



Green initiatives for logistics service providers: An investigation of antecedent factors and the contributions to corporate goals

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ABSTRACT

Concern for sustainability has become more intense among business practitioners due to increasing societal demand for environmental care. Product sellers nowadays cannot sustain themselves in the competitive market only from greening the manufacturing processes, but all parties across the supply chain are also driven to be 'green', even logistics service providers (LSPs). This study aims to provide insights into the initiation of green policies within logistics companies by investigating the significant factors that influence the adoption of green practices, along with the ranking orders of several green activities in terms of their contributions to two corporate goals: cost reduction and environmental protection. The results were based upon a questionnaire-based survey on 311 LSPs in Thailand. Interviews with industry experts were also employed to supplement the questionnaire data. Thailand, as one of Asia's manufacturing hubs, represents developing countries distributing products worldwide, and its logistics industry is growing rapidly. The results indicate that 'eco-driving' and 'vehicle routing' activities are more acknowledged and commonly conducted across the industry. The contributions of 'alternative energy' and 'modal shift' are also highly recognised by the practitioners, but a number of concerns still obstruct the implementation of these approaches. In terms of the antecedent factors, 'company size', 'financial status', 'service areas', 'pressure from customers', and 'organisational support' appear to be statistically significant for the level of green logistics implementation. The findings make a contribution to strategic decision making for LSPs who need to improve their environmental performance by initiating green projects.

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1. Introduction

Manufacturing industries nowadays are under critical conditions in which the issues of energy scarcity and environmental degradation are greatly considered (Zhang et al., 2014; He et al., 2017). Business practitioners nowadays need to take into account the environmental and social impacts of the whole supply chain in order to respond to growing public awareness of sustainability (Ferreira et al., 2016; Colicchia et al., 2013). Some customers these days, for example, require their suppliers to assess and report the level of carbon dioxide (CO₂) emissions or other environmental performance metrics (Azapagic and Perdan, 2000; Ferreira et al.,

2016). Based on the life cycle assessment (LCA) concept, total CO₂ emission throughout the supply chain must be considered for determining a product's carbon footprint. This implies that the pressure is, nowadays, widened to all parties in the chain, including LSPs.

Logistics system is generally claimed as one of the major contributors to overall greenhouse gas (GHG) emission and energy consumption in the world (Kim and Han, 2011; Oberhofer and Dieplinger, 2014; Murphy and Poist, 2003; He et al., 2017). Based on Eurostat, the transportation sector is responsible for 24% of CO₂ emission in Europe, and road transport is the major source of that (Oberhofer and Dieplinger, 2014). Similarly, in the US, 26% of the total GHG emissions come from the transportation sector, and it is the second largest contributor after the electricity sector (He et al., 2017). According to these, LSPs are required to 'green' their operations in order to sustain themselves in a competitive market. A survey from Eyefortransport (2007) also reveals that around 25% of

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sampled companies across the US, Europe, the Middle East, and the Asia Pacific were collaborating with a third-party logistics service to help their overall image to be more environmentally friendly or to move their green projects forward, while another 27% were studying the possibility to do this in the future. As [Martinsen and Björklund \(2012\)](#) note, shippers' demands for green logistics services are increasing. This in turn leads to an increasing interest in 'green logistics' (hereafter GL).

GL is an integration of environmental goals into traditional logistics operations. An overall performance in GL reflects a company's ability to protect the environment by conserving natural resources and reducing waste through efficient product flow and storage ([Lai and Wong, 2012](#)). Examples of GL activities include the use of alternative fuels in transportation, the optimisation of transport routes to reduce miles, the change of transport mode from road to rail, or the use of recyclable packaging materials. The focus of GL is not only on environmental performance but traditional goals for logistics management to reduce costs and enhance product value ([Murphy and Poist, 2003](#); [Lau, 2011](#); [Lai and Wong, 2012](#); [Pazirandeh and Jafari, 2013](#)). As [Martinsen and Björklund \(2012\)](#) suggest, for LSPs, GL is a kind of value added service offered to customers, and this creates an opportunity to gain an advantage over competitors.

Southeast Asia is one of the most vulnerable regions in the world to global warming, and it urgently needs to take environmental issues into account ([Asian Development Bank, 2010](#)). For Thailand, since the geographical location is at the centre of ASEAN countries and also close to growing-market countries such as India and China, Thailand is becoming a hub of logistics and distribution centre of the region. It would be also one of the world factories serving consumers in developed countries who have extensive concerns in conserving natural resources and lessening global environmental impacts ([Lai and Wong, 2012](#)). For this study, Thailand is used as a representative of Asian developing countries and other newly industrialised countries which produce and distribute products to the global market. To continue business trading and untie some market restrictions, it is essential for Thai practitioners to catch up with the global concern of sustainability by considering an initiation of GL policy.

According to the literature review, while the implementation of GL might be influenced by several factors such as a company's financial status, pressure from stakeholders, or top management support ([Lau, 2011](#); [Lin and Ho, 2011](#); [Lai and Wong, 2012](#); [Evangelista, 2014](#); [Baz and Laguir, 2017](#)), there is so far a lack of empirical study to understand significant mechanisms for the GL initiation in Thailand. Different countries, as stated by [Lin and Ho \(2011\)](#), can yield different results regarding environmental practices. Furthermore, while many survey studies have explored common GL practices, there is still a lack of studies focusing on the extent of the contribution those practices make to meeting companies' goals or expectations. It is possible that an activity generally conducted within the logistics industry might not completely satisfy the companies. This study, therefore, focuses on two objectives. The first is to investigate factors influencing the adoption of green practices in the Thai logistics service industry. Secondly, this study also aims to rank the contributions of various GL activities to two corporate goals: cost reduction and environmental protection, based upon the perspectives of Thai logistics practitioners. Based on the review of the GL literature, these two goals have been claimed as the primary reasons for logistics companies to establish green practices ([Lau, 2011](#); [Zhang et al., 2014](#); [Murphy and Poist, 2003](#); [Evangelista, 2014](#); [Pålsson and Kovács, 2014](#)). Environmental protection is also connected to a desire to enhance the corporate image and reputation towards achieving the

improvement of customer relationships as well as to move beyond environmental regulations. The answers obtained from this study would provide managerial insights into the initiation of GL for LSPs. Furthermore, the practitioners are advised in terms of how to prepare themselves to be successful in GL implementation. Also, among various GL activities, the study seeks to establish which should be initiated in order to better fulfil the requirements of either cost reduction, environmental protection, or both.

This paper is organised as follows. After the introduction, Section 2 presents a literature review on empirical studies relating to GL management. Section 3 then describes the research framework and hypotheses. The methodology used is presented in Section 4. The results and discussion on managerial insights are given in Section 5. Finally, Section 6 provides a conclusion.

2. An overview of studies of green logistics management

In order to identify research gaps and construct the initial framework, empirical studies of GL management were reviewed by focusing on two different aspects. Section 2.1 summarises previous studies that aimed to classify and/or investigate GL practices in a particular country or region. Section 2.2 then provides a review of studies that explored the driving factors or mechanisms for the implementation of GL.

2.1. Green logistics practices

During the past decade, a number of researchers conducted empirical studies to explore several aspects of GL initiatives in a specific country or region. A survey from [Eyefortransport \(2007\)](#), first of all, compared GL practices among companies in the US, Europe, the Middle East, and Asia Pacific using the data of 536 respondents from various industries. The respondents were all transportation and logistics professionals from the sample companies. From the survey, GL practices commonly adopted worldwide included route planning to reduce mileage, improving energy efficiency, and establishing green warehousing and distribution centres. Changing transport modes was popular in Europe but rarely implemented in other regions. Moreover, emissions measuring and reporting as well as using alternative fuels were generally conducted in the US and Europe but they were not generally applied in the Middle East or in the Asia Pacific region. Regarding the measurement and analysis of air emissions, [Zailani et al. \(2011\)](#) employed a questionnaire-based survey to explore perceptions of Malaysian logistics managers regarding the environmental impact which was related to their operations. The results indicated that more than half of Malaysian firms had never monitored and/or measured the environmental impacts of their logistics activities, and they also did not have a formal environmental policy or strategy. However, most of them showed willingness to invest in green technology in order to become more environmentally friendly. Among several logistics functions, the transportation sector was their focus area to initiate environmental policies and strategies. [Kim and Han \(2011\)](#) then employed a confirmatory factor analysis study to develop multi-item scales for measuring GL practices. The data were collected from more than a hundred logistics companies in Korea. From this, GL practices were classified into three dimensions: internal environmental management, environmental sourcing and packaging, and environmental process design.

[Pieters et al. \(2012\)](#) investigated green initiatives related to physical distribution and transportation through a survey of 145 LSPs in the Netherlands. All initiatives were classified towards four aspects (internal and external approaches, and optimizing and innovating). Examples of activities under each combination

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