

# Integrating environmental criteria into the supplier selection process

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## Abstract

In this paper, a framework for integrating environmental factors into the supplier selection process is presented. Traditionally, companies consider factors like quality, flexibility, etc. when evaluating supplier performance. However, environmental pressure is increasing, resulting in many companies (mainly large companies) beginning to consider environmental issues and the measurement of their suppliers' environmental performance. This paper aims to develop a decision support tool which should help companies to integrate environmental criteria into their supplier selection process. Subsequently, a framework of the supplier selection process which incorporates environmental performance is developed. Finally, a knowledge-based system is constructed based on the proposed framework is presented and an example is used to illustrate how the knowledge-based system would be implemented.

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## 1. Introduction

Environmental factors are rapidly emerging as an important issue for business and management to consider. Legal and public pressures on the attainment of good environmental practice are mounting. A significant proportion of these pressures has been directed at business which is often identified as a major source of pollution. Organisations have attempted to respond by developing products/services which, for example, use less packaging, reduce pollution and/or decrease energy consumption. Even though business has been blamed for many of the environmental problems, there is still little guidance on how it can reduce this risk. A potentially effective way of managing a company's environmental policy is by linking it closely with the activities of the purchasing function. Diffusing environmental management techniques along the supply chain can be an appropriate method of enhancing the environmental performance of an industry.

Carter and Narasimhan [1] in a survey of purchasing trends indicate that the purchasing function has a significant role to play in developing an organisation's environmental policy. Recently, Deans [2] indicated that an environmental initiative is on-going within the US utilities industry to ensure that environmental considerations become a signification

factor in purchasing policy and in the selection process for suppliers. The need for companies to consider environmental issues is also important from a competitive viewpoint. Currently, organisations have embarked on two change processes which have major implications for the purchasing function, by reducing the number of firms in the supply base and establishing closer, collaborative relationships with the remaining companies. As the supply base diminishes, suppliers must look for ways of differentiating themselves from competitors. Implementing an environmental management programme may give a supplier a competitive edge in the marketplace.

Nowadays, company operation systems are computerised. Artificial intelligence expert system's applications became popular in the field of engineering management and those applications for expert system in the medical, financial and industrial fields are most well known [3]. Vokurka et al. [4] defined that an expert system is a computer program which emulates the behaviour of human experts who are solving real-world problems associated with a particular domain of knowledge. They have suggested a prototype expert system for evaluation and selection of potential suppliers. McIvor et al. [5] suggested using knowledge-based systems technology to assist decision-makers in the area of strategic purchasing. However, these knowledge-based systems have not considered environmental criteria in the supplier selection process. Brink et al. [6] developed a system called 'ECO-QUEST'. It provides a questionnaire for suppliers to

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self-audit their environmental performance and gives them some solutions to improve the environmental profile of their product. However, the functionality is limited since it focuses on suppliers in the electronics industry and the comparison of different suppliers' performances is not assessed.

Based on the above reasons, this paper has three main objectives. Firstly, to identify the environmental criteria which influence a company's purchasing decision. Secondly, to develop a framework of the supplier selection process which incorporates environmental performance and finally use the framework to develop an environmental decision support system to illustrate how knowledge-based systems can assist in the environmental supplier selection process. It is anticipated that the findings should, in the long term, enhance the competitive position of companies in the supply network by integrating environmental factors into the evaluation of suppliers.

### 2. Identification of environmental criteria

Historically, several methodologies have been developed for evaluating, selecting and monitoring potential suppliers [7] which take into account factors dealing with, for example, quality, logistics and cost. However, none of them has considered the importance of environmental factors in the decision-making process. Due to the increasing realisation

of the importance of integrating environmental factors into assessing supplier's performance, a number of researchers have begun to identify some possible environmental indicators and criteria. Lamming and Hampson [8] have attempted to provide provisional guidelines for evaluating suppliers according to environmental management issues. These researchers concluded that there was no co-ordinated response to dealing with the environment and each of the companies in the study had used a different approach. Noci [9] suggested a preliminary framework that identifies measures for assessing environmental performance but little emphasis was placed on environmental cost data.

After a detailed review of the literature [8–12], several environmental categories and criteria were identified. These criteria are viewed as important to consider during the 'green' supplier selection process and are illustrated in the following section.

### 3. Proposed framework for incorporating environmental criteria with supplier selection process

By integrating the categories and criteria identified from the literature sources, an environmental framework was developed for incorporating environmental criteria into the supplier selection process. Fig. 1 shows a systematic model of the environmental framework.

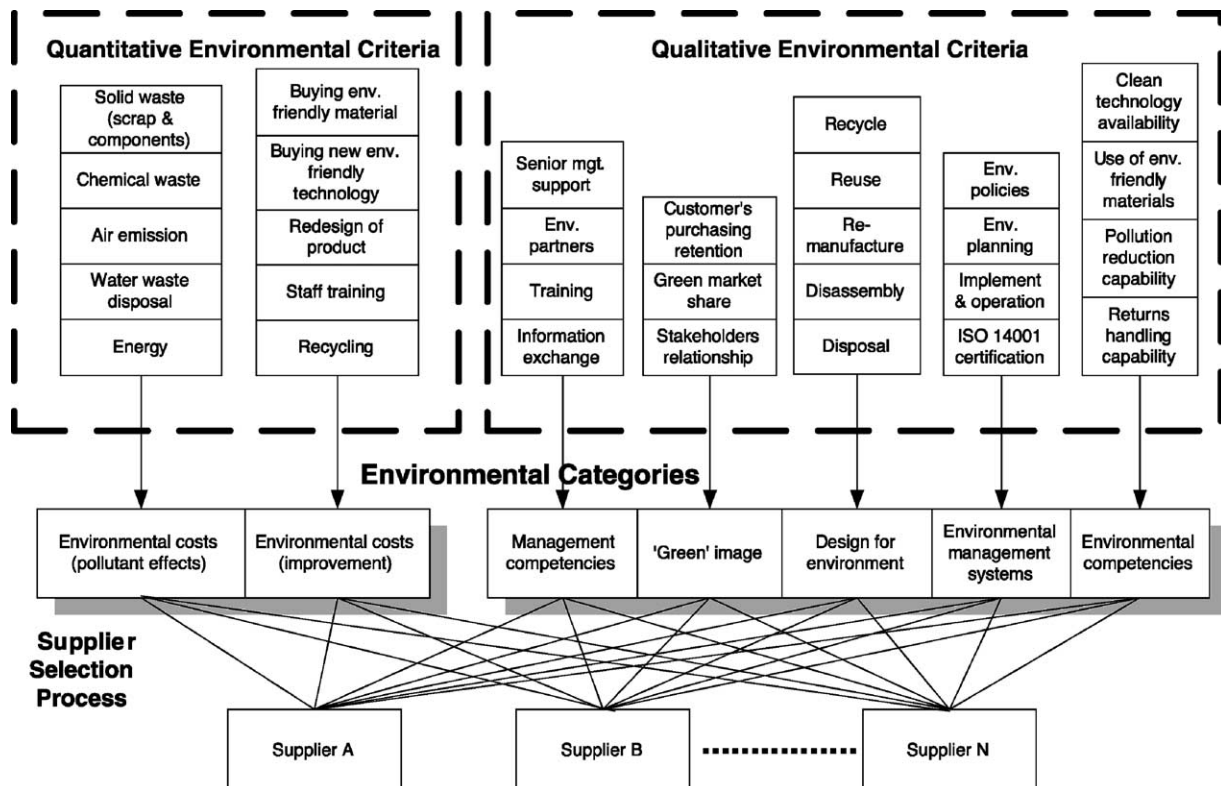


Fig. 1. Environmental framework for incorporating environmental criteria into the supplier selection process.

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