

# Green logistics management affecting sustainability in the air transport industry: a case study of Thai Airways International Public Company Limited

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## Abstract

This research aims to 1) study the awareness of business and stakeholders in the air transport industry: a case study of Thai Airways International Public Company Limited; 2) analyze the capability of logistics management, green logistics management process, application of environmental technology and social marketing value creation: a case study of Thai Airways International Public Company Limited; and 3) propose a green logistics management approach that affects sustainability in the air transport industry: a case study of Thai Airways International Public Company Limited. This research is a mixed-methods research. The population and quantitative samples used in this study are 400 employees of Thai Airways International and 9 key informants, selected by purposive sampling. The selection criteria are those who have at least 5 years of experience in various operations related to air cargo transport. The research instruments are questionnaires and interview forms. The statistical data analysis includes percentages, means, standard deviations, and content analysis. The research results found that the use of digital technology to manage logistics in real time increases the efficiency of resource utilization, reduces waste, and helps the transport process to be more accurate and faster. In addition, cooperation between the public and private sectors in setting environmentally friendly transport standards is necessary to ensure systematic operations and compliance with environmental measures, including setting environmental practices for suppliers, in terms of organizational coordination, promoting environmental awareness, and logistics technology for sustainable green logistics management.

**Keywords:** Green logistics management, Industrial sustainability, Air transport

## 1. Introduction

Due to the increasingly severe problem of global warming and climate change, all sectors, including the aviation industry, are committed to reducing greenhouse gas emissions. Studies of various types of vehicles currently in use show that aviation accounts for approximately 2-2.5% of global carbon dioxide (CO<sub>2</sub>) emissions, increasing by an average of about 2.3% annually from 1990 to 2019. The COVID-19 pandemic brought global travel to a standstill, leading to a decrease in CO<sub>2</sub> emissions from aviation. In 2019, emissions peaked at over 1 billion tons of CO<sub>2</sub>, decreasing to 600 million tons in 2020. However, in 2021, they increased again to approximately 720 million tons of CO<sub>2</sub> and are expected to rise rapidly, exceeding the 2019 peak levels in the next few years. Meanwhile, other vehicles such as cars, motorcycles, trains, and boats are moving towards using renewable and clean energy fuels. Previously, clean

fuels for air travel had not been widely discussed, but now research, development, and policy initiatives in many countries are gaining a broader perspective. (National Science and Technology Development Agency, Ministry of Higher Education, Science, Research and Innovation, 2024) In terms of enhancing national competitiveness to move beyond a middle-income to a high-income country, relying solely on low-cost labor is no longer sufficient. Instead, the production of goods and services must be upgraded to emphasize the use of technology, innovation, and human capital (Kerdpitak et al., 2023; Wisedsin et al., 2020). Therefore, the country needs higher investment to add value to supply chain management activities and environmentally conscious transportation management to meet diverse, general, and specific needs of individuals and organizations across economic, social, and environmental dimensions, as well as to support both domestic and international demands, thus becoming an integral part of the global value chain. (Waiyawuththanapoom et al., 2023; Tirastittam et al., 2020)

Based on the aforementioned problems, the researchers recognize that the use of fuel energy remains a major global issue, with increased energy consumption impacting the environment. This research aims to study and analyze the importance of green logistics management capabilities for sustainable development in the business sector, with the potential for effective future application.

## **1.2 Research Objective**

1. To study the business awareness and stakeholder profiles in the air transport industry, using Thai Airways Public Company Limited as a case study.
2. To analyze logistics management capabilities, green logistics management processes, the application of environmental technologies, and the creation of social marketing value, using Thai Airways Public Company Limited as a case study.
3. To guidelines for green logistics management that contribute to sustainability in the air transport industry, using Thai Airways Public Company Limited as a case study.

## **2. Literature review**

According to Bajdor and Grabara (2011) stated that green logistics management refers to the management of activities that are part of green supply chain management. The essence of supply chain management is the procurement of raw materials, the processing of finished goods, and the transportation of goods to warehouses for preparation for delivery to consumers. Originally, the focus was on fast and cost-effective transportation, but now environmental considerations are also important. Therefore, green supply chain management is about balancing activities and the environment by creating a green environment within the supply chain. This process considers the environmental impact of every activity in the supply chain and also builds long-term relationships with suppliers and society.

Wu and Dunn (1995: 21-22) stated that green logistics is the responsibility of the logistics system for the environment, taking into account the processes of raw material procurement, production, packaging, transportation, and waste disposal, reducing environmental impact. Therefore, creating a green organization will lead to better performance, reduced costs, and environmental sustainability.

### 3. Methodology

This study employed a mixed-methods research approach, utilizing both primary and secondary data collection methods for content analysis.

#### Quantitative Research

The quantitative population and sample used in this study consisted of 14,000 employees of Thai Airways International (Source: Thai Airways Personnel Data, 2023). The sample size was determined using Taro Yamane's formula with a margin of error of 0.05. For this study, the researcher selected a sample size of no more than 400 people with a 95% confidence level to ensure the completeness of the study, employing purposive sampling.

#### Qualitative Research

In this qualitative study, the researcher used purposive sampling for in-depth interviews with nine key informants. Following Cresswell's (2018) concept that focus groups for research explaining phenomena should consist of 3-10 participants, this research employed triangulation to compare research findings from different sources and perspectives: three representatives from organizational development, warehouse management, and air freight operators.

### 4. Results

The analysis of opinions regarding business and stakeholder awareness (overall) showed a high level of opinion ( $\bar{x} = 4.02$ , S.D. = 0.52), particularly regarding situational awareness, followed by social context awareness, secondary stakeholders (external networks), environmental awareness, primary stakeholders (operational sector), and primary stakeholders, in that order.

The analysis of opinions regarding logistics management capability (overall) also showed a high level of opinion ( $\bar{x} = 4.02$ , S.D. = 0.52), particularly regarding problem and obstacle management, followed by logistics control, logistics operations, logistics evaluation, and logistics planning, in that order.

The analysis of opinions regarding green logistics management processes (overall) also showed a high level of opinion ( $\bar{x} = 4.02$ , S.D. = 0.52), particularly regarding environmentally friendly packaging, followed by environmentally friendly warehousing, environmental logistics data management, and waste management. And environmentally friendly transportation, respectively.

Overall opinions regarding the application of environmental technology were at a high level ( $\bar{x} = 4.02$ , S.D. = 0.52), including the environmental technology adopted, followed by the impact of the technology and efficient resource management, respectively.

The application of environmental technology in air cargo transportation involves utilizing environmental technologies to reduce environmental impact while increasing efficiency and cost-effectiveness in the industry. These technologies focus on energy efficiency, emission reduction, and sustainable resource use, contributing to long-term business and environmental benefits for the air cargo process.

## 5. Conclusion

The analysis results for Objective 1, regarding business and stakeholder awareness (overall), showed a high level of opinion ( $\bar{x} = 4.02$ , S.D. = 0.52). This included situational awareness, followed by social context awareness, secondary stakeholders (external networks), environmental awareness, fundamental stakeholders (operational sector), and primary stakeholders respectively.

The analysis results for Objective 2, regarding overall logistics management capability, showed a high level of opinion ( $\bar{x} = 4.24$ , S.D. = 0.62), followed by problem and obstacle management, logistics control, logistics operations, logistics evaluation, and logistics planning, respectively.

The analysis results according to objective 3 revealed that green logistics management approaches contributing to sustainability in the air transport industry, with Thai Airways Public Company Limited as a case study, include the use of digital technology for real-time logistics management. This improves resource efficiency, reduces waste, and enhances the accuracy and speed of the transportation process. Furthermore, collaboration between the public and private sectors in establishing environmentally friendly transportation standards is essential for systematic operations and compliance with established environmental measures.

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