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Evaluation of environmental management resources (ISO 14001) at civil engineering construction worksites: A case study of the community of Madrid

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ABSTRACT

In recent years, significant advances have been made in business organization and management. The growing demands of clients as well as the globalization of world markets are among the many factors that have led to the establishment of systems of quality control and environmental management as a competitive strategy for businesses.

When compared to other professional sectors, the construction sector has been slower to respond to environmental problems and to adopt Environmental Management Systems (EMS). In the world today the ISO 14001 standard is currently the main frame of reference used by construction companies to implement this type of management system.

This article presents the results of a general study regarding the evaluation of the application of the ISO 14001 standard at civil engineering construction worksites in the Community of Madrid (Spain), specifically pertaining to requirement 4.4.1, *Resources, roles, responsibilities, and authority.*

According to requirement 4.4.1, company executives should appoint people responsible for implementing the EMS and also specify their responsibilities and functions. The personnel designated for supervising environmental work should also have sufficient authority to establish and maintain the EMS.

The results obtained were the following:

- EMS supervisors did not generally possess adequate training and solid experience in construction work and in the environment. Furthermore, supervisors were usually forced to combine their environmental work with other tasks, which made their job even more difficult.
- Generally speaking, supervisors were not given sufficient authority and autonomy because productivity at the construction site had priority over environmental management. This was due to the fact that the company management did not have a respectful attitude toward the environment, nor was the management actively involved in the establishment of the EMS.
- Insufficient resources were allocated to the Environmental Management Unit.

As a result, the application of EMSs in construction projects often appeared to be more of a formality, which was merely a way of maintaining the certification of the Environmental Management System. It was more a means of meeting the requirements for submitting a tender to contracting organisms rather than an indicator of any real commitment to improving the environmental performance of construction companies.

1. Introduction

Construction work can have both positive and negative impacts on the environment. On the positive side, the construction of infrastructures, such as road and railway networks, dams, public utilities, housing, etc., enhances the quality of life in a society (SEOPAN, 1992), and is a means of increasing socioeconomic development (UNEP, 1996).

Nevertheless, at the same time, construction work can also generate negative impacts on the environment. For example, construction is one of the principal consumers of non-renewable resources (e.g. the building sector accounts for 30–40% of global

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energy use, UNEP, 2007) as well as an important source of waste. It also contributes to the pollution of water and air, and leads to deforestation of the land (UNEP, 1996).

In comparison to other business sectors, construction has adopted relatively few measures to make building work more respectful of the environment. In fact, in Europe, the construction sector has lagged far behind others, when it comes to actively responding to and dealing with environmental problems (Griffith, 1996).

Fortunately, construction firms are gradually becoming aware of the need to improve their environmental attitude and policies. They are beginning to realize that they must adapt their work to comply with increasingly strict national and international legislation. Furthermore, they must also respond to the public's growing interest in environmental problems and effectively satisfy market demands (Griffith, 1995, 1996).

Finally, as an increasing number of building developers have begun to include the adoption of EMS as a clause in their contracts, more and more construction companies have opted for incorporating this type of Environmental Management System (Garrote de Marcos and Mosqueda, 2002). In this sense, one of the main factors influencing the adoption of green specifications in construction is stakeholder involvement (Lam et al., 2009).

Today, construction firms are motivated to implement the ISO 14001 EMS as a way of doing the following: (i) adapting to environmental legislation (Fundación Entorno, 2003); (ii) improving the public image of their firm (Turk, 2009); (iii) improving environmental performance (Fryxell and Szeto, 2002); (iv) increasing environmental awareness of employees (Fryxell et al., 2004; Turk, 2009; Matouq, 2000; Valdez and Chini, 2002) as well as to meet market demands.

However, the primary motivation for the implementation of EMS in the construction sector is the demands of a changing market, followed by the desire to improve competitive strategies (Fundación Entorno, 2003; Ofori et al., 2002; Porter and Van Der Linde, 1995). In contrast, the principal obstacle that companies generally encounter in becoming more environmentally friendly is the substantial investment required in both material and human resources (Sakr et al., 2010; Ofori et al., 2002; Fundación Entorno, 2003).

Although, the opposite has also been argued for: improved environmental performance would induce cost savings and increase sales and thus improve economic performance (Schaltegger and Synnestvedt, 2002).

Construction companies admit that they are often reticent to adopt measures for environmental improvement because they do not seem to lead to tangible benefits (Fundación Entorno, 2003).

In addition to, the establishment of EMS by construction firms is decisively constrained by the distinctive characteristics of this sector. For example, it is more difficult to apply an Environmental Management System at construction works because of their temporal and spatial variability.

One of the ISO 14001 requirements for establishing an EMS is the availability of resources and the definition of roles, responsibilities, and authority to guarantee its implementation. Since this requirement is so important for the Environmental Management System, its analysis and assessment can help to detect deficiencies in currently functioning EMSs in construction companies.

From an international perspective, Spain is one of the countries that leads the world in companies with ISO 14001 certifications (Peglau, 2008), and the Community of Madrid, is one of its most important regions.

This justifies the fact that this study focuses only on the Community of Madrid. More specifically, Madrid's geopolitical importance made it possible to regard the results obtained as sufficiently representative and generalize them to both a national and European context.

2. General framework for the establishment of EMS in the construction sector

2.1. Regulations

Currently, Spanish and European companies can establish, certify/register and/or evaluate an Environmental Management System according to one of the following two regulations:

- *Regulation (EC) No 761/2001* (EMAS). This regulation was modified by *Commission Regulation (EC) No 196/2006* taking into account the European Standard EN ISO 14001:2004.
- European regulation EN ISO 14001:2004 (identical to the Spanish *UNE-EN ISO 14001:2004* and to the international regulation ISO 14001: 2004). This regulation is a revision of ISO 14001:1996 although the basic requirements of the EMS are the same in both versions. In other words, this new version (UNE-EN ISO 14001:2004) has the same structure as the previous regulation. Rather than incorporating new requirements, this document further clarifies and interprets those of the previous document. This means that organizations with an EMS system implemented or being implemented according to the ISO 14001:1996 standard should not experience excessive difficulties in the incorporation of new requirements (Hervás, 2005).

2.2. EMS requirements in ISO 14001: resources, roles, responsibilities and authority

ISO 14001 specifies the requirements for the establishment of an Environmental Management System. These requirements are organized in the following sections:

- General requirements
- Environmental policy
- Planning
- Implementation and operation
- Checking
- Review by the management

Regarding the **implementation and operation** of the EMS, the company management should guarantee the availability of resources (i.e. personnel, special skills, infrastructure, funding, and technology) (AENOR 2004). Such resources are essential for establishing, implementing, maintaining, and improving the EMS.

ISO 14001 also requires companies to designate one or various management representatives with well-defined roles, responsibilities, and sufficient authority to guarantee the establishment and maintenance of the EMS (AENOR, 2004).

In any company, environment is a horizontal function, so that the successful implementation of an EMS requires the commitment of all organization employees. Environmental responsibilities should not be restricted to those environmental function responsibles, it must involve other areas of the organization (AENOR, 2004; SEPI, 2000). In fact, one of the strategies to improve the company environmental performance is to introduce environmental responsibilities in all job descriptions. Therefore environment is defined as a criterion for the selection of new employees (Jabbour and Santos, 2008).

Construction sites are places of temporary work. The establishment of an EMS by construction firms requires the application of this Environmental Management System at the worksites where building projects are being carried out.

The correct operation of the EMS at the worksite is conditioned by a wide range of factors, such as the resources available to EMS