

Chapter 8

Current Challenges and Technological Solutions for Sustainable Aviation


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ABSTRACT

This chapter aims to discuss the relevant problems in sustainable aviation development and feature the scientists' solutions addressing these issues. The chapter highlights and discusses the relevant problems in sustainable aviation development; features the scientists' solutions addressing these issues, for instance, by using environmentally friendly aircraft engines, alternative energy sources, and materials; and discusses the likely results in the economy of this practice. The research conceptualizes and contributes to the novel literature on aviation area for supporting Sustainable Development Goals (SDGs) in aviation area. Since the airline shipment continuously grows and is expected to become the fastest means among other modes of transport, it certainly brings environmental problems into view such as noise pollution, discarded fuels and emissions from burning, from both airplane and airport operational activities. These have been underlying issues demanding constant effort for energy, natural, and ecological experts.

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1. INTRODUCTION

Aircraft transporting, with a unique role as an international transportation means of shipment, are promoting the speedy way of transporting people and valuable freight long distance. On the one hand, for over fifty years, the airline industry has increasingly contributed to the progress of the economy and the society, promoting the current trading and migrating patterns, driving the growth and preservation of diverse cultural communities, the world economy, and transnational political partnerships (Nguyen, L. T. Q et al., 2021). The profits that the international economy and transportation gain from this aspect are considerable, and various regions and cities depend significantly on these profits nowadays. The significant development of national airline shipment since the 1950s has, on the other hand, exerted adversely environmental effects which currently put the foreseeable future industry at risk. Locally, noise from airplane operational activities and the low quality of the regional atmosphere have already increased the productivity pressures and suspended the expansion plans at airports, so have restricted the competence to adapt to the requirement of the economy and the social promotion in the areas they exist. In contrast, globally based on the dependence of airplanes on fossil fuels, the peak oil and climate change existentially threaten the distant future of the industry and the responsibility it takes in the global economic and social aspects in the other half of the 21st century (Hoang, 2018). The driving force of globalization, along with the reducing cost of flying and constant development in wealth, has been instrumentally supporting the growth of world aviation. However, it is inevitable that, in the distant future, environmental problems will limit this trend to a certain extent (Hoang, 2018). So far, technology advancement in the industry has not been able to solve the adverse effects on individual health and environment regarding airline shipment improvement. Therefore, continual eco-efficiency will be inadequate when significant changes and disruptor facilities are needed (Hoang et al., 2020).

Conversely, the rising cost of enhancing these technologies while mitigating the environmental impacts could be so huge that the cost of flying is escalating to the level that it restricts the demand and changes the role it plays in the contemporary world (Hoang T.G et al., 2021). Conceivably, considerable efforts of the international airline in adapting technological advances in the next few decades which drives the industry towards the sustainable development may both alleviate the adverse effects to the ecology, and also promote the operational efficiency as well (Hoang et al., 2020; Nguyen, H. T. et al., 2021). Therefore, this paper firstly addresses potential challenges in sustainable aviation and discusses their implications for wider stakeholders. After this, possible technical solutions for those issues will be discussed.

2. CURRENT CHALLENGES IN THE DEVELOPMENT OF AVIATION INDUSTRY

The primary negative implication from the aviation industry firstly came from its operational activities, which cause air contamination, noise pollution and contribute to global climate change (Hoang et al., 2022). In the European Union (EU), these impacts result in economy deficiency, which adversely affects the life quality of most European communities. While there are still common reasons to support aircraft transporting (such as freedom, mobility, prestige, etc.), these advantages which are taken for granted need to be considered carefully due to the escalating challenges that aviation currently brings to the human communities (Minh Quyen & Vu, 2019). These challenges are significant and have delivered adverse effects to both the environment and also human health (Hoang C.V, et al., 2021a). Loud noises from the

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