ISSN 2633-285X (Print)
ISSN 2633-2868 (Online)

Novos
Research and Impact Journal
Discipline Research

AN ASSESSMENT OF THE EFFECT OF COMMERCIAL AND ENVIRONMENTAL AVIATION POLICIES ON PRO-SUSTAINABLE TOURISM GROWTH IN DEVELOPING COUNTRIES

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ABSTRACT:
This study sought to assess the possible effects of commercial and environmental aviation policies on the possibilities for developing countries in particular, to grow their incoming tourism sectors in a pro-sustainable way. The study used a mixed approach of qualitative expert interviews and a country-based tourism and air transport dependence indicators to identify states that are more likely to need to prioritise aviation policies. The expert interviews revealed some notable reservations about the aviation sector's ability to enable pro-sustainable tourism growth, despite ambitious targets for the aviation and tourism sectors to become net-zero by 2050. In the short to medium term, long haul travel in particular, will continue to rely on emissions intensive aircraft and therefore important policy decisions need to be made to help strike a balance between the economic imperatives of avoiding the worst effects of climate change and encouraging tourists to return during the post-pandemic period. A tourism and air transport dependence ranking was created from published data sources to illustrate the countries where environmental and commercial aviation policy decisions may be the most difficult to reconcile, given their acute reliance on incoming tourism. With a high number of incoming tourists and a high reliance on air transport for enabling tourist visits, countries like Thailand, Cuba and the Maldives were ranked highest.

1. Introduction

This study is the first phase in evaluating how ICAO aligned aviation policies and training programmes can support pro-sustainable tourism growth, and whether existing commercial and environmental aviation policies help to address the challenges that tourism-dependent developing regions have in finding a balance between economic growth and environmental sustainability, to be in line with the United Nation's Sustainable Development Goals.

The challenge, particularly during the pandemic recovery period, to balance the need for economic recovery with ongoing impacts on the climate, was highlighted by ICAO on 23rd Feb 2023:
"Through ICAO, governments have reached agreements on goals toward zero accident fatalities by 2030 and zero carbon emissions by 2050, and these will continue to play key roles in both guiding continued

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Keywords
Aviation Policy, Pro-sustainable Tourism Growth, Incoming Tourism, Developing Countries

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Accepted 30th October 2023

Published Online

ISSN 2633-285X (Print)
ISSN 2633-2868 (Online)

progress and in prioritizing ICAO's implementation support initiatives" Doc 10004 (ICAO, 2022)

Currently, there are gaps in ICAO aligned aviation policies as much of the focus of commercial policy is around stimulating growth in aviation and incoming tourism, helping to answer the predominantly economic requirements of developing regions and countries. On the other hand, ICAO has developed concrete environmental commitments and policies as underlined in the 41st ICAO Assembly held in 2022, related to climate change, noise, air quality and CORSIA. There is currently a lack of integration and alignment, however, between commercial and environmental policies, which can lead to uncertain outcomes, notably for tourism-dependent developing regions.

In line with the aim this study sets out to generate an index that highlights the developing countries in the world that are most dependent on incoming tourism and which are also depending on air transportation for enabling incoming tourist arrivals into a country. The top 10 ranked countries can then be used for an in-depth analysis on the relevant commercial and environmental aviation policies that are applicable to those jurisdictions to help determine if they are currently compatible with the concept of pro-sustainable tourism growth (to be undertaken in phase 2 of the research). To assist in providing context, a comprehensive literature review was carried out on pro-sustainable tourism growth and the role of commercial aviation within it along with the carrying out of three expert interviews to explore themes of significance that can be incorporated into the top 10 country in-depth analysis at phase 2 of the project.

The rest of the study will be laid out as follows: Section 2 contains the review of contextual literature; Section 3 outlines the chosen interview methodology;; Section 4 discusses the various definitions of developing country and outlines the selected definition used for the tourism and air transport dependence index; Section 5 details the tourism and air transport dependence ranking for developing countries and findings; Section 6 reveals the main findings of the expert interviews and Section 7 provides conclusions and next steps.

"There is currently a lack of integration and alignment between commercial and environmental aviation policies, which can lead to uncertain outcomes, notably for tourism-dependent developing regions".

2. Review of contextual literature

The relationship between aviation and tourism has been covered by studies published in both the aviation and tourism fields (Wu, Jiang, and Yang 2018, and Tsui et al. 2021). They acknowledged the importance of air services availability for tourism activities since tourism and aviation rely on each other to fulfil their goals and generate income for governments and private companies. Due to the importance of those two fields for domestic and international markets, policymakers constantly fluctuate between introducing and removing policies affecting the market. Within the latest trends, policymakers and researchers are examining the possibilities of sustainability in aviation as a long-term strategy. Wu, Jiang, and Yang (2018) and Tsui et al. (2021) highlighted that policymakers have concentrated on balancing the interests of airlines and tourism sectors when determining aviation policies. However, in recent years, governments introduced another factor into the equation, which is sustainability raising the possibility that aviation and environmental policies clash with each other since any commercial aviation policy can lead to growth in air transport activities and international tourism, which generates an increase in total emissions. On the other hand, environmental policies are focussed on achieving a decrease in or at the very least an offsetting of emissions.

Gössling and Lyle (2021) determined that policies are not equally effective. However, it needs to be noted that for a wide range of policies, their effectiveness will depend on the level [national or regional] at which these are set and, on the type, [Voluntary, Market-based, and Regulatory] of policy since Voluntary policies are the least effective in contributing to emission reductions. Additionally, Gössling and Lyle (2021) highlighted that most policies aim to affect demand rather than addressing the needed mitigation since policymakers ignore the distributional issues and phase out of fossil fuels.
Moreover, Berker and Böcher (2022) highlighted three key findings for why the establishment of eco-

ISSN 2633-285X (Print)
ISSN 2633-2868 (Online)

taxes to aid the environmental case does not generate the required results by governments. Firstly, the tax rate introduced by policies is usually very low to stimulate a behavioural change in travel given that the impact on profit levels is minimal. Second, when policymakers propose an aviation tax, the tax rate always begins at a low rate and slowly moves in the direction of economic incentives to avoid any political resistance. And finally, policymakers introduce market-based instruments that primarily exist to parallel and complement other long-standing regulations rather than replacing or editing them. Thus, the influence of policies introducing tax rates or market-measures to reduce greenhouse gas emissions produced by aviation is unlikely to achieve the targeted goals. Guimarans et al. (2019) divided aviation sustainability into four dimensions:

- Operational sustainability: this aspect details with the importance of designing strategies to be resilient to the vulnerabilities of the aviation industry.
- Socio-political sustainability: this aspect covers the responsibilities of local and regional authorities to balance the economic growth of aviation with the surrounding urban areas since the expansion of aviation activities could negatively impact the quality of living for nearby residents.
- Environmental sustainability: this aspect of sustainability is about the utilization of advanced technologies to reduce the contribution of aviation to greenhouse gas emissions and noise pollution.
- Sustainable growth: this aspect concentrates on optimizing the utilization of the current seat and cargo capacity by better matching demand and supply (emissions efficiency).

Kılıç, Uyar, and Karaman (2019), who investigated the relationship between sustainability reporting and performance in the aviation industry, highlighted that internal variables have more influence on reporting practices since aviation companies operating in a non-major economy are more likely not to issue a stand-alone sustainability report. Thus, this could create an issue on how accurate the data collected is from developing nations.

Pavlenko (2021) believes that policymakers need to understand that sustainable aviation fuel will require direct financial support at the early stages due to the size of the infrastructure needed and the limited availability of feedstock to produce fuel. For example, the utilization of hydrogen as a sustainable aviation fuel has a higher production cost than jet fuel (Yusaf et al., 2022). Yusaf et al. (2022) concludes that the aviation industry's potential to implement hydrogen as an alternative to commercial jet fuel is possible due to support provided by the European Commission. Nonetheless, hydrogen production is not entirely green since it is primarily a by-product of fossil fuel, which undermines the benefits it can bring to the environment. However, the mandate of sustainable aviation fuel in the EU could result in a negative impact by increasing the potential for airlines to try and 'tinker' with the issue. Rutherford et al. (2021) suggested that the EU will have three options: Mandating airlines to purchase sustainable aviation fuel at EU airports; limiting the purchases/carriage of excess fuel to and from Europe; or encouraging neighbouring countries to mandate sustainable aviation fuels. Despite the negatives, from an intra-regional perspective this type of policy can have a positive impact on moves towards a sustainable aviation industry (see Appendix I for a summary of SAF related regulations and targets across a selection of countries).

Hamaguchi's (2021) results demonstrated that changes in grandfather permits for the aviation sector inhibit tourism-led growth and indicate an incompatibility between tourism-led development and sustainable tourism. Additionally, a trade-off between tourism and other types of economic growth determines the extent of tourism-led growth. Hamaguchi (2021) recommended that policymakers introduce EPT (Emissions Permit Trading) within the aviation sector to realise the compatibility between tourism-led growth and sustainable tourism. This clearly demonstrates the symbiotic relationship between aviation sector changes on the one hand and sustainable tourism-led economic growth in economies on the other hand. A paper by Tsui et al. (2021) examined the causal relationship between aviation and tourism growth, showing that removing existing constraints via air liberalization is more effective for growing tourism than governments providing aviation subsidies. However, the outcome will aid in increasing the number of flights and passengers without accounting for the emissions generated by opening air traffic rights and air space. Hence, it is essential for policymakers to reconsider such recommendations for developing sustainable recovery strategies since

ISSN 2633-285X (Print)
ISSN 2633-2868 (Online)

the advancement of technologies is still at a developmental stage.

Air transport enables the mass movement of tourists to archipelagos/islands due to the affordability of prices and speed of traveling thousands of kilometres. As a result, air connectivity became a critical link for archipelagos/islands as it increased the value of tourists for countries dependent on tourism activities. This increases national income on islands and creates jobs in tourism-related fields. Dorta (2021) stated that this development impacts the environment since it accelerates the depletion of natural resources and increases total carbon emissions related to tourism. Therefore, Dorta (2021) believes that island states in particular need to consider environmental sustainability by persuading tourists to extend the length of their stays instead of pushing to increase the number of visits in order to reduce greenhouse gas emissions. Emission reduction measures should be sensitive to the relationship between tourism growth and aviation sustainability due to the extremely fragile economies of islands dependent on tourism. So, it is recommended that any reductions in tourist numbers should be approached in a way that does not reduce the overall income generated from tourism. Additionally, Chen (2019) highlighted three factors that need to be integrated for the sustainable development of island tourism: recreation, environment, and information management. Hence, the following recommendations for a balanced approach to maintaining a growing tourism industry and future sustainability: restricting the daily number of visitors, providing an in-depth guide service directed at higher spenders and longer stay tourists, along with implementing a pricing system to determine the full cost of tourism and developing tourism packages.

The impact of the COVID-19 pandemic resulted in a resetting the aviation industry, which created a golden opportunity for policymakers to introduce policies to accelerate the switch to a sustainable aviation industry. Salesi et al. (2022) emphasised the ineffectiveness of travel-related policies in controlling and mitigating the spread of COVID-19 in the South Pacific region. Furthermore, Salesi et al. (2022) suggest that the aviation and tourism sectors should look at past pandemics to understand travel behaviour to develop recovery strategies. However, policymakers' focus on utilizing the COVID-19 pandemic to influence aviation sustainability quickly turned to how best to facilitate economic recovery due to the heavy financial impact of lockdowns.

There have been several country-specific case studies looking at an aviation perspective on sustainability, which have tangible effects on levels of incoming tourism: -

- **Netherlands** (Berker and Böcher, 2022): the government introduced a policy in 2008 called aviation tax with two categories: destinations located less than 2,500 km from the Dutch airports and other destinations. The aim of the policy was to reduce greenhouse gas emissions by decreasing the number of passengers and flights. However, the aviation tax was abolished in 2010 due to the financial crisis. The aviation tax was reintroduced in 2021 except this time the tax had one category and a lower cost on airlines from 11.25/45 euros to 7.45 euros per passenger per flight. It was highlighted that the first tax introduction was motivated by an environmental stand while the second introduction was politically motivated.

- **Germany** (Berker and Böcher, 2022): like the Netherlands government, Germany introduced an aviation tax in 2011. The tax was divided into three levels by distance: 8 euro for short-haul flights, 25 euro for medium-haul, and 45 euro for long-haul. In 2020, the tax rate decreased, with the corresponding prices in euro being 7.38, 23.05, and 41.49 for short, medium and long-haul respectively. The aim of policy is to limit the growth rate of airlines by reducing number of flights and passengers.

- **Caribbean** (Wiltshire and Jaimurzina, 2017): The Caribbean region faces several challenges, such as infrastructure bottlenecks, which limit passenger and cargo demand growth rates. Also, the region is very well connected to the USA and Europe, but connections to Latin America are minimal. As a result, the region could benefit from tourism growth in Latin America. Improvements in air traffic handling, airport infrastructure, and integration of air transport policies into the framework of government logistics is necessary while maintaining sustainable growth

- **Dominican Republic** The key findings from the feasibility study indicates that the design and implementation of a value chain for producing and using sustainable aviation fuels in the Dominican Republic can help reduce aviation CO2 emissions,

ISSN 2633-285X (Print)
ISSN 2633-2868 (Online)

increase rural jobs, foster local development, and provide long-term benefits to tourism.

Challenges facing the production of Sustainable Aviation Fuel (SAF) in this country, however, include:

- A fuel demand of 400,000 t/year, projected to increase to 1.4 Mt/year by 2050, requires increasing energy imports and increased CO2 emissions.
- A highly regulated energy market.
- The aviation fuel market is dependent on imports.
- There are limited resources or wastes that could be used as feedstock without negatively impacting other markets.
- No existing production facilities could be retrofitted for SAF production.
- A declining sugar industry with decreasing land dedicated to sugar cane production from 300,000 hectares in 1985 to less than 100,000 hectares in 2015.
- High regulation of the sugar industry with limited allowances for sugar production, creating a barrier to the potential expansion of cane crops for SAF production.
- Lack of technological expertise and research in the country for developing the aviation fuel sector, requiring external assistance or the development of specialised capacity.
- Poor land use planning and agricultural control, causing limited data on land cover and use, which could pose a risk to the sustainability of the value chain.

Within the Dominical Republic case, there were several strengths also cited with respect to SAF developments: -

- Skilled expertise in sugarcane production: The Dominican Republic has a long-standing tradition of sugarcane production, including research resources dedicated to its cultivation and varieties improvement.
- Unused or available land suitable for sugarcane production much of which has been abandoned or replaced with less productive crops like low-quality pastureland. This has contributed to unemployment and poverty. The current government is analysing projects to revitalize these areas through sugarcane production, and SAF production could present a development opportunity with social and environmental benefits.
- Accessible storage resources near main airports and sugarcane production areas: This could provide an opportunity for SAF production and distribution, and help to diversify the supply, reducing the risk of supply shortages to airports.
- Good location for supplying markets in the US and the Caribbean: There is potential to export SAF in case of a surplus.
- Policy framework suitable for mandate implementation: There have already been precedents of mandates for the use of bioethanol. In addition, the hydrocarbons market price is fixed by the government.

This contextual review has highlighted several important themes and gaps in the current discussions and policies surrounding sustainable aviation and pro-sustainable tourism growth. First, it is evident that policymakers play a crucial role in shaping the aviation industry and influencing its sustainability. However, there is a lack of consensus on the effectiveness of policies introduced to improve sustainability, with voluntary policies being considered the least effective. Moreover, the review emphasizes the need for a comprehensive approach to aviation sustainability that addresses four key dimensions: operational, socio-political, environmental, and sustainable growth including related sustainable tourism growth. Policymakers must balance the interests of aviation and tourism while considering environmental concerns and may need to provide direct financial support for developing new types of fuel and engines, as well as consider the limitations and potential environmental trade-offs associated with alternative fuels such as hydrogen and SAF. Furthermore, the relationship between aviation and tourism is explored, emphasizing the impact of air connectivity on archipelagos and islands. It is recommended that policymakers pursue strategies that focus on extending the length and spend of tourists' stays rather than merely increasing the volume of visitors. There are ongoing gaps in the literature, however, on what mix of aviation policies both commercial and environmental may be applied for the tourism industries to achieve a desired outcome.

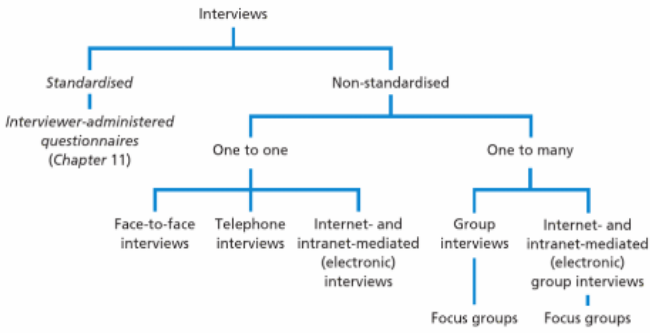
3. Methodology

To further explore the relationship between aviation policies and sustainable tourism growth and set the groundwork for the in-depth country-based study in phase two of the research, a qualitative approach was

ISSN 2633-285X (Print)
ISSN 2633-2868 (Online)

taken with three semi-structured one-to-one expert interviews undertaken in the late Spring of 2023.

Figure 1. Different forms of interviews



These interviews were conducted on-line (see Figure 1 for the various interview types included the selected one) and lasted between 30 minutes to over an hour and included a series of five exploratory themes related to the main research question. To capture the interview data effectively, recordings were used after gaining consent from the participants (Jamshed, 2014). The disadvantages of on-line interviews are recognised and outlined in Table 1, though were considered to be the most suitable platform to maximise convenience for the expert participants.

Table 1. The advantages and disadvantages of online interviews

Advantage	Disadvantages
Better response to open questions Unrestricted geographical sample Low-cost	Restricted to online populations Data analysis is time-consuming Potential technological problems

Source: Bell et al, 2022.

The researchers' judgment led to selection of the participants based on their roles within the aviation and tourism industry. The details are as follows: One independent consultant, academic and author on pro sustainable tourism (A), an employee from ICAO (B) and a University Professor in the field of tourism (C). The participants were contacted on LinkedIn or via email on an online professional network platform. First, interviews were recorded, then a data transfer technique was adopted whereby all parts of the interviews were transcribed (Saunders et al., 2023). Afterwards, the most relevant quotes from the transcripts were identified in accordance with the five themes.

The five exploratory themes/questions were as follows:

1. Do you feel the focus on aviation sustainability and pro-sustainable tourism growth can co-exist?
2. Currently there is no consistent definition of 'developing country' between the various authorities and agencies in this field. What do you define as a developing country?
3. How can aviation help to balance pro-sustainable tourism with economic growth and social equity in developing countries?
4. Does focussing on initiatives 'outside' technology support pro-sustainable tourism or should both industries fully focus on technology to help balance the 'pro-sustainability tourism' scales?
5. Can aviation meet the 2050 vision of being 'net zero' and how?

The interview results are detailed in Section 6. A series of quantitative indicators were also used to develop a composite index of tourism and air transport dependency by country, which is detailed further in Section 5.

4. Definitions of country development

According to the United Nations (UN), Least Developed Countries (LDCs) are "low-income countries confronting severe structural impediments to sustainable development. They are highly vulnerable to economic and environmental shocks and have low levels of human assets." According to the UN there are 46 listed 'least developed' countries. These countries characterised by three criteria that are then evaluated when determining its status of 'development'. These are:

1. Human Asset Index.
2. Economic Vulnerability
3. Income Per Capita (UNCTAD, 2022).

The list is reviewed every three years by the Committee for Development Policy (CDP). The CDP is a subsidiary body of the United Nations Economic and Social Council. A country must meet at least two of the three criteria for two consecutive years to be considered for graduation at which point the country is then listed as 'developed'. The World Trade Organisation (2023) also recognises the United Nation's list for least developed countries as accurate.

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ISSN 2633-2868 (Online)

4.1. OECD definition

According to the Organisation for Economic Co-operation and Development (OECD), countries are considered vulnerable based on their "economic, geographic, political and social hurdles". The Organisation for Economic Co-operation and Development recognises a much broader list of categorised 'developing' countries. Like the UN's review by the Committee for Development (CPD), the Development Assistance Committee (DAC) revises the list of countries they consider 'developing' every three years. A country or territory must exceed the high-income threshold for at least three consecutive years at a time of the review to be removed.

The overall goal is to recognise countries and territories that are eligible to receive Official Development Assistance (ODA). ODA promotes aid specifically targeting the economic development and welfare of eligible countries and territories. The Development Assistance Committee (DAC) promotes development and "other related policies so as to contribute to implementation of the 2030 Agenda for Sustainable Development".

There is no universally accepted definition of a developed or developing country. Therefore, there is a clear gap between the terms 'least developed' (UN) and 'developing' (OECD).

4.2. World Economic Situation and Prospects

The World Economic Situation and Prospects (WESP) has established a range of aggregation methods to outline trends in various economies across the world. The data was prepared by the Development Policy and Analysis Division (DPAD) of the Department of Economic and Social Affairs of the United Nations Secretariat (UN/DESA). This data proves more accurate for this area of research as it is based on information that has been obtained from:

- Statistics Division and the Population Division of UN/DESA
- United Nations Conference on Trade and Development (UNCTAD)
- United Nations World Tourism Organisation (UNWTO)
- International Monetary Fund (IMF)
- World Bank
- Organisation for Economic Cooperation and Development (OECD).

For the purpose of this research, data from WESP has been used to support the country selection process

5. Developing state dependence on tourism and air transport ranking

Originally, WESP classifies all countries into one of three main categories: developed economies, economies in transition and developing economies. These are then characterised into more definite groupings: small island developing states, developed economies, economies in transition, least developed countries, and landlocked developing countries.

For analytical purposes, the following values were given to be incorporated into the overall ranking:

- Developed economies (1)
- Economies in transition (2)
- Small island developing states (3)
- Developing economies (3)
- Small island developing states (3)
- Landlocked developing countries (3)
- Least developed economies (4)

The indexed development ranking converted the original variables into percentages as follows: 1 = 25%, 2 = 50%, 3 = 75% and 4 = 100%.

5.1. Annual tourist arrivals and indexed annual tourist arrivals

Annual international tourist arrivals were collected by the World Bank for the year 2019 to ensure the data was not skewed by the implications of Covid-19. The data was collected as raw values and then converted into normalised percentage values. This was performed to ensure that each of the three variables making up the overall ranking were given an equal weighting.

5.2. Percentage of annual tourist arrivals by air

The percentage of annual tourist arrivals by air has was collected from UNWTO. The data collected also used 2019 data as the last normal year before the pandemic and it has been presented in its original format as percentages.

ISSN 2633-285X (Print)
ISSN 2633-2868 (Online)

5.3. Total index ranking

The overall goal was to establish a ranking criterion that demonstrates a country's relative reliance on international tourists and in turn on air transport for brining those tourists. The total score was created by taking the indexed development ranking and the indexed annual tourist arrivals with the percentage of annual tourist arrivals by air. The higher the final percentage, the more reliant the country is on tourists and tourist arrivals by air.

The top 10 countries most dependent on their incoming tourists by air travel were Thailand, Cuba, Philippines, Maldives, Turkey, Timor-Leste, Sri Lanka, Qatar, Lebanon and Spain (Table 2)

Table 2: Top 10 countries: International tourism and air transport dependence

Country	Development ranking	Indexed development ranking	Annual international tourist arrivals	Indexed annual tourist arrivals	Percentage of annual tourist arrivals by air	Total indexed score
Thailand	3	75%	39,916,000	18%	83.90%	177%
Cuba	3	75%	4,276,000	2%	100%	177%
Philippines	3	75%	8,261,000	4%	98.00%	177%
Maldives	3	75%	1,703,000	1%	100%	176%
Turkey	3	75%	51,747,000	24%	77.00%	176%
Timor-Leste	3	75%	74,800	0%	100%	175%
Sri Lanka	3	75%	2,027,000	1%	94.50%	170%
Qatar	3	75%	2,136,500	1%	90.80%	167%
Lebanon	3	75%	1,936,000	1%	89.80%	166%
Spain	1	25%	126,170.00	58%	82.30%	165%

Countries that did not have complete data for the three variables included in the overall index score were excluded from the analysis, leading to 68 countries that have been included in the sample across all stages of development. Despite being a developed country, and therefore receiving a low level of prioritisation in the index from this perspective, Spain was ranked 10th because of is high number of annual tourist arrivals and its high reliance on air transport for bringing in international tourists. France and the United Kingdom were ranked 23rd and 29th respectively.

6. Expert interview findings (themes):

The interview results are presented as a discussion based on each of the interview themes.

1. Do you feel the focus on aviation sustainability and pro-sustainable tourism growth can co-exist?

The three experts agreed that aviation sustainability and tourism growth are interrelated and co-exist. Also, they highlighted that it is essential to focus on aviation sustainability and pro-sustainable tourism growth for countries dependent on aviation and tourism to contribute to the economy. However, they emphasized the difficulty of utilizing green technology to replace current aircraft for long-haul flights and the limits of air space capacity, which restrict tourism growth. As a result, countries dependent on tourism will need to find other types of income in the future.

2. Currently there is no consistent definition of 'developing country' between the various authorities and agencies in this field. What do you define as a developing country?

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ISSN 2633-2868 (Online)

Depending on the expert background, they would prefer to use the World Economic Forum and Spectrum or the ICAO definition of developing and developed countries or create their own requirements (A). However, they highlighted that those definitions released by big organisations are a bit outdated or biased when determining what is developing and developed. Additionally, that countries always go through a cycle of being developing and developed, and that is better for us to consider human indicators such as health (life expectancy), food, and education rather than GDP. Since GDP does not differentiate between natural and artificial wealth, countries are either making progress/improving their systems or stagnant/declining compared to a few years ago. Nonetheless, it is better to select one type of definition and strictly follow the criteria set by the definitions to divide developed and developing countries whilst highlighting the shortcoming of the definitions.

3. How can aviation help to balance pro-sustainable tourism with economic growth and social equity in developing countries?

This is a complex topic to answer due to the different perspectives affecting developing countries. Islands dependent on tourism and the aviation sector are extremely fragile economies. For instance, the responsibility of utilizing the funds gained from tourism falls into the hands of the local authorities/government to establish a system to keep as much of the money inside the country and invest in social projects in education, healthcare, social services, or even infrastructure development that boost aviation and tourism activities (C). However, the aviation industry, which sustains developing countries, contributes to rising sea levels through emissions that threaten these islands future. Nonetheless, if green technology continues to advance, there could be a future where countries like the Gambia and the Caribbean islands could be manufacturing hydrogen using either wind or solar or both, and they could sell the fuel to the airlines (A). Besides that, airlines are leaning towards choosing aircraft that are more fuel efficient over size, which shows that there is a form of solution to islands dependent on aviation. There will be no social justice or social equity in selecting which developing countries receive financial aid since the international community base the metrics on economy/ return on investment.

5. Does focussing on initiatives 'outside' technology support pro-sustainable tourism or should both industries fully focus on technology to help balance the 'pro-sustainability tourism' scales?

Technology alone would not be enough to achieve the change in the environment that we want to see. We are currently late when it comes to using technology to solve our problems. To achieve sustainability, we need to maximise the gains from all fronts inside and outside technology (B). However, it should be highlighted that the responsibility and accountability for social changes lean more on the shoulder of providers rather than the individual (C). Additionally, technology comes with a price tag which provide producer countries with more power to decide the future of emerging countries and how the world achieves sustainability (B).

6. Can aviation meet the 2050 vision of being 'net zero' and how?

The experts agree that aviation will not achieve net zero by 2050 if governments do not implement extreme changes without technological breakthroughs. For example, if airlines use hydrogen aircraft in the next decade, we will achieve the 2050 vision (A). We should not forget that achieving the net-zero vision would be difficult due to the nature of political differences between countries like USA, Europe, India, Southeast Asia, and China's large and growing aviation market. However, these countries will always keep the goal within reach primarily due to fiscal incentives (B). Furthermore, the experts agree that sustainable aviation fuel (SAF) will not provide the required solutions and will fail in doing the heavy lifting due to the negative impacts it will bring if implemented on a massive scale (A, B, C) Investments spent on SAF development should be shifted to other technologies like hydrogen engines (A). We are in a bad position and will soon start telling people that transporting luxury goods by air will be restricted since moving medical supplies will have higher priority.

7 Conclusions and next steps

7.1 Summary of findings from this study (phase 1)

ISSN 2633-285X (Print)
ISSN 2633-2868 (Online)

This study sought to assess the possible impacts of commercial and environmental aviation policies on the possibilities for sustainable growth in developing countries to grow their incoming tourism sectors in a pro-sustainable way. The expert interviews revealed some notable reservations about the aviation sector's ability to enable pro-sustainable tourism growth, despite ambitious targets for the aviation and tourism sectors to become net-zero by 2050. In the short to medium term, long haul travel in particular, will continue to rely on emissions intensive aircraft and therefore important policy decisions need to be made to help strike a balance between the economic imperatives of avoiding the worst effects of climate change and encouraging tourists to return during the post-pandemic period. A tourism and air transport dependence ranking was created from published data sources to illustrate the countries where environmental and commercial aviation policy decisions may be the most difficult to reconcile, given their acute reliance on incoming tourism. The index score can be used to aid the selection of countries for an in-depth analysis to be carried out during phase 2 of the research, which can also be guided by the expert interview responses.

7.2 Next steps: Phase Two

Having collated the data on the countries that appear most dependent on achieving pro-sustainable tourism growth, the next phase of the research is to undertake an in-depth analysis of the top 10 ranked counties in Table 2, which will include a thorough assessment of commercial and environmental aviation policies as applicable to those jurisdictions and an assessment of whether the mix of applicable aviation policies help to provide a framework for moving towards pro-sustainable tourism growth. Once the results have been obtained, findings will be incorporated into revised training curricula and advisory packages that can be tailored towards the observed countries' regulatory bodies, and tourism/aviation sectors. This phase of the research will be carried out in collaboration with ICAO's Global Aviation Training team (GAT) towards the end of Phase 2 and post-Phase 2.

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Appendix 1: Environmental Policies on Aviation Fuels

Table provides a summary of the policies (adopted and under development) to foster the use of Sustainable Aviation Fuels and Lower Carbon Aviation Fuels.

Date	***State***	***Policy title***	***Policy description***	***Status***
15 Feb 2023	*Japan*		*Japan's campaign to cut greenhouse gas emissions is extending to the skies, as the government aims to have airlines replace 10% of their jet fuel with eco-friendlier alternatives by 2030.*	*adopted*
13 Feb 2023	*United States (Illinois)*	*Invest in Illinois Act*	*This legislation in Illinois provides a tax credit of $1.50 per gallon for SAF used by aircraft in the state. For the SAF to qualify for the credit, it must reduce carbon emissions by at least 50% throughout its life. The credit applies to all SAF used in Illinois, regardless of where it is produced. However, credits for SAF used before June 1, 2028, must come from renewable sources such as biomass, waste streams, renewable energy, or gaseous carbon oxides. The tax credit will be available until January 1, 2033.*	*adopted*
10 Feb 2023	*United States (Washington)*		*the bill aims to create a preferential business and operations (B&O) tax rate of 0.275 percent for the manufacturing and wholesaling of alterative jet fuels. The B&O tax is Washington's major business tax. According to a legislative documents, the B&O tax is imposed on the gross receipts of business activities conducted within the state, without any deduction for the cost of doing business. Some current B&O tax rates include 0.471 percent for retailing and 0.484 percent for manufacturing, wholesaling and extracting. The bill would also establish a B&O and public utilities tax credit for certain sales and purchases of alternative jet fuel. The amount of the credit would be $1 per gallon of alterative jet fuel that has at least 50 percent less carbon dioxide equivalent emissions than conventional jet fuel. The credit would increase by 2 cents for each additional 1 percent reduction beyond 50 percent, with a cap of $2 per gallon. Eligibility for the credit for sales of alternative jet fuel would be limited to businesses located in a qualifying county or a businesses' designated alternative jet fuel blender located in Washington. A qualifying county is a county that has a population of less than 650,000. The credits could only be earned on purchases of alternative jet fuel for flights departing Washington.*	*adopted*
16 Nov 2022	*India*		*SAF mandate blending under consideration for domestic aviation*	*under development*
18 Oct 2022	*Japan*		*The Japanese government is seeking public comments on a draft policy to promote decarbonization in the aviation industry. The policy, in part, would require flights to be carbon neutral by 2050 and require airlines to use sustainable aviation fuel (SAF).*	*under development*
3 Oct 2022	*China*	*China Civil Aviation Green Development*	*Target of 50k tons of SAF use by 2025 SAF performance testing, airworthiness certification, exploration of new paths for its development.*	*adopted*

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		Policy and Action		
16 Aug 2022	*United States*	*Inflation Reduction Act (SAF blenders tax credit)*	*The bill provides a $1.25 per-gallon credit for each gallon of SAF sold as part of a qualified fuel mixture, including that it has a demonstrated lifecycle greenhouse gas (GHG) reduction of at least 50 percent compared to conventional jet fuel. The credit, available for two years beginning January 1, increases up to $1.75 per gallon on a sliding scale based on the percentage of lifecycle GHG emissions reduced beyond 50 percent. Beginning in 2025, SAF would be eligible for credits up to $1.75 per gallon under a new Clean Fuel Production Credit (CFPC). That credit is set to expire at the end of 2027.*	*adopted*
19 Jul 2022	*United Kingdom*	*Jet Zero Strategy*	*Increasing support for sustainable aviation fuels (SAF), by creating secure and growing UK SAF demand through a SAF mandate that will require at least 10% of jet fuel to be made from sustainable sources by 2030 and kickstarting a domestic SAF industry, supported by the new £165 million Advanced Fuels Fund.*	*adopted*
18 May 2022	*Brazil*	*Brazil*	*Brazilian sustainable aviation fuel mandate that will take effect in January 2027 will target cutting Brazil's airline emissions by 1% of the sector's 2026's total emissions, with the possibility of raising that figure to 10%*	*under development*
7 Apr 2022	*United States*	*Renewable Diesel and Sustainable Aviation Fuel Parity Act*	*The Renewable Diesel and Sustainable Aviation Fuel Parity Act of 2022 will: Require the Energy Information Administration to report on U.S. production and foreign imports of renewable diesel and sustainable aviation fuel, including the type, origin, and volume of feedstocks used for these fuels; Allow renewable diesel and sustainable aviation fuel production facilities to qualify for the Department of Energy's Title XVII loan guarantees under the Energy Policy Act of 2005; and Exempt renewable diesel that meets the same technical specifications as petroleum-based diesel from the labeling section of the Energy Independence and Security Act of 2007.*	*overridden by Inflation Reduction Act*
2 Jan 2022	*Denmark*		*Denmark Targets 2030 For Fossil Fuel-Free Domestic Flights*	*under development*
25 Nov 2021	*Brazil*	*National Biokerosene Programme*	*The policy directs federal agencies and institutions to provide resources to SAF projects, as well as fiscal incentives.*	*adopted*
16 Jul 2021	*Regional (European Union)*	*ReFuelEU*	*proposed mandate of SAF use, starting from 2% in 2025 up to 63% in 2050*	*under development*
13 Jun 2021	*New Zealand*	*Sustainable Biofuels Mandate*	*Proposed policy requires fuel suppliers to reduce the GHG emissions from transport fuels by a defined percentage each year. It applies to all transport fuels, including domestic aviation fuel, and requires biofuels to meet sustainability criteria to certify that they do not impact on food production or indigenous biodiversity. It requires fuel suppliers to prepare annual reports to demonstrate compliance. There will be penalties for non-compliance, although there is some*	*under development*

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			flexibility for fuel suppliers, including the ability to trade emissions reductions with each other, and to defer for two years.	
20 May 2021	*United States*	*Sustainable Skies Act*	*Tax incentive of up to $2.00 for every gallon produced of sustainable aviation fuel. The bill introduced by Whitehouse aims to create a grant program authorized at $1 billion over five years to expand the number of facilities producing SAF and build out the necessary supporting infrastructure.*	*under development*
18 Dec 2020	*Canada*	*Clean Fuel Standard*	*The Clean Fuel Standard will require liquid fossil fuel primary suppliers (i.e., producers and importers) to reduce the carbon intensity of their liquid fossil fuels used in Canada from 2016 carbon intensity levels. In 2022 the carbon intensity reduction requirement will start at 2.4 gCO2e/MJ. It will gradually increase over time reaching 12 gCO2e/MJ in 2030. To achieve this, fuel producers will need to provide innovative solutions and new fuel options to consumers.*	*under development*
12 Dec 2020	*France*	*France*	*SAF roadmap to reach a SAF supply of 1% by 2022, 2% in 2025 and 5% in 2030. Focus on advanced feedstocks*	*under development*
25 Sept 2020	*Germany*	*Germany*	*National legislation for GHG-reduction of fuels (to transpose the RED II) and the German National Hydrogen Strategy foresee a SAF energetic sub-quota of 2 % in 2030 and ONLY for PtL-kerosene.*	*under development*
11 Sept 2020	*Sweden*	*Sweden*	*A carbon neutral country by 2045. Legislative proposal for 0.8% GHG reduction mandate in 2021, and gradually increase to 27% by 2030.*	*under development*
8 Sept 2020			*Roadmap for Carbon Neutrality (RNC2050): integrated approach to transport decarbonisation including aviation*	*under development*
8 Sept 2020			*Climate Change Law: 2% SAF supply objective in 2025. Several new bio-refineries under planning with special focus on wastes and residues.*	*under development*
8 Sept 2020	*Netherlands*	*SAF roadmap*	*SAF Roadmap under development with a blending mandate at the national -or EU- level. Focus on advanced feedstocks.*	*under development*
13 Jul 2020	*Canada (British Columbia)*	*Renewable & Low Carbon Fuel Requirements Regulation*	*The BC-LCFS sets CI targets that decline each year. The Act does not currently recognize GHG reductions within the aviation and marine fuel sectors, so the Ministry is considering whether to expand the BC-LCFS to include these reductions and provide support for low carbon fuel development by adding two additional fuel classes: jet fuel class and marine fuel class.*	*under development*
19 Nov 2019	*Norway*	*Norway*	*SAF blend 0,5% mandate started in 2020. Considering a 30% target for 2030.*	*adopted*
4 Jun 2019	*Finland*	*Finland*	*A carbon neutral country by 2035: Increasing SAF obligation to reach 30% in 2030.*	*under development*
27 Sept 2018	*United States (California)*	*Low Carbon Fuel Standard (LCFS)*	*Crediting for fuel pathways and projects, based on a carbon intensity score*	*adopted*

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27 Jun 2018	*ICAO (International)*	*CORSIA*	*CORSIA allows airlines to reduce their offsetting requirements with the use of CORSIA eligible fuels, which include Sustainable Aviation Fuels and Lower Carbon Aviation Fuels.*	*adopted*
18 Apr 2018	*United Kingdom*	*Renewable Transport Fuel Obligation (RTFO)*	*The Renewable Transport Fuel Obligation (RTFO) rewards SAF production with the same economic incentives given to road vehicles.*	*adopted*
1 Jan 2013	*Indonesia*	*Indonesia*	*Mandate of 5% SAF use by 2025. Doc 10004 (ICAO,2022)*	*adopted*

ISSN 2633-285X (Print)
ISSN 2633-2868 (Online)

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