legal requirements and information concerning significant environmental impacts. A first version was launched in 1996, and a second one was launched in 2004 after some changes. Since the launch of the first version of the ISO 14001, the number of certified companies in the world has continuously grown (Bansal and Hunter, 2003; Balzarova and Castka, 2008).

Despite the EMAS have arisen before, undoubtedly the ISO 14001 gained more notoriety and has become the EMS standard most worldwide applied. Regarding environmental performance and different standards (EMAS or ISO 14001), Testa et al. (2014), for instance, investigated the impacts of EMAS and ISO 14001 on the reduction of carbonic anhydride emissions on 229 energy intensive plants in Italy. The results suggested that the implementation of an environmental management system in energy intensive industries has a clear influence on environmental performance both in the short and in the long term, but a different effect of ISO 14001 and EMAS on environmental performance occurs.

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