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# THE IMPACT OF REDUCTION OF CARBON FOOTPRINT BY MALAYSIAN AIRPORTS ON THE PERCEPTION OF GOOD SUSTAINABILITY PRACTICE BY CONSUMERS

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**Abstract:**

Flying leads to lots of carbon emissions. For an average household, flying comes at number 6 of in the top 10 list of activities that cause the most carbon emissions. With the rise of sustainability and green awareness, many airports around the world aim to lower the CO2 footprint. While much research has been conducted on international airports in developed nations, little is known about the commitment of airports in developing nations as well as the perception of the air travelers in the effort taken by Malaysian Airport Berhad. Passengers are an important stakeholder of airports as they are the users of airport facilities and the main source of income for airports. The main aim of this research is to identify the perception of passengers on the measures taken by the Airport Management Company in Malaysia (Malaysia Airports Berhad, MAB) in reducing $CO_2$ emission at the airport (KLIA). A qualitative approach via document review and interview will be utilized to meet the aim of this research.

The tourism and transportation industries are significant contributors to global carbon dioxide (CO2) emissions, with air transportation accounting for approximately 12% of CO2 emissions in the transport sector. The rapid growth of the tourism industry, particularly in developing nations like Malaysia, exacerbates this environmental challenge. This study investigates the measures undertaken by Malaysia Airports Holdings Berhad (MAB) to manage and reduce CO2 emissions at Kuala Lumpur International Airport (KLIA) and explores passengers' perceptions of these efforts.

MAB has made strides in environmental sustainability by adopting comprehensive carbon management strategies, including the implementation of the Airport Carbon Emission Reporting Tool (ACERT) and solar energy initiatives, which resulted in a 42.86% reduction in carbon emissions at KLIA from 2012 to 2014 despite a 22% increase in passenger volume. These efforts align with Malaysia's commitment to a 40% reduction in national carbon emissions by 2025 and the Intergovernmental Panel on Climate Change's global emission reduction targets.

The research addresses key questions about MAB's reporting practices, the implementation of emission-reducing measures, and passengers' concerns about airport-related CO2 emissions. Findings aim to provide insights into passengers' perceptions of sustainable airport practices, contributing to improved stakeholder engagement and enhancing the alignment between corporate social responsibility (CSR) initiatives and public expectations.

This study underscores the importance of sustainability management in the aviation sector, highlighting the challenges faced by airports in balancing growth with environmental responsibility. It also emphasizes the need for effective communication and stakeholder collaboration to achieve carbon neutrality and foster a positive public image for sustainable practices in airport operations.

**Keywords**: Malaysia Airport Berhad (Malysia Airport Corporation), Carbon C02 Emissions, corporate social responsibility (CSR)

Chapter 1: Introduction

1.0. Background

Business activity has significant negative environmental impacts, which can be seen in recent times through incidences of global warming and climate change. One of the contributors for adverse environmental effects is the growth of tourism industry and in particular the growth of air transportation (Dubois, et al., 2011). Relatively recent figures show that aviation industry accounts for about 2% of the global carbon dioxide ($CO_2$) emissions and about 12% of the $CO_2$ emissions within the transport sector.

The tourism industry is one of the growing industries in developing countries including Malaysia. It was estimated that in 2017 more than 25 million visitors will visit Malaysia (MATTA, 2016). With the large influx of visitors, traveling is becoming one of the most important activity in the tourism industry. With the rising tourism activity especially both locally and globally, there is a rising concern that the carbon dioxide ($CO_2$) emission from tourism activity can cause a negative outlook to the environment.

Over the last few years, there has been an increasing trend for business organization to make their products or services as green or environmentally friendly (Hagmann, Semeijn, & Vellenga, 2015). This is because, key stakeholders such as consumers are considering the aspect of environmentally friendliness in their purchase or consumption decision (Hagmann et al., 2015)

From the literature review, it is clear that transportation industry is a significant contributor to $CO_2$ emissions (Ashok et al., 2014; Dubois, et al., 2011; Grampella et al., 2017; Linz, 2012; Masiol, & Harrison, 2014; Schlenker, & Walker, 2015; Stettler, Eastham, & Barrett, 2011; Yamaguchi, 2010).

Dubois, et al., (2011) state that in 2005, tourism industry transportation was responsible for around 5% of all $CO_2$ emissions globally. With the rapid growth of the tourism sector, it is estimated that the $CO_2$ emissions from the tourism industry will increase by over 150% by 2035.

Considering the increasing intensity of global warming and climate change, many organizations took the initiative towards the reduction of carbon emissions. The Intergovernmental Panel on Climate Change

recommends to reduce global emissions by 50 to 80% on or before 2050 (Dubois, et al., 2011). Malaysia has targeted a reduction of carbon emissions by 40% in the year 2025 (Fong et al., 2008).

Presently, airliners and airports are not legally required to report or take action in reducing the carbon emission from their business activities. However, there are several airports and airliners around the world that do disclose their carbon footprint voluntarily to meet the expectations of relevant stakeholders (Yamaguchi, 2010). For example, airports that operated in relatively high population area took the initiative to report and manage their carbon footprint despite having high landing and take-off (LTO) activities (Ashok et al., 2014).

According to Stettler et al. (2011), $CO_2$ emissions during a particular phase of the landing-takeoff (LTO) cycle are proportional to the amount of time spent in that phase of operation the 'time-in-mode' (TIM). There is international certification of LTO cycle, but it is generally not representative of operations at airports, and so major airports usually do not consider LTO as part of their responsibility (Masiol & Harrison, 2014).

Stettler et al. (2011) found that British Airways adopt taxiway acceleration with thrust settings up to 17%, which is 10% more than the recommended 7% thrust, especially when an aircraft is required to cross an active runway or make a sharp turn. However, perhaps as a form of compensation, British Airways uses 4% engine trust when idle instead of the recommended 7% (Stettler et al. 2011). According to Schlenker & Walker (2015), the emission of gases such as carbon monoxide and $CO_2$ varies according to the amount of time planes spend idle on the tarmac. Fig. 1 depicts the standard LTO (Masiol & Harrison, 2014).

1.1. Statement of Problem

The contribution of tourism and the transportation industry to the levels of $CO_2$ emissions is generating much interest today. This is because due to the effect of globalization, the transportation industry especially air transportation is expected to experience growth in the future. An adverse effect of this growth is the increase in the levels of $CO_2$ emissions at the airports. Researchers have looked at measures to reduce emissions by the aviation industry. However, the measures can impact profitability, which negatively affects the industry and its stakeholders.

While there are many researches that have been conducted on international airports in developed nations, little is known about the commitment of airports in developing nations as well as the perception of the air travelers in the effort taken by MAB. Passengers are important stakeholders of airports as they are the users of airport facilities and the main source of income for airports.

As such the main issues of sustainability management particularly the action taken by the MAB in managing the $CO_2$ emissions is the perception of the passengers on using the airports, with Kuala Lumpur International Airport (KLIA) being the focus of this research. In short, the main issue that this research aims to investigate is the importance of sustainability as the reason for using and shopping at the airports that adheres to good sustainability management.

### 1.3. Research Questions

This research is aimed at answering the following research questions:

I. Does MAB report on $CO_2$ emission to relevant stakeholders?

II. How does the management of MAB implement those measures?

III. To what extent passengers is concerned with $CO_2$ emission of airport being considered as an issue in using an airport?

### 1.4. Objective of the Study

The main aim of this research is to identify perception of passengers on the measures taken by Airport Management Company in Malaysia (Malaysia Airports Berhad, MAB) in reducing $CO_2$ emission at the airport (KLIA). This aim can be broken down into the following objectives.

I. To identify the current procedures adopted by MAB in reporting $CO_2$ emissions to relevant stakeholders.

II. To examine the implementation of measures currently undertaken by MAB to reduce $CO_2$ emissions at the airport.

III. To investigate the extent of passengers' concern on $CO_2$ emission of the airport being considered as an issue in using an airport

### 1.5. Scope

The focus is on the impact of the commitment of MAB in reporting, managing and reducing carbon emissions at the airports that it currently operates on the positive perceptions among the passengers using MAB airports. One of the difficulties in airports around the world to implement effective strategy of good sustainability practices such as managing and controlling the $CO_2$ emissions, is meeting the expectation of each stakeholders. For shareholders, employing sustainable strategies may reduce the profit generated by business organization and thus it is not good.

## 1.6. Significant of the Study

Corporate social responsibility (CSR) is playing an increasingly important role in business today, and economic, political and social factors are shaping CSR activities around the world. Some authors describe CSR as a set of actions aimed to further some social good, beyond the explicit pecuniary interests of the firm, that are not required by law and as practices that improve the workplace and benefit society in ways that go above and beyond what companies are legally required to do.

Environmentally responsible business practices are an element of CSR in that they are often initiated for reasons other than to make a firm money, they are not required by law, and they benefit society.

## 1.7. Definition of Terms

- Carbon Footprint

A carbon footprint is a calculation of the total greenhouse gas emissions caused directly and indirectly by an organization or company. This is typically calculated and reported over a period of 12 months.

What often makes a carbon footprint complicated is defining the boundaries of the audit. The Greenhouse Gas Protocol provides guidance to assist in determining both the organizational and operational boundaries of the carbon footprint. The organizational boundary of a carbon footprint is determined through one of two approaches, namely the equity or control approaches.

- Sustainability

The study of how natural systems function, remain diverse and produce everything it needs for the ecology to remain in balance. It also acknowledges that human civilization takes resources to sustain our modern way of life. There are countless examples throughout human history where a civilization has damaged its own environment and seriously affected its own survival chances. Sustainability takes into account how we might live in harmony with the natural world around us, protecting it from damage and destruction.

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Chapter 2: Literature Review

2.1. Towards Green Air travel

Over the last few years, there has been an increasing trend for business organizations to make their products or services as green or environmentally friendly (Hagmann, Semeijn, & Vellenga, 2015). This is because, key stakeholders such as consumers are considering the aspect of environmental friendliness in their purchase or consumption decision (Hagmann et al., 2015)

From the literature review, it is clear that the transportation industry is a significant contributor to $CO_2$ emissions (Ashok et al., 2014; Dubois, et al., 2011; Grampella et al., 2017; Linz, 2012; Masiol, & Harrison, 2014; Schlenker, & Walker, 2015; Stettler, Eastham, & Barrett, 2011; Yamaguchi, 2010). Dubois, et al., (2011) state that in 2005, tourism industry transportation was responsible for around 5% of all $CO_2$ emissions globally. With the rapid growth of the tourism sector, it is estimated that the $CO_2$ emissions from the tourism industry will increase by over 150% by 2035.

Considering the increasing intensity of global warming and climate change, many organizations took the initiative towards the reduction of carbon emissions. The Intergovernmental Panel on Climate Change recommends to reduce global emissions by 50 to 80% on or before 2050 (Dubois, et al., 2011). Malaysia has targeted a reduction of carbon emissions by 40% in the year 2025 (Fong et al., 2008).

Presently, airliners and airports are not legally required to report or take action in reducing the carbon emission from their business activities. However, there are several airports and airliners around the world that do disclose their carbon footprint voluntarily to meet the expectations of relevant stakeholders (Yamaguchi, 2010). For example, airports that operated in relatively high-population areas took the initiative to report and manage their carbon footprint despite having high landing and take-off (LTO) activities (Ashok et al., 2014).

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idle instead of the recommended 7% (Stettler et al. 2011). According to Schlenker & Walker (2015), the emission of gases such as carbon monoxide and $CO_2$ varies according to the amount of time planes spend idle on the tarmac. Fig. 1 depicts the standard LTO (Masiol & Harrison, 2014).

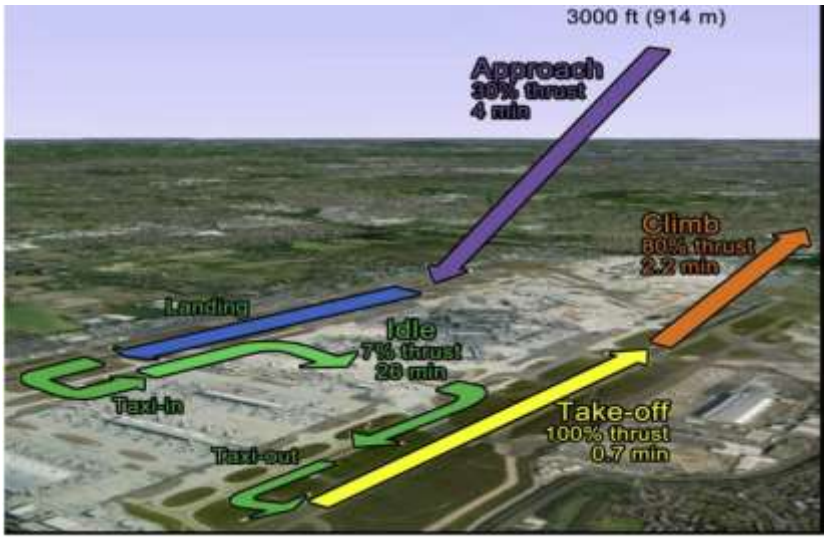


Fig. 1: Standard LTO cycle (Masiol & Harrison, 2014)

According to Hagmann et al. (2015), customers are key stakeholders that play an important role for the adoption of environmental friendly policies such as good carbon footprint management. However this trend has yet to be seen in the airline industry particularly the passengers. For example, passenger's preference of using air travel for leisure short haul trips, instead of the more fuel efficient rail or coach travel.

In the research conducted by Hagmann et al. (2015), they found that only about a third of the participants had heard of carbon management schemes. This indicates that there are many of passengers who are not aware about the importance of good carbon management that has been undertaken by airliners. In their research, they found however that airliners with good carbon management generally has a better image than airliners that do not have a good carbon management. The low-cost carriers are generally deemed to be very unfriendly with the environment and this was a significant consideration taken by some of the passengers when selecting airlines for their travel need.

2.2. Green Initiative by Malaysia Airports Holdings Berhad (MAB).

MAB is a public listed company and has been trading on the Main Board of Bursa Malaysia Securities Berhad (Malaysian Stock Exchange) since 1999. Currently, it operates and manages 39 airports in Malaysia including

five international airports, 16 domestic airports and 18 short take-off and landing (STOL) ports. Malaysia Airports has produced Sustainability Reports annually from the year 2009, signaling its commitment toward greener Malaysia. The accuracy of the MAB reports has been verified by SIRIM QAS International *Sdn. Bhd.* (Private Limited) through a detailed on-site audit process. Malaysia Airports has also published in 2015 the "Carbon Management Plan 2015-2020", to get longer term plans and targets of Malaysia Airports towards the achievement of carbon neutral growth in 2020.

MAB is becoming a sustainable organization, environmental consciousness is one of Malaysia Airport's five pillars of sustainability, meaning taking great concern for environmental sustainability is one of Malaysia Airports' core values (Malaysia Airports, 2015). MAB is developing plans around four focus areas of energy, waste, water and carbon management. These areas are believed to be of major importance in future to MAB's business operations. MAB also believes that by improving its reputation as a sustainable airport company, it can attract stakeholders (Malaysia Airports, 2015).

Malaysia Airports since 2012, has deployed the usage of Airport Carbon Emission Reporting Tool (ACERT) to facilitate data inventory on carbon emission of airport-owned vehicles and transport and electricity consumption at all its international and domestic airports. MAB has gone beyond mere disclosure and towards more meaningful reporting (Malaysia Airports, 2015). From the review of the MAB report, report aimed to

"provide best practice guidance for Malaysia Airports Holdings Berhad on producing individual carbon reduction strategies, targets and associated carbon management plans". Short-term and long-term targeted milestones were defined in the report as follows.

i. To collaborate with stakeholders (tenants, airline business partners, and others) to reduce indirect emissions.

ii.. To reduce total direct emissions of 10% by year 2020, and to manage/avoid the generation of additional $CO_2$ emissions as a result of its business operations.

iii. To achieve Carbon Neutrality

MAB, is a participant in the ACI Airport Carbon Accreditation program, and by looking at the ability of the airport to reduce its carbon emission by 42.86% in 2014, KLIA was certified level 2 (Reduction level). There are all together four levels, where level 3 is the Optimization of resources and level 4, is the carbon neutrality.

Achieving level 4 is the ultimate aim of MAB, where the increase in its capacity will not have any increase in its carbon emission. In addition, MAB was recognized as one of the few Malaysian companies that were included in Malaysia's Inaugural Environmental, Social, Governance (ESG) Index, also known as the FTSE4Good Bursa Malaysia Index (Malaysia Airports, 2015).

The review of the MAB sustainability report (Malaysia Airports, 2015) indicates several action that has been undertaken by MAB to reduce its carbon emission. First of all, MAB has embarked on various initiatives to manage its emissions level efficiently (Malaysia Airports, 2015). In attempting to achieve industry and national targets, MAB has worked towards balancing the growth of its business while reducing its carbon footprint (Malaysia Airports, 2015). The first is to measure the carbon footprint using 2012 as the baseline year, as it was the first year that KLIA started its carbon footprint data inventory (Malaysia Airports, 2015).

MAB has implemented the use of solar power and its rooftops, parking lots, and 'buffer' areas at airports were turned into clean energy generation facilities at KLIA in January 2014 (Malaysia Airports, 2015), KLIA implemented. As of October 2014, the solar power systems at KLIA helped to save 12,092.2 tonnes of $CO_2$ emissions.

Table 1 provides a comparison of carbon emissions from 2012 to 2014. It can be seen from the action and the results. From Table 1, it can be seen that despite the growth in the number of passengers at KLIA by as much as 22% in 2014, the carbon emission has been reduced by 42.86%.

Table 1 MAB's reporting of Carbon Reduction from 2012-2014 (Malaysia Airports, 2015).

| Year | Scope 1 Emissions | Scope 2 Emissions | Total $CO_2$ Emissions | Number of Passengers | Emission Intensity | Reduction Achieved |
|---|---|---|---|---|---|---|
| 2021 | 1,944.23 | 44,050.00 | 45,994.23 | 39,887,866 | 0.0011 | |
| 2022 | 1,934.23 | 47,021.00 | 48,955.23 | 47,498,157 | 0.0010 | 9.1% |
| 2023 | 2,192.23 | 32,452.00 | 34,644.23 | 48,930,409 | 0.0007 | 42.86% |

2.3. Personal Norm

Chen, (2013) have suggested several contributing factors that could influence the passengers perception toward accepting the airliners with green image and to participate in any carbon-reducing scheme. These contributing factors include attitudes and personal norms. Attitudes refer to evaluative reactions to an action and are thought

to reflect predispositions to respond in a favorable or unfavorable manner to a given product or service (Chen, 2013). However, according to Chen (2013), attitudes are considered to lack the strong motivational content needed to induce an intention to act and thus it did not have a significant influence on the decision-making process of consumers.

### 2.4. Information Seeking and Information Availability

Xiang, Magnini, and Fesenmaier, (2015) found that there are two important aspect in information search in travel and tourism, which are information seeking and information availability. Information seeking refers to the action of the passengers to constantly search important information for making their travel needs. Information availability on the other hand refers to the existence of the information that is being seek by passengers (Xiang et al., 2015). Together, both information seeking and availability assist the consumer in deciding their actions.

### 2.5. Perception toward Green Initiatives

From the literature review, it is clear that MAB has taken the necessary steps to reduce the carbon emissions at KLIA. However, the major gap in green organization is the perception of key stakeholders on the actions taken by the business organization towards the use of the product and services. According to Hagmann et al. (2015), customers are key stakeholders that play an important role for the adoption of environmentally friendly policies such as good carbon footprint management. Hagmann et al. (2015), they found that not many passengers are aware about the importance of carbon management of airlines. It is thus imperative to understand the perception of passengers at the airport on the importance of good carbon management.

Chen, (2013) has suggested several contributing factors that could influence the passengers' perception toward accepting airliners with green images and participating in any carbon-reducing scheme. These contributing factors include attitudes, personal norms, and positive anticipated and negative anticipated emotions. From their research, it was found that attitude did not have a significant role in the actions of the passengers to participate in the carbon-reducing scheme. However, personal norms was found to have a significant role in the actions of the passengers to participate in the carbon-reducing scheme.

Chapter 3: Methodology

The methodology in social science research domain can be generally categorized into two which are quantitative and qualitative research methods. The qualitative approach uses non-numerical data to understand the relationships between different variables (Creswell, 2003).

### 3.1. Data Collection

In this study, qualitative research was conducted via an interview using structured, closed-ended questions. The use of such a questionnaire enables this study to obtain a profile of visitors at the Malaysian Airport regarding their positive perception of green initiatives by the Malaysian Airport.

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