Strategic Business Operations, Freight Transport and Eco-efficiency: A Conceptual Model

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In an editorial in the International Journal of Physical Distribution and Logistics Management for a special issue devoted to the environmental aspects of logistics, McKinnon (1995: 3) described the logistics literature concerning environmental issues as ‘small but expanding’. Since then, the literature on the environmental sustainability of freight logistics has flourished; as Murphy and Poist (2000: 5) posited, ‘environmentalism has “come of age” as a major topic in logistics and no longer can be regarded as a peripheral concern or fad’.

Referred to commonly as green logistics, this topic of inquiry has also been widely acknowledged as one of the key issues facing logistic management in Europe in the new millennium (Skjoett-Larsen 2000). Despite the growing attention given to topics relating to green logistics, most research in the area seems to be preoccupied either with exploring ways to achieve environmentally sustainable logistics or with determining strategies considered as most cost-effective for managing and responding to environmental issues in logistics. There are a number of studies directed at exploring solutions for environmentally sustainable logistics. Examples include Beamon’s (1999) paper on designing the green supply chain; Wu and Dunn’s (1995) recommended steps toward achieving a proactive environmental management focus in logistics; and Lin et al.’s (2001) process perspective on environmental practices and assessment.

In the case of research aimed at identifying green logistics strategies, a survey by Murphy and Poist (2000) of companies in the USA, Canada and the European Union (EU) on the usage patterns of green logistics strategies is an illustration. The work by Prendergast and Pitt (1996), who surveyed marketing executives of UK companies on their perceptions of trade-offs between traditional marketing and logistical functions and environmental pressures to reduce, recycle and re-use packaging, is another. A further example involves Fernie et al.’s (2000) analysis of UK grocery retailers’ assessment of factors that affect grocery supply chain as a result of a need to accommodate e-commerce initiatives and environmental pressures. Unfortunately, scant attention has been directed at developing theories...
that can assist senior management in making decisions on supply chain strategy that meet the necessary requirements of environmental sustainability.

Building on the notion of sustainable development—that is, meeting the needs of the present without jeopardising the needs of future generations—contained in the report of the Brundtland Commission (WCED 1987), De Simone and Popoff (1997: 21) defined eco-efficiency as ‘the business response to the challenge of sustainable development’. These investigators argued that eco-efficiency is more than the reduction of pollution, energy, and material throughput, as contended by Schmidt-Bleek (1994). The principle is seen to transcend even pollution prevention, product stewardship and other concepts addressed in industrial ecology (Ayres 1989; Ayres et al. 1994). Eco-efficiency encompasses four key ideas: creating value for business as well as society; building long-term targets for improvements; linking business excellence with environmental excellence; and ensuring production as well as consumption is sustainable. To understand how businesses can attain these eco-efficiency aspirations in their continual striving to achieve and sustain competitive advantage, it is clear that links between strategic operations and business decisions need to be established on empirics.

In this chapter we argue that understanding behavioral responses of firms to the changing nature of business environments is a prerequisite to dealing with issues arising from impacts that freight transport has on the environment. In Section 6.1, drawing on the transport system model of Gudmundsson and Höjer (1996) we develop a conceptual framework linking three sets of factors regarded as having a direct effect on the manner and extent to which companies devise strategies to deliver products to customers. In Section 6.2, the strategic product delivery actions adopted by three organisations in different business activities, to optimise business growth and profitability, are presented and examined (Sections 6.2.1–6.2.3). Ways in which these actions have led to dissimilar patterns of product delivery regimes, creating different levels of impact on the environment, is discussed in Section 6.2.4. We conclude the chapter, in Section 6.3, by highlighting the applicability of the proposed conceptual model. This framework provides a useful platform for conceptualising future green logistic research aimed at understanding impacts of changing logistical demands and concomitant business responses on the environment.

### 6.1 Freight Transport and Environmental Impact: A Conceptual Causal Framework

Kordi et al. (1979) suggested that the physical components of any transport system include the vehicle (e.g., car, train, vessel, aircraft), the energy source (e.g., petrol, liquefied petroleum gas, diesel oil, electricity) and infrastructure (e.g., road, railway, airport, harbour). Moreover, Gudmundsson and Höjer (1996) contended that a functioning transport system also encompasses a social system. Individuals, who dictate the structure of the social system through their choices and institutional make-up, also operate within the system and are affected by it. The imposition of the social system gives rise to two other important elements: vehicle operators and organisations. Gudmundsson and Höjer (1996) asserted that these five elements—