



Environmental management system vs green specifications: How do they complement each other in the construction industry?

Patrick T.I. Lam^{a,*}, Edwin H.W. Chan^a, C.K. Chau^b, C.S. Poon^c, K.P. Chun^a

^a Dept. of Building & Real Estate, The Hong Kong Polytechnic University, Kowloon, Hong Kong

^b Dept of Building Services Engineering, The Hong Kong Polytechnic University, Kowloon, Hong Kong

^c Dept of Civil Engineering, The Hong Kong Polytechnic University, Kowloon, Hong Kong

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ABSTRACT

Environmental Management System (EMS) has been one of the important tools for sustainable construction for around two decades. However, many issues concerning sustainable development have not been properly addressed, and there is a need for the introduction of green specifications to advance green performance in construction through contract management. This paper defines green specifications, identifies the reasons for adopting green specifications and highlights the environmental issues that may not be addressed by solely adopting EMS. It also presents the results of a recent survey of practitioners concerning their opinions towards green specifications and possible impacts arising from their adoption. From the results of the survey, a framework for developing green specifications is deemed valuable for the cities striving for sustainability. Interestingly, the level of acceptable changes brought about by green specifications as perceived by different industry stakeholders is found to be unrelated to whether they were from organizations implementing EMS or not.

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1. Introduction

During the three decades after the introduction of the well-known definition of "Sustainable Development" in the Report of the World Commission on Environment and Development (WCED, 1987), extensive literature has covered the principles and possible frameworks for sustainable construction, such as that of Kibert (1994), Hill and Bowen (1997) and Ofori (1998). Yet, there are still discrepancies between the ideal form of sustainable development and existing construction because of the practical difficulties in realizing the concepts of sustainability.

Since the International Organization for Standardization issued the ISO 14000 series with principles similar to the previous British Standards, Specification for Environmental Management System (BS7750, 1992 and 1994) in the 1990s, Environmental Management System (EMS) has been recognized as a way to achieve sustainable development in the construction industry. Hill and Bowen (1997) discussed comprehensively the significance of using EMS in construction and proposed a framework for providing a strong impact in the field of construction towards EMS. Many other studies, including Tan et al. (1999), Ball (2002) and MacDonald (2005), were concerned with applying EMS along with other tools, such as Environmental Impact Assessment and Eco-labelling, to promote

sustainable construction in the recent decades. Although EMS has profound positive environmental influence within the construction industry, it is clear that optimal environmental performance may not be guaranteed by the implementation of EMS (ISO 14001, 2004) alone. Therefore, Robert (2000) and many others have attempted to fix the intrinsic problem of EMS by identifying some frameworks for sustainable development.

In this paper, the term "Green Specifications" is defined and the background and current practices of EMS are reviewed. The important environmental issues which have not been addressed by merely implementing EMS in current construction are investigated. Hence, green specifications are proposed to promote sustainable construction along with EMS. In addition, the results of a recent postal survey exploring the attitudes of stakeholders towards environmental considerations in specifications and the level of acceptable changes concomitant with the implementation of green specifications in Hong Kong are presented. Comparisons of these considerations in EMS and non-EMS organizations are also made. In the conclusion, the cost implications of green specifications on the construction industry are indicated, and the need for a green specification framework has been highlighted.

2. Backgrounds and definitions of green specifications

Traditionally, construction projects have been executed based on the descriptive or prescriptive requirements set out in specifications

* Corresponding author. Fax: +852 27645131.

E-mail address: bsplam@polyu.edu.hk (P.T.I. Lam).

and drawings. Whereas drawings provide a graphical presentation of physical arrangement, specifications are used to convey written directions on the prescribed material, practices, personnel, equipment, and workmanship including tolerances.

Specifications should give clear information for tendering, construction quality and handover requirements. Much of the literature on specifications (Gelder, 2001; Cox, 1994; Giunta and Ramirez, 1991) suggest that quality, cost and time have been the predominant considerations in the preparation of specifications for conventional construction projects. However, with the increase of public environmental awareness, integrating the concepts associated with sustainable development into specifications to promote construction has become inevitable. Berke (2002) believes that embracing a holistic vision of community building and committing to solutions for the common good are the directions for planning in the twenty-first century. Green specifications should provide a conduit for translating the theory of sustainability into practice for the supporters of sustainable development in the construction community.

Although many construction information organizations and building societies, such as the International Construction Information Society (ICIS) and the Building Research Establishment (BRE, 2010a), have identified the significance of environmental issues associated with construction, literature related to the definition, criteria and application of green specifications is relatively limited. Hill and Bowen (1997) suggested that the environmental components in EMS should be prescribed as requirements in the specifications but the practical framework for realizing this has not been identified. Many organizations and companies claim that they have adopted green specifications or provided consultancy for green specifications in contracts but the environmental performance of these specifications and written instructions to mitigate impacts due to construction have not been well documented. Moreover, the scope and the adopted principles of these green specifications vary between organizations. For example, the Green Guide to Specification by BRE focuses on the environmental impacts of building materials rather than green construction practices such as waste management (BRE, 2010b). In the case of the California Energy Commission (2007), the assessment criteria for the planned green building specification are energy efficiency and environmental sustainability.

In an earlier paper, the authors defined “Green Specifications” as a set of contractual requirements placing adequate weight on the environment, and also incorporating the concerns regarding social development and the integrity of economics (Lam et al., 2009a). In this study, the term is further elaborated to mean the written instructions for construction practice relating to the use of materials and working procedures to ensure sustainability of development in terms of economics, community, technical feasibility and the environment with both global and local considerations. Hence, the principles for sustainable development in this research are in line with those in the Report of the World Commission on Environment and Development - “Our Common Future” (WCED, 1987).

Green specifications are further divided into two types: general and particular green clauses. General green clauses are the collection of explicit requirements which are applicable to all works in construction with environmental considerations, whereas particular green clauses are a set of specific requirements depending on individual features of the projects.

3. Issues of EMS in the construction industry

As a result of increasing concern on the environment in construction and recommendations from academia, many stakeholders intend to control the impacts associated with their activities

by adopting EMS. However, after about a decade from the first publication of the predecessor of ISO 14001, the environmental performance of construction projects is still far from achieving sustainable development even though the companies implementing EMS are expected to have a better environmental performance than those without EMS. The difficulty in achieving sustainable development by EMS can be summarized under four headings: (a) the nature of EMS, (b) non-environmental motives for EMS, (c) inadequacy towards contracts issues and (d) problems in many alternative frameworks for EMS.

3.1. Nature of EMS

The intrinsic problem of EMS is that the optimal environmental outcomes may not be ensured solely by the implementation of the system (ISO 14001, 2004). EMS in ISO 14001 is a general business management standard emphasizing the importance of managing elements of organizations' activities, products or services that can interact with the environment, but it provides limited direction for performing the planning function and detailing the operations. Only fundamental Environmental Impact Assessment procedures and requirements are loosely implied or defined in the procedures of EMS (Eccleston and Smythe, 2002).

Many practitioners of EMS do not know how to implement these sustainable concepts because of a lack of knowledge or skills. Ofori et al. (2002) identified that the scarcity of qualified personnel and the low level of cognisance in the industry are the biggest expected problems in the implementation of ISO 14000, according to the results of a survey carried out in Singapore. Ball (2002) found that the level of awareness on green issues on the part of clients and designers in construction still needs to be raised. Other studies (Tse, 2001 and Šelih, 2007) pointed to the crucial role of clients as the key stakeholders in setting out requirements for EMS, whereas a lack of support from them constitutes a major barrier to its success. In other words, in addition to fulfilling the routine requirements in EMS, clients' commitment in ensuring the availability of information and know how within a set of comprehensive contractual framework is important for giving clear and precise directions leading to green performance during the works.

Another intrinsic problem of EMS is that indicators for the sustainability of works are not commonly applied, especially in developing countries. Despite the requirements of annual internal and external audits in EMS, the indicators for the auditing do not always incorporate the objective principles of sustainable development in most companies. For example, Sha et al. (2000) identify that one of the important barriers to sustainable construction in China is that many performance indicator systems are directed at quantities or economic growth but pay little attention to quality and the environment.

Moreover, the degree of commitment is decided by each company, and there is no requirement for public interest to be the priority in the policies of EMS. Under ISO 14001 (2004), only environmental policy is required to be made available to the public. Therefore, aside from the issues of environmental policy setting and operation, the public has not much influence on the companies' decisions in EMS (Eccleston and Smythe, 2002).

3.2. Non-environmental motives for EMS

The motivations for implementing EMS by organizations affect the degree of sustainability resulting from the EMS. MacDonald (2005) asserts that some companies only adopt ISO 14001 to secure minimal compliance when subjected to consumer pressure. Even though construction practitioners may know how to carry out green construction, it may be difficult for them to use EMS without an environmental policy which is based on the basic principles of

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