Reducing CO_2 Emissions in Logistics Activities: Drivers and Barriers

Jimmy Castro Boluarte[1] Yongmei Bentley[2] Ram Ramanathan[3]

Business School, University of Bedfordshire, UK
yongmei.bentley@beds.ac.uk

Abstract

This study examines aspects of CO_2 emissions reduction in logistics activities of a number of large UK companies. Data were collected from in-depth interviews with logistics managers of UK companies across different sectors. The research identified the main drivers and barriers for CO_2 reduction initiatives in these companies. It was also found that most CO_2 reduction initiatives are mainly operational and tactical in nature, and a major driver for companies to adopt CO_2 emission initiatives has been the link between emissions reduction and cost reduction.

Keywords: CO_2; emissions; reduction; initiatives

1. Introduction

The 1997 Kyoto Protocol agreement set targets for 37 industrialized countries and the European community for reducing greenhouse gas emissions [1]. Since then there has been an increasing public and government concern for the environment, and companies have been under mounting pressure to reduce the environmental impact of CO_2 generated by their activities, including logistics activities.

Emissions of CO_2 from logistics activities in the UK for 2004 were 34 million tonnes, about 6% of the total UK emissions [2]. Findings from Kahn Ribeiro and Kobayashi [3] and the World Economic Forum [4] are consistent with these UK findings, and show that total world emissions from the freight transport sector, at around 2,800 million tonnes of CO_2 per year, are between 6% and 8% of global emissions. This means that with the inclusion of warehousing and handling, logistics is likely to account for 10%-11% of the worldwide total [5].

In light of these facts, a wide variety of initiatives to reduce CO_2 emissions are being currently used or actively considered in UK logistics operations, especially by the larger firms which have the available resources and capability.

While there are some signs of development in the understanding of the firms' responses towards environmental issues such as CO_2 emissions, there is little understanding of the individual logistics managers' behaviour and perceptions, and their decision-making process [6]. This is surprising considering the importance and urgency of logistics in developing strategies for achieving lower emissions [7] [8]. Therefore, this research examines the initiatives currently being implemented in selected UK companies to reduce CO_2 emissions in their logistics activities, and the main drivers and barriers affecting the implementation of these initiatives.

2. Literature review

There have been an increasing number of studies that look at the environmental impacts of logistics activities. Topics stud-

ied included: CO_2 auditing [9]; environmental impacts of freight transport [10]; the environmental impact of warehousing and distribution [11]; reverse logistics and waste management [12]; and the environmental costs of logistics [13]. Specific practices that have an impact on CO2 emissions include: the use of 'green' criteria to choose suppliers and transporters [14]; consolidation of shipments and selection of cleaner transport modes [15] [16][17]; the use of environmentally friendly packaging, recuperation of materials for reuse, and the disposal of waste [12] .

Doherty and Hoyle [4] identify some of the more significant and commercially-feasible opportunities for the decarburization of logistics and transport. These include the use of 'clean' vehicle technologies; de-speeding the supply chain; enabling low-carbon sourcing; optimized logistics networks; energy efficient logistics buildings; packaging design initiatives; training and communication; modal switches; reverse logistics; increased home delivery; and reducing congestion. These initiatives in combination, according to the authors, have the potential to reduce global logistics and freight transport emissions by 1,400 million tonnes of CO_2 in the medium term, i.e. 50% down from current levels.

3. Research methodology

Interviewing was judged as the method most likely to yield the information required for this research. In this technique, although the research pursues 'a consistent line of inquiry', the actual stream of questions in an interview is likely to be 'fluid rather than rigid' [18]. Throughout the interview process, the researcher has two main jobs – one is "to follow your line of inquiry …" and the other is "to ask your actual questions in an unbiased manner that also serves the needs of your line of inquiry" [19].

A key criterion for selecting the UK companies to interview was that they had significant logistics operations. A total of 18 logistics managers from 15 large UK companies were interviewed (1 retailer, 7 manufacturers, 3 logistics operators, 3 transport infrastructures, and 1 Hospitality Company) between October 2010 and November 2011. Each interview lasted about an hour. The interviews were semi-structured to allow interviewees to elaborate on issues that seemed to them particularly important.

4. Key findings

4.1 Drivers for implementing CO_2 reduction initiatives

An important area to explore was the factors that are influencing companies in their decisions for taking CO_2 reduction actions. The interviewees were asked therefore about the drivers of the change towards low CO_2 logistics operations. Answers from participants were very diverse, which was understandable as their companies were also diverse in nature. Nevertheless they agreed on one fundamental driver: CO_2 reduction is frequently linked with cost reduction. For this reason cost benefits were mentioned by all the interviewees as a driver for implementing CO_2 reduction initiatives, with some differences between the levels of importance they gave to this.

The other main driver highlighted by the majority of the interviewees was corporate social responsibility, which was engrained in the values and principles of most of the companies interviewed. But they suggested that any effort to reduce emissions in logistics had to balance financial, social and environmental factors, in order to guarantee the sustainability of their businesses. Other drivers mentioned

by a number of interviewees include: the influence of the end-customers, desire to improve public image, legislation, and increasing fuel prices.

4.2 Barriers to implementing CO_2 reduction initiatives

While there are drivers for companies to implement CO_2 reduction initiatives there are also *barriers* which delay the changes being carried out. It was noted that according to the nature of their business, companies face a wide variety of barriers, reflecting the differing function of logistics in their operations. Not surprisingly the most frequently mentioned barrier was the lack of resources. Many respondents mentioned that capital had been an issue, especially since the start of the economic crisis in 2008, and companies had prioritized investments in activities that added more value to their products. Three of the manufacturers indicated that because logistics is only a support function and not their core business, it had not received the same attention, and it had been difficult to channel additional resources to implement CO_2 reduction initiatives. Since logistics is not their biggest CO_2 emitter it had also been lower on their priority list for potential CO_2 reduction.

In additions to financial resources, time resources had also affected and delayed the implementation of CO_2 reduction initiatives in logistics. The interviewee at one manufacturer revealed that they are on a tight timescale and "sometimes... little things … won't get done, just because there just isn't the time to actually do them". Respondents at two other manufacturers also had similar statements and agreed that an important barrier is people's time to actually make these changes in logistics happen.

Other barriers mentioned by several respondents include: the complexity of logistics responsibilities, unsettled technologies, belief in CO_2 emissions issues, commitment to meet customer services requirements, lack of control from the use of third party logistics, and lack of significant incentives from the government.

Despite of the barriers, one of the most frequent responses was that there were 'no major barriers for implementing initiatives to reduce emissions in logistics'. This is an encouraging finding for those wishing to see CO_2 reductions continue to be taken forward. Almost a third of the respondents agreed that because all of these initiatives come together with logistics efficiency and cost benefits, everybody is on board from top management to the lower levels of management.

5. Conclusions

This paper reports the findings from an investigation to identify the drivers and barriers affecting the initiatives taken to reduce CO_2 from the logistics activities of a number of UK companies. Two key findings are: (1) there is a positive correlation between most CO_2 reduction initiatives and cost reduction, and this link has been a major driver for the adoption of CO_2 reduction in the companies investigated; and (2) a key barrier for the adoption of CO_2 reduction initiatives in logistics has been the lack of resources.

References

[1] UNFCCC. 1997. *Kyoto Protocol to the United Nations Framework Convention on Climate Change*. United Nations.

[2] McKinnon, A., 2007. CO_2 Emissions from Freight Transport in the UK, Climate Change Working Group of the Commission for Integrated Transport, Edinburgh.

[3] Khan-Ribeiro, S. & Kobayashi, S., 2007. Transport and its infrastructure. *In:* Change, I. *Fourth Assessment*

Report: Climate change 2007- mitigation of climate change. Geneva.

[4] McKinnon, A., 2010. Environmental sustainability. A new priority for logistics managers *In:* McKinnon et al (eds.) *Green Logistics. Improving the environmental sustainability of logistics.*

[5] Carter, C. R. & Easton, L., 2011. Sustainable supply chain management: evolution and future directions. *International Journal of Physical Distribution and Logistics Management*, 41 (1)**,** 46-62.

[6] Wu, H. J. & Dunn, S. C., 1995. Environmentally Responsible Logistics Systems. *International Journal of Physical Distribution,* 25 (2)**,** 20-38.

[7] Ehrhart, C. E., 2010. Delivering Tomorrow: Towards Sustainable Logistics. Bonn: Deutsche Post AG.

[8] Piecyk, M., 2010. Carbon auditing of companies, supply chains and products. *In:* McKinnon et al (eds.) *Green Logistics: Improving the environmental sustainability of logistics.*

[9] Cullinane, S. L. & Edwards, J. B., 2010. Assessing the Environmental Impacts of Freight Transport. *In:* McKinnon et al (eds.) *Green Logistics: Improving the environmental sustainability of logistics.*

[10] Marchant, C., 2010. Reducing the Environmental Impact of Warehousing. *In:* McKinnon et al (eds.) *Green Logistics: Improving the environmental sustainability of logistics.*

[11] Cherrett, T., S. Maynard, McLeod, F. & Hickford, A., 2010. Reverse logistics for the management of waste. *In:* McKinnon et al. (eds.) *Green Logistics: Improving the environmental sustainability of logistics.*

[12] Piecyk, M., McKinnon, A. & Allen, J., 2010. Evaluating and Internationalizing the Environmental Costs of Logistics. *In:* McKinnon et al. (eds.) *Green Logistics: Improving the environmental sustainability of logistics.*

[13] Edwards, J. B., Wang, Y., Potter, A. & Cullinane, S., 2010. E-commerce, E-logistics and the Environment. *In:* McKinnon et al. (eds.) *Green Logistics: Improving the environmental sustainability of logistics.*

[14] Eglese, R. & Black, D., 2010. Optimizing the routing of vehicles. *In:* McKinnon et al. (eds.) *Green Logistics: Improving the environmental sustainability of logistics.*

[15] McKinnon, A., 2010. Increasing fuel efficiency in the road freight sector. *In:* McKinnon et al. (eds.) *Green Logistics: Improving the environmental sustainability of logistics.*

[16] Doherty, S. & Hoyle, S., 2009. Supply Chain Decarbonization: The Role of Logistics and Transport in Reducing Supply Chain Carbon Emissions. World Economic Forum.

[17] McKinnon et al (eds.) *Green Logistics: Improving the environmental sustainability of logistics.* London: Kogan Page Limited.

[18] Rubin, H. J. & Rubin, I. S., 1995. *Qualitative interviewing: The art of hearing data,* CA, Sage.

[19] Yin, R. K., 2003. *Case Study Research, Designs and Methods,* London, Sage Publications Ltd.