

## Chapter 3

# Benchmarking Sustainability Performance of Suppliers Using ISO 14001 and Rough Set QFD–Based Approach

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### ABSTRACT

*Supply chain management plays an important role in design, development, manufacturing, etc. and has key impact on company's overall environmental performance. Recently, green supply chain management has gained great interest from researchers and practitioners. Consideration has been given to consider environmental factors in entire supply chain starting from procurement, production, transportation, consumption, and post-disposal of products to make the whole product life cycle green. And those companies implementing ISO 14001 are controlling and minimizing risks not only internally but also externally with their suppliers. In this chapter, the authors are benchmarking sustainability performance of suppliers using ISO 14001 and rough set QFD. For this objective, firstly they identify the requirements for green supply chain planning on the basis of ISO 14001. Then, they evaluate the suppliers on the basis of these requirements using a QFD-based approach. To handle the uncertainties arising due to lack of or limited data, rough set theory is used. The results show that the proposed approach can effectively handle imprecise information and facilitates selection of green supply chain initiatives in a structured way.*

### INTRODUCTION

Green supply chain management involves a thinking of supply chain management with concern of environment factors from green purchasing to the end of the product cycle including product design,

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manufacturing, distribution, final delivery of products, use, reuse and recycle i.e. reducing packaging and waste, developing green suppliers and developing more eco-friendly products and reducing carbon dioxide emissions in all of the supply chain processes. In recent years, greening the supply chain has become a progressive concern for the success of companies and a challenge for logistic managers because the traditional approaches to supply chain management are not enough to be effective in today's market. And the first most important step towards greening starts from procurement and most important aspect of procurement is supplier selection. In this paper, our focus is on benchmarking sustainability performance of suppliers using ISO 14001 and rough set QFD. How buyer organizations can improve their environmental performance by selecting suppliers based on their conformance to ISO 14001 requirements.

The International Standard organization (Foster, 2010): ISO has developed a series of standards for quality systems for organizations. ISO 9000-2000 (Quality Management System for fundamentals and vocabulary), ISO 9001-2000 (Quality Management System- Requirements), ISO 9004-2000 (Quality Management System- Guidelines for performance improvement), ISO 14000- (International standard for Environment Compliance). ISO 14000 series contains a set of guidelines for developing systems and practices in environment area. It has six sectors, each having one or more standards: 1) ISO 14001 and ISO 14004: Environmental Management Systems. 2) ISO 14010 to ISO 14012: Environmental Auditing. 3) ISO 14020 to ISO 14025: Environmental Labels and Declarations. 4) ISO 14031: Environmental Performance Evaluation. 5) ISO 14040 to 14043: Life Cycle Assessment (LCA). 6) ISO 14060: Environmental Aspects in Product Standards.

The standard ISO 14001:2004 EMS is a framework that assists companies to manage impact of their activities on the environment in a better way. This framework is based on Plan-Do-Check-Act cycle (PDCA) which means that companies must focus on identifying and continuously improving their environmental performance. Specifically, organizations implementing ISO 14001 standard have to meet certain requirements or key elements that can be classified into five main categories as shown in figure 1 (MacDonald, 2005). A third party certification is needed to evaluate the organization's procedures and site visits to check conformance with respect to implementing ISO 14001.

The ISO 14001 EMS implementation is done in a step by step approach. It involves 15 different steps namely obtain top management commitment, set up an environmental steering committee, understand the company's and ISO 14001 Requirements, train the environmental team and employees, establish an effective environmental management system, establish environmental policies and procedures, create sound environmental management programs, maintain documentation and make it accessible, establish a functional process of recording for the EMS, review of EMS by management, initiate and conduct environmental auditing, select ISO 14001 standard, get registered and maintain your management system. These steps are used for the integration and implementation of ISO 14000 family but in this paper it is used specifically for the implementation of ISO 14001 for better EMS practices in the business (Ball, 2002).

In this paper, rough set based QFD is implemented to determine the best performing supplier with respect to ISO 14001 requirements. The rough set theory approach is used to handle the uncertainties in decision maker's evaluation. QFD is implemented because it is a proven methodology for achieving total customer satisfaction.

To complete the investigation the paper starts with literature review to introduce the background of the techniques used in this concern. Then we proposed a solution for the investigation. We implemented QFD for selecting best supplier for the green supply chain planning, and then Rough set based QFD is implemented to control the enlargement of data with a conclusion in the end.

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