Chapter 1.11
Sustainable Supply Chain Management:
Cases and Models of RFID and Information Systems use in Green Logistics

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ABSTRACT

Integrating environmental considerations into supply-chain management has become an increasingly important issue for industry, government and academic researchers. Supply chain managers are being required to respond to the challenges of new legislation, standards and regulations; changing customer demands; drivers for efficiency, cost effectiveness and return on investment; while simultaneously being 'green'. The fundamental tension between business and environmental drivers is difficult, but critical to understanding how to effectively re-engineer and re-design existing supply chains in a manner that is sustainable both financially and environmentally. Information systems have a significant role to play in supporting corporate responses to environmental management and the development of holistic green logistic solutions. This chapter examines contemporary discussions on the current state of sustainable supply-chain management and green logistics. It presents a case study from the Fujitsu Corporation in Japan and explores models of information systems and RFID use in green logistics. Combining insights from the case and existing models the chapter explores an example

DOI: 10.4018/978-1-60960-472-1.ch111

of how a combined model can be used to explore the potential of a specific emerging technology (RFIDs) in 'greening' supply chains.

INTRODUCTION

Industry increasingly recognises the challenges of responding to concerns about the environment. These challenges include both how to respond to compliance with emerging climate policies such as the EU Emission Trading Scheme and to changing consumer demands for carbon neutral products and/or environmentally friendly and sustainable production processes. These issues directly impact on production processes and supply chain management. In order for organisations to minimise their impact on the environment, it has been argued that they need to evaluate and act from a total system perspective (Wu & Dunn, 1995). The supply chain represents such a holistic system and is a strong candidate for far-reaching greening initiatives. Supply chains link various types of organisations and extend across multiple boundaries before reaching the consumer. The volume of goods and produce being carried across the globe continues to grow. This is due in part to higher productivity, increased efficiency in primary industries, cheaper freight costs and the rapid expansion of the BRIC (Brazil, Russia, India, and China) nations.

Conventional approaches to supply chain management continue to encounter the challenge of how to balance being effective and cost efficient on one hand, whilst becoming more environmentally friendly on the other (Rodrigue, Slack & Comtois, 2001). Technology has been presented as a means to resolve this tension between the need for cost efficiency in SCM and improved quality, safety, and environmental sustainability. Many current technology scenarios for cutting emissions are focused on large-investment solutions like electrical vehicles, aircrafts running on bio fuels, and ships running on hydrogen fuel cells, or hybrid fuel cells (Stangeland, 2008). An alternative to evolution towards green supply management can be seen in several emerging technologies that can assist companies in achieving cost efficiency, value advantage (Rundh, 2008) and environmental sustainability. One candidate technology is Radio Frequency IDentification (RFID). However, the evidence of the return on investment (ROI) in terms of cost efficiencies or effectiveness of these responses to improve moves to carbon neutrality are lacking for most current technologies (O'Connor, 2005). From a research perspective there is also a challenge in how to approach this tension and the generation of insights that can be used meaningfully by multiple stakeholders (industry, governments, community and consumers). Aside from the challenges of a lack of evidence of ROI, the use of technology such as RFIDs presents issues around standardisation in global supply chains.

RFID technology provides automated identification and information gathering from objects and people which are not necessarily within a short range and at an optically visible disposition. An RFID system can also communicate with products and update the data on RFID tags simultaneously, which makes it possible to capture process data as well. The technology provides opportunities in the automation of the data capture and monitoring of time, temperature, product location, etc. and compliance verification across the whole supply chain. Integrating these processes into an Information System that is available to all partners in the supply chain, facilitates a useful tool for logistics managers. A number of researchers and practitioners have already considered the application of RFID in certain areas of green supply chain, for example in reverse logistics (Lee & Chan, 2009; Payaro, 2004). In reverse logistics, RFID is adopted for example to increase the service level to the customers so as to complete the recovery service in a certain period of time. In forward logistics, RFID helps replenish the goods in a timely manner so as to satisfy customer needs.