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TOWARDS SUSTAINABILITY IN ACADEMIC AIR MOBILITY IN THE DIGITAL AGE

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ABSTRACT

Peppi Borgenström: Towards Sustainability in Academic Air Mobility in The Digital Age
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The purpose of this study was to investigate the relationship between academic air mobility and the increasing recognition of its sustainability-related issues. Universities had set carbon neutrality goals to address the climate crisis. Despite the high knowledge within academia, it is paradoxical that this sector significantly contributed to emissions. Virtual conferences are a lower-emission alternative; however, academics have been concerned about the diminishing social aspects of conferences in a virtual environment.

The research employed a qualitative research method, thematic interview, to answer the research question: How is academic air mobility understood from the sustainability perspective in the digital age? The case study for this research was Tampere University, and the sample comprised seven researchers from various career stages and faculties.

The findings revealed that academics value international travelling in terms of career advancement. However, the significance of academic travelling decreases alongside seniority. The study emphasized the need for universities to update travel guidance to promote land-bound options. Funding bodies' outdated criteria for international collaboration were identified as one driver of unnecessary academic air mobility. Despite the rise of virtual communication channels due to COVID-19, face-to-face conferences remain highly valued, especially for networking. However, virtual conferences were acknowledged for their accessibility and cost-effectiveness, contributing to greater inclusivity in academia.

Keywords: Aviation, Digitalisation, Sustainable Development, Universities

List of abbreviations

CO_2	Carbon Dioxide
CO2eqv	Carbon Dioxide Equivalent
EDU	Faculty of Education and Culture
GHG	Greenhouse Gasses
IPCC	The Intergovernmental Panel on Climate Change
ITC	Faculty of Information Technology and Communications
MAB	Faculty of Management and Business
NPM	New Mobilities Paradigm
SDG	Sustainable Development Goal
TAU	Tampere University
tCO2eqv	Metric Tonnes of Carbon Dioxide Equivalent

CONTENTS

1 INTRODUCTION

Climate change is an urgent concern, which has raised awareness notably after the infamous report of IPCC in 2019 about Global Warming of 1.5°C. Climate change is rapidly warming the globe because of the escalating greenhouse gas emissions stemming from human activities. Among these emissions, transportation, with aviation playing a significant role, is a major contributor to the increase in greenhouse gases. Aviation has raised extensive discussions about its essentiality due to its high emissions per passenger kilometre.

Climate change is a super wicked problem with no central authority to address it (Levin et al., 2012), but people tend to turn to academia for solutions due to its high knowledge (Eriksson et al., 2022). Paradoxically, regardless of the high knowledge academics are among the most aeromobile groups in society (Baer, 2022; Jacobson, 2022). IPCC (2019) notes that climate change and sustainable development share a profound connection. Preventing climate warming aligns with the environmental goals, while mitigation efforts may pose challenges in achieving social and economic sustainable development goals. (IPCC, 2019).

Air mobility is highly valued in academia due to internationalization, career advancement, and various set of beliefs. One major driver of these practices is the so-called conference culture (Whitmarsh et al., 2020). Conferences are spaces, where academics can form new connections and share their work (Jäckle, 2022). Some academics feel entitled to the privileges of academic travel and are reluctant to change the culture (Whitmarsh et al., 2020).

In Finland, many universities, including Tampere University, have set goals of becoming carbon-neutral by 2030, making it clear that the current practices of academic air mobility must change to achieve these goals. The COVID-19 pandemic disrupted the mobility patterns of academia, forcing a rapid transition to digital communication channels, including virtual conferences. During the pandemic, this shift was viewed optimistically, with virtual participation even suggested as a potential new norm. However, scholars have suggested that this change does not become a norm by default and very little is currently known about how academics perceive these changes in the post-pandemic era.

The research area of sustainability perspective of academic air mobility has grown in maturity after 2019. Before this, the literature had not considered the environmental sustainability of academic air mobility to a great extent. The book 'Academic Flying and the Means of Communication' edited by Bjørkdahl and Franco Duharte (2022) is the most extensive collection of relevant articles about the topic. The open-access book categorizes these articles into three categories, each of which corresponds to an essential analytical phase needed for a comprehensive exploration of the problem of academic air mobility. The first category is documenting the amount and consequences of academic air mobility (e.g., Jäckle, 2022). The second category examines motivations and values that drive academics to fly (e.g., Baer, 2022). The third category is proposing alternatives and frameworks for change (e.g., Tseng et al., 2022).

In addition to moving the conferences to a virtual format, the scholars have recommended promoting land-bound mobility options to decrease the emissions caused by academic mobility. However, Finland's geographical isolation as a cul-de-sac limits the land-bound mobility options resulting in lengthier travel times and increased financial costs. Consequently, the implications of scholars may not directly be applicable in the Finnish context.

Academic air mobility in the Finnish context was researched before the pandemic by Ahonen et al. (2021) in an article 'The Sustainability of Academic Air Mobility in Finnish Universities' which analyses quantitative data about air mobility of Finnish Universities and reveals how much academics in Finland fly. No previous study about the topic has been made during or after the pandemic, or about the motivations and values that drive academic air mobility in the Finnish context.

Several factors justified the choice of Finland as the context for this research. Firstly, the author is living and pursuing master's studies in Finland, making the context already familiar. Secondly, the carbon neutrality goals set by Finnish universities support further research into one of their largest contributors to emissions. Moreover, above mentioned factors of Finland's geographical location present an intriguing context for the research. Consequently, the case study was chosen to be Tampere University.

The specific objective of this thesis is to answer the research question: *'How is academic air mobility seen from the sustainability perspective in the digital age?'* The research method is qualitative and the data for this study was collected using thematic interviewing.

The perspective on sustainability of this study is holistic, encompassing all three key areas of sustainable development. However, the issue is closely tied to environmental sustainability, with a particular focus on emissions, as this is the primary concern within academia.

The thesis consists of seven themed chapters, the first one being this introduction, which presents arguments for the need for this study. The second chapter delves into existing literature encompassing the topics of academic air mobility, sustainable development, the effects of COVID-19 on academic mobility and academic mobility in the digital age, closing with the conceptual framework and research question. The third chapter outlines the methodologies used in this qualitative research. The fourth chapter presents the findings of individual interviews undertaken during May of 2023. The fifth chapter discusses the insights derived from the literature review and the research findings in alignment with the conceptual framework. The sixth chapter consists of evaluates the trustworthiness of the research as well as considers the ethical aspects. Seventh and the final chapter serves as the conclusion of this thesis. It not only wraps up our research but also offers seven suggestions to academia for fostering more sustainable mobility practices. These recommendations are a conclusion of the research findings.

Throughout this thesis, the term ‘academic air mobility’ will be used in this thesis to refer to work-related flying undertaken by academics, while the term ‘land-bound travel’ will be used to refer to less emitting alternative travel modes to flying, although travelling from Finland often requires a sea transportation option in addition to transportation by land.

2 LITERATURE REVIEW

2.1 Academic air mobility

During recent decades academic air mobility has increased due to the transformation and globalization of modern work life (Lassen, 2022). Simultaneously the interest to research the issue has grown in maturity. Bjørkdahl and Franco Duharte (2022) proposed that there are three essential analytical phases needed for a comprehensive exploration of the problem of academic air mobility: documenting the amount and consequences of academic air mobility, examining motivations and values that drive academics to fly, and proposing alternatives and frameworks for change.

Academic air mobility is sustained by a complex set of incentives (Bjørkdahl & Franco Duharte, 2022) and is seen as an integrated component of academic life (Baer, 2022). Academics are among the most aeromobile groups in society (Baer, 2022; Jacobson, 2022). Poggioli and Hoffman (2022) describe the culture around academic air mobility as 'flyout culture', which is maintained by academics teaching new academics in the community about its importance to academic life. The belief is that academics must fly to 'stay in the game' (Bjørkdahl & Franco Duharte, 2022). Data from several studies suggest that academics can experience a 'fear of not flying' (e.g., Poggioli & Hoffman, 2022), which demonstrates the power of the belief that academic success requires flying. Currently, the culture is challenged by pressure outside and inside academia due to high emissions from flying contributing to climate change. (Poggioli & Hoffman, 2022)

University as a workplace has a high self-determination score concerning travel (Lassen, 2022). According to Whitmarsh et al., (2020), the level of flying increases with the seniority level and is affected by the placement of the scholar. Academics in Europe fly less than their peers elsewhere. However, the level of flying undertaken for leisure predicts the amount of work-related travel most efficiently. (Whitmarsh et al., 2020)

Lassen (2022) notes that the culture around academic air mobilities is connected to a larger transformation of work culture. The new network-based post-Fordism work-life is based on innovation, globalization, and decentralization of work. The work culture is increasingly mobile, as connecting with the employer can be done digitally. Global workers do not often think of flying as

a novelty, but simply as a means of transportation. It is a 'global bus', that does not include the sentiments that flying used to historically have. (Lassen, 2022)

According to Eriksson et al. (2022), contemporary knowledge production includes a dominating idea of internalisation, which itself is seen as a quality parameter. Internalisation is often linked to a higher level of quality. (Eriksson et al., 2022) Digitalisation and globalization as part of post-Fordism have changed people's way of working to cross-border use of digital tools. COVID-19 supported the transformation, as academic events and teaching went online. This rightly raises a question, how are these changes now understood?

Eriksson et al. (2022) imply that academia includes a paradigm of mobility. The New Mobilities Paradigm (NPM) is a paradigm in the field of social sciences (Aldred, 2013). Mobility is among the most important concepts of contemporary social sciences and cultural studies (Habti & Kurki, 2019).

NPM was established by Urry in the early 2000s and described to challenge the way social sciences research has been "a-mobile". Social sciences have historically overlooked the importance of "*the systematic movements of people for work and family life for leisure and pleasure, and for politics and protest*" (Sheller & Urry, 2006). Aldred (2013) implies that '*mobilities'* expand the idea of '*transport'*. NPM covers also virtual and imaginary movement in addition to the increasing movement of people and possessions. (Aldred, 2013) The ideas, information, pictures, and knowledge among other things are circulating rapidly affecting the lives of people (Habti & Kurki, 2019). NPM implies that places are also not static but moving around and not necessarily staying in the same location. The places are about proximities, the physical copresence of the people at that place at a particular time (Sheller & Urry, 2006). This implies also when considering academic conferences. NPM offers criticism of the social sciences.

Academic air mobility today is powered by several motivators. Whitmarsh et al. (2020) suggest that conducting fieldwork is common, especially for researchers studying climate change, but the 'conference culture' was the dominant reason for travelling in most disciplines. Similarly, Wynes et al. (2019) found that the majority (60 %) of the flights taken by the researchers at the University of British Colombia were conference-related.

Tseng et al. (2022) suggest a framework called the 'transport cultures framework of academic flying', which combines elements from the foundational model and insights from existing academic flying literature, as well as adaptations during the COVID-19 pandemic. The foundational model emphasizes the interplay of cognitive norms, material culture, practices, and moderators. These

elements interact and reinforce one another, making it challenging to change academic flying practices without altering at least one of these elements. (Tseng et al., 2022)

According to Tseng et al. (2022), cognitive norms encompass academics' attitudes, values, beliefs, and understandings regarding the necessity of frequent travel, which is often driven by university expectations related to career advancement, internationalization, and academic achievements. Networking, a key aspect of career development, is a central motivation for especially early-career academics to participate in academic air mobility. (Tseng et al., 2022)

Lassen (2022) implies that copresence is fundamental for social relationships. Face-to-face communication enables people to build trust through non-verbal communication. He refers to a conference as an arena, where international contacts can be created. (Lassen, 2022). Glover et al. (2022) describe these social events as a platform to build “network capital”. According to Lassen (2022), these networks have many functions; being known by others can open doors and foster one’s career. Participation in a formalized network provides the chance to collaborate on research with fellow scholars. Air mobility allows the formation and maintenance of these networks. (Lassen, 2022).

Glover et al. (2022) argue that academics attending conferences around the globe are more likely to spur interest than their peers who prefer to stay in the office. Jäckle (2022) argues that resenting at a prestigious conference is considered a sign of scientific accomplishment and can be listed on resumes. The scientific conferences around the world gather academics together not only to disseminate their research but also to learn from the developments within the discipline. (Jäckle, 2022) Conferences are an integral part of academic life, and large emissions caused by air mobility are common knowledge. Why do academics with high knowledge still prefer to fly to these events?

According to Whitmarsh et al. (2020), air mobility is seen as a cheaper, faster, and easier option compared to other types of transport. Another reason for academics to fly to a conference could be desirable conference destinations. Poggioli and Hoffman (2022) argue that conferences held in a tourism centre can generate greater interest and, therefore be more prestigious compared to a conference in a remote small town without easy airport access or situated in a colder climate. Academics often prolong their conference trip in a desirable destination to combine leisure with business, sometimes bringing family along. (Poggioli & Hoffman, 2022) Many academics see travel as a ‘perk’ of academia (Whitmarsh et al., 2020). It allows benefits such as exploration of places, meetings with peers around the world and an escape from daily life, meaning that many academics want to keep the entitlements to air mobility (Glover et al., 2022).

Although the social value of these international gatherings is inevitable, their scientific value has been questioned by critics. Wynes et al. (2019) analysed the data of 705 academics at the University of British Colombia, Canada to reveal the relationship between academic achievements and academic air mobility. Their findings conclusively demonstrate the absence of a significant correlation between these two variables. Therefore, they suggest that academics may be able to reduce emissions from air travel without career sacrifices. (Wynes et al., 2019) With similar results, Jacobson (2022) interviewed academics who had already reduced flying some years ago and they did not experience serious disadvantages in their research.

Internalization of research institutions and the raising awareness of the harmful effects of flying combined cause an 'academic paradox', where the knowledge does not translate into action (Ahonen et al., 2021). Academics may prefer air mobility to stay absent from everyday consciousness even if they work on issues related to sustainability and climate change. (Glover et al., 2022) Eriksson et al. (2022) note that scholars acting against their knowledge can risk their credibility. Academics belong to a group of people, whose values and habits may influence others (Eriksson et al., 2022).

Whitmarsh et al. (2020) conducted a large international survey of aviation undertaken by climate change experts with 1,408 researchers. They compared results from the climate change expert and non-expert researchers and found that the group of climate experts fly more. This difference was only partly explained by the fieldwork they did. However, the group of experts report a higher level of awareness and concern about air mobility's effect on climate change and they are more likely to offset their flights and choose other – even more expensive travel modes. Hence, knowledge and concern are weak predictors of flying in the sample. However, whether the experts choose to act does matter in the public's eyes. The researchers in climate-related fields, who reduce their carbon footprint are more credible and likely to inspire change in behaviour change and policy support in the eyes of the public. (Whitmarsh et al., 2020)

Similarly, the study by Eriksson et al. (2022) researched whether a higher level of knowledge functions in arguments about lowering emissions. They found arguments evading responsibility regardless of the high knowledge. (Eriksson et al., 2022) But what is the viewpoint of academics on this matter as sustainability concerns have raised awareness in recent years?

2.2 Sustainable development in the context of academic air mobility

According to Venkatesan and Luongo (2019), sustainable development means meeting the current needs without compromising the possibility of future generations meeting their needs. The implementation of sustainable development needs to progress in three main areas of sustainable development: environmental, social, and economic. The areas are interconnected and developing one can reinforce another. United Nations created 17 sustainable development goals (SDGs) to support the recommended parameters for sustainable development. They offer guidelines and goals for every country to adopt according to their situation. (Venkatesan & Luongo, 2019)

Climate change and sustainable development are connected profoundly (IPCC, 2019). Air mobility is growing fast, and it releases more carbon dioxide (CO_2) per passenger kilometre than other transport modes (Whitmarsh et al., 2020). The environmental sustainability of academic air mobility has gained momentum after the renowned report by The Intergovernmental Panel on Climate Change (IPCC) in 2019. Previously research on academic mobility has dismissed environmental sustainability. According to the IPCC's (2019) report, human activities have already caused approximately 1°C global warming from pre-industrial times. If the increase rate continues similarly, global warming is prone to reach 1.5°C between 2030 and 2052. Climate-related risks for natural and human systems rise simultaneously with global warming. The risks are greater if global warming exceeds 1.5°C. To limit global warming to 1.5°C, it's essential to take comprehensive measures, which include reducing emissions, building technological and infrastructural resilience, and implementing behavioural and policy changes. (IPCC, 2019)

Levin et al. (2012) label climate change as a "super wicked" problem, to which there is no central authority to turn for solutions. Hence, society turns to academia for contemporary problems due to a high level of knowledge (Eriksson et al., 2022). However, academics are also one cause of the problem (Levin et al., 2012).

To minimize global warming, greenhouse gas (GHG) emissions must be reversed and transportation is an important field of action (Jäckle, 2022) Aldred (2013) notes that transport is perceived as having notable environmental consequences which are hard to resolve in other production and consumption sectors. For the entire population of the world, it is not feasible to consume fossil fuel-powered transport resources at the same level as in the countries of the global north (Aldred, 2013). Unfortunately, the countries with lower emissions contribution are often the ones suffering most from climate change (Baer, 2022).

According to the report by Finnish Environment Institutes report (Niemistö et al. 2019) emissions from air travel are primarily generated through the combustion process during flight. This process contributes to the production of CO_2, which accounts for approximately 70 per cent of the total GHG emissions. Water vapour constitutes approximately 30 per cent of the emissions. Furthermore, there are additional emissions that make up less than a per cent of the total emissions. The combined impact on climate caused by carbon dioxide and other combustion products such as water vapour, aerosols, and nitrogen oxides can be assessed, for example, using a so-called radiative forcing index (RFI). Another commonly used measure in environmental impact assessment is the carbon dioxide equivalent (CO_2eqv), which is used to calculate and report the combined impact of emissions from various greenhouse gases converted into an equivalent amount of carbon dioxide. Recent studies have observed that the overall effects of emissions caused by air mobility are about two times greater than the impact solely related to CO_2 emissions. (Niemistö et al., 2019)

Ahonen et al. (2021) researched the academic air mobility of universities in Finland. Their study objective was to find the extent to which GHG emissions from academic mobility affect the total GHG emissions of Finnish universities, and what mobility trends and patterns can be identified in them. They mapped the travel destinations to understand the scope of academic mobility in the Finnish context. Accordingly, universities have three main sources of emissions: energy and heating, mobility, and waste. Out of these three, waste is often the smallest cause of emissions. Of the 14 universities studied, Tampere University had the second lowest level (12 %) of aviation CO_2 emissions compared to total emissions in 2019. In comparison, a university with the highest aviation footprint had 78 per cent. Thus, if the university uses renewable energy and has cut its emissions efficiently in other areas, the aviation footprint may seem higher in the big picture. (Ahonen et al., 2021) Contrary to Ahonen et al. (2021), Tampere University's (TAU) calculations for the same year indicated significantly larger (39 %) emissions caused by air mobility (Tolvanen, 2021) in the same university. This could indicate that the emission calculations are not equivalent or there has been a mistake in either calculation.

While mobilities have expanded in recent decades, there are still several factors that limit the mobility of some individuals (Habti & Kurki, 2019). Accessibility and inclusivity of academic air mobility is a significant topic to be considered since the benefit is not equally distributed (Glover et al., 2022; Sheller, 2022). The inclusivity of in-person conferences has been criticized due to their high costs, which encompass attendance fees and travel-related costs (Tseng et al., 2022). Seniority, working in an elite university and attaining funding grants are increasing factors in academic air mobility. Thus, personal factors, such as family circumstances, bodily abilities, and health status can

limit the ability to participate. Moreover, other factors like discrimination, visa rules and citizenship may constrict travelling. (Sheller, 2022) Tseng et al. (2022) highlight that academic travel can lead to disruptions in family life and create an imbalance between work and family responsibilities.

Economic sustainability plays a vital role in academic air mobility. Most of the travel costs are funded by the academic organization or external funding structures. Action points for decarbonizing conference travel after COVID-19 by Klöwer et al., (2020) advise that academic associations and professional bodies could set criteria for funding conferences. Those who ignore the emission targets should not be funded. Additionally, research funding bodies should change to support virtual conferences instead of conference travel. The expenses for a virtual conference should be covered, including a conference leave to allow full attendance. Furthermore, creating a carbon budget for the grant applications should be considered. (Klöwer et al., 2020)

One of the elements of the foundational model by Tseng et al., (2022) introduced previously is practices, which reflect the practical aspects of reducing academic air mobility behaviour. Several scholars have provided suggestions on practices to reduce emissions from academic air mobility. These practices include choosing accessible venues for conferences, which lowers emissions significantly (Jäckle, 2022; Klöwer et al., 2020). A central location means, that the venue is well connected with a public transportation network allowing participants to travel by land (Jäckle, 2022). In this regard, Finland cannot be considered a central location due to its isolated cul-de-sac positioning. Especially during Baumeister (2019) suggests that land-bound travel can keep up with the travel times of flying options on routes up to 400 km in domestic travel.

The scholars agree that land-bound travel options could be promoted actively among participants (Ahonen et al., 2021; Eriksson et al., 2022; Jäckle, 2022). Estimations by Jäckle (2022) indicate that flying is a particularly bad option regarding emissions. Long-distance coaches and trains are better options, though they increase the travel time. (Jäckle, 2022) However, promoting alternative travel modes might not be enough if flights are seen as a desirable travel mode. Whitmarsh et al. (2020) note that other travel modes need to be developed to make them as – or more – attractive than flying. Jäckle (2022) notes that policies and programmes to reduce carbon emissions are already promoted by scientific organisations hosting conferences. However, some of these acts are mainly symbolic, such as choosing whether the participant wants a printed conference programme. The impact is minimal compared to the emissions caused by travel. (Jäckle, 2022)

Additionally, scholars have suggested ways to reduce emissions without reducing air mobility Ahonen et al. (2021) suggest updating the travel guidance so that academics can choose a more sustainable airline instead of the least expensive one, and reduce stopovers. They advise making the

emission calculations equivalent and gathering more data on habits of individuals' mobility and larger patterns of the issue. (Ahonen et al., 2021) Poggioli and Hoffman (2022) suggest carbon offsetting as the least disruptive change to flyout culture. Carbon offset matches the carbon emissions of a flight to an equal or higher amount of carbon absorptions. (Poggioli & Hoffman, 2022) However, as indicated previously, transportation causes large emissions and carbon offsetting might not be enough, since the emissions are hard to resolve in other sectors (Aldred, 2013). Therefore, it seems evident that academic air mobility cannot continue as usual and improve its sustainability. Ahonen et al., (2021) suggest that universities could research the reasons for academic mobility.

Klöwer et al., (2020) suggest that funding bodies should favour conferences that generate fewer emissions, such as virtual conferences. The role of academic role models is big, and the senior researchers should accept presenting keynote speeches virtually or pass the opportunity to under-presented groups. (Klöwer et al., 2020) Jäckle (2022) mentions introducing hybrid conferences as an alternative for people travelling from further away since a small group of participants accounts for a significant part of the emissions. Other scholars likewise recommend virtual presence (Ahonen et al., 2021; Eriksson et al., 2022; Poggioli & Hoffmann, 2022). Ahonen et al. (2021) additionally suggest evaluating whether the physical presence is needed on a case-by-case basis, with a preference for in-person attendance during networking events where new connections need to be established, rather than events with pre-existing networks. Klöwer et al., (2020) propose making major annual conferences biennial with an option for virtual presence. Furthermore, they suggest a "*three hub model",* in which regional annual conferences would occur concurrently in three central hubs, connected through dedicated virtual rooms, enabling participation in any session from anywhere. The location of the hubs should be prioritized to minimize long-haul flights. (Klöwer et al., 2020)

Despite the growing awareness of the GHG emissions caused by air mobility, academics have continued to travel. However, the COVID-19 pandemic disrupted this pattern for two years, and it remains uncertain whether it has brought about lasting changes in academic air mobility. The next chapter describes the effects of the pandemic on academic mobility.

2.3 The effects of COVID-19 on academic mobility

The COVID-19 pandemic broke out globally at the beginning of 2020. Countries set travel restrictions and advised people to stay home to prevent the spread of the virus before the development and distribution of vaccinations. Thus, the pandemic has been the largest disruptor of

global air mobility in recent decades (Jack & Glover, 2021) as global air mobility reduced by 60-90 per cent (Sheller, 2022). Like the entire society, academia was greatly affected by the pandemic (Salomon & Feldman, 2020) and had large implications for researcher mobility (Hauss, 2021).

Jack & Glover (2021) imply that in contrast to previous instances of air-travel restrictions, COVID-19 went beyond disruptions to the mode of mobility. Since face-to-face gatherings were ideal places for the virus to spread, the pandemic also prohibited physical co-presence, which is often the main purpose of academic air mobility, resulting in events like conferences and symposia being cancelled, postponed, or moved online. (Jack & Glover, 2021) The 'social distancing' during the pandemic challenged the informal scientific communication (Hauss, 2021).

The limitations on travel had a positive effect on the overall emissions of universities. For example, TAU's emissions changed drastically in 2021 from the pre-pandemic time. The total emissions of TAU dropped from 2019's 25,000 t CO_2eqv (Metric Tonnes of Carbon Dioxide Equivalent) (Tolvanen, 2021) to 2021's approximately 16,500 tCO_2eqv (Tampere Universities, 2023b). In 2021 only 5 per cent of emission was caused by travel (Tampere Universities, 2023b), while in 2019 the share was still 42 per cent (Tolvanen, 2021).

Jacobson (2022) interviewed academics about their travel habits during the COVID-19 pandemic when all their activities requiring travel were cancelled, postponed, or transitioned to a virtual format. Surprisingly, none of the interviewees found it as an issue. The time previously spent travelling was free for other uses, such as finalizing studies. Participants of the study believed that academics will become pickier with travelling since digital solutions save their time, money and the environment. (Jacobson, 2022) The convergence of the push for decarbonisation and the changes in work habits brought by the pandemic presents a unique opportunity to redefine academia away from the flyout culture, and towards a renewed culture that is environmentally sustainable (Poggioli & Hoffman, 2022).

2.4 Academic mobility in the digital age

As indicated previously, the NPM implies that mobility is more than people and goods travelling from one place to another. It also includes the movement of virtual information and data. The framework introduced by Tseng et al. (2022) includes material cultures, which focus on the available technologies and material products that diminish the appeal of academic air mobility. Improved information and communication technology facilitate academics in participating in conferences and establishing social networks without the necessity of air mobility (Tseng et al., 2022). Before

COVID-19, which paused global travel, including academic air mobility, virtual communication solutions were still incipient. The pandemic encouraged academics to adopt digital communication channels, revealing that the demand for academic air mobility was not as strong as previously believed (Tseng et al., 2022). Foramitti et al., (2021) suggest that virtual conferences could become the 'new normal of international academic events. However, Klöwer et al. (2020) remark that the move to digital meetings in response to the pandemic does not become a norm by default. But has the sudden transformation changed the attitude of academics towards digital communication options?

Virtual mobility has a significant role in network-based academic work (Lassen, 2022). However, a prior COVID-19 study by Whitmarsh et al., (2020) indicated that the academics experienced virtual meetings to be worse than face-to-face options. Thus, the group of climate change experts were less negative than non-experts. (Whitmarsh et al., 2020) The pandemic forced the world into a digital transformation, and most scholars today have a great amount of experience in virtual mobility. Jacobson (2022) believes that virtual and hybrid meetings form a 'new normal' in academia. The digitalisation of work life as a 'new normal' has been widely discussed during the pandemic. Are the digital communication solutions adopted during the pandemic here to stay?

A later study by Jäckle (2022) implies that in technical means, hybrid conferences are attainable and work well. Nowadays researchers work on their electronic devices anyway, the participation in an online conference does not make a significant difference in emissions. Digital communication solutions enable participation from home. (Jäckle, 2022) According to Foramitti et al. (2021), the most notable benefit of virtual conferences is that they eliminate the emissions of travelling and large venues. Jäckle (2022) calculated the emissions of an online-only event by the electricity consumption of the event. The way electricity is generated has a large impact on the emissions. Electricity is needed for the devices of participants and for the servers to provide video and audio transfer. (Jäckle, 2022)

Virtual and hybrid conferences are organized via online platforms, such as ZOOM. ZOOM offers a webinar function, where the participants are divided into presenters and audience Seidenberg et al., (2021) point out that virtual conferences and in-person conferences share similarities, both have presenters and attendees, networking activities, paper presentations and discussing research work in a formal setting.

The two formats also have differences. Salomon and Feldman (2020), and Foramitti et al., (2021) imply that there are various benefits to virtual conferences beyond environmental benefits. Firstly, virtual events are more accessible (Foramitti et al., 2021; Salomon & Feldman, 2020).

According to Seidenberg et al. (2021), a significant advantage of virtual formats is the ability to participate in conferences without the need for physical presence at the venue. Salomon and Feldman (2020) indicate that as the chances to participate in conferences grow with seniority, virtual conferences are accessible to a wider group of people. Virtual conferences decrease the bias caused by location. In-person events tend to attract people from nearby countries, but virtual alternatives can attract participants from various locations. The costs and time required are notably smaller than with face-to-face conferences. (Salomon & Feldman, 2020) Foramitti et al. (2021) imply that virtual conferences have the potential to be more inclusive and safe spaces for participants. Seidenberg et al., (2021) note that virtual conferences have inevitable limitations on informal socialisation and therefore they are more learning-centred than in-person conferences.

Based on the literature, it seems evident that the biggest drawback of virtual conferences is socialisation. Seidenberg et al. (2021) imply that face-to-face conferences are superior to virtual conferences in terms of social interaction. Similarly, Jacobson (2022) implies that the most challenging part of the academic world to transform to virtual is social networking. Another issue identified by the scholars relates to varying time zones, which can make participation challenging for some participants in different time zones (Tseng et al., 2022).

Salomon and Feldman (2020) collected feedback from virtual conference attendees on how to improve the event. The results suggest that the participants could turn on their cameras to make a better sense of community. This suggestion however includes safety issues and can overload the system. Additionally, participants suggest more chances for interaction. For example, chat rooms with speakers after the presentation or during breaks would create space for extra questions and debate. (Salomon & Feldman, 2020) Foramitti et al. (2021) suggest that the facilitation of such informal spaces for social interaction is a challenge. They also mention another drawback of virtual conferences - screen fatigue. Some participants of the virtual events have difficulties staying concentrated during the event. Accordingly, virtual communication can be more exhausting than face-to-face interaction. (Foramitti et al., 2021)

Klöwer et al., (2020) imply that the development of virtual conference solutions for academia should be encouraged. They note that the transition towards a new model of academic conferencing will only gain traction through concerted and coordinated efforts. (Klöwer et al., 2020)

2.5 Conclusion and research question

In conclusion, the articles reviewed demonstrate that air mobility is integrated into the academic culture due to several factors, including cognitive norms, globalization of work life and the so-called 'conference culture'. In the post-Fordism work culture, the emphasis on mobility and internalization is growing. The growing concern about the environmental impact of the increasing mobility patterns has made the scholar has made scholars to search for alternative practices to mitigate these consequences.

Virtual solutions have developed over the years, and conferences can be organized completely virtually or as hybrids, which significantly lowers the emissions, but academics have been reluctant towards digital communication channels. Conferences have faced challenges especially in replicating the social dimension of physical conferences in a virtual environment. The sudden shift to virtual during COVID-19 has shaped the attitudes, but whether these changes will sustain post-pandemic remains uncertain. Virtual conferencing might become the new normal in academia, but only through a coordinated effort. It is yet to be defined what kind of mobility will be prominent to meet the needs of academia alongside sustainability goals.

TABLE 1. The Conceptual framework for studying academic air mobility from the sustainability perspective in the digital age.

Conceptual framework	References
Academic air mobility	(Ahonen et al., 2021; Aldred, 2013; Baer, 2022; Bjørkdahl & Franco Duharte, 2022; Eriksson et al., 2022; Glover et al., 2022; Habti & Kurki, 2019; Jäckle, 2022; Jacobson, 2022; Lassen, 2022; Poggioli & Hoffman, 2022; Sheller & Urry, 2006; Whitmarsh et al., 2020; Wynes et al., 2019)
Sustainable development in academic air mobility	(Ahonen et al., 2021; Aldred, 2013; Baer, 2022; Baumeister, 2019; Eriksson et al., 2022; Glover et al., 2022; Habti & Kurki, 2019; IPCC, 2019; Jäckle, 2022; Klöwer et al., 2020; Levin et al., 2012; Niemistö et al., 2019; Poggioli & Hoffman, 2022; Sheller, 2022; Tolvanen, 2021; Venkatesan & Luongo, 2019; Whitmarsh et al., 2020)
Digital age: virtual conferences as an alternative	(Foramitti et al., 2021; Jäckle, 2022; Jacobson, 2022; Klöwer et al., 2020; Lassen, 2022; Salomon & Feldman, 2020; Seidenberg et al., 2021; Tseng et al., 2022; Whitmarsh et al., 2020)

The research question of the study is: “How is academic air mobility understood from the sustainability perspective in the digital age?”

3 METHODOLOGY

3.1 Case Tampere University

Tampere University (TAU) is one of the 13 universities operating in Finland and it is located the largest inland city in the Nordic countries, Tampere. The city of Tampere is well connected to the Finnish railway and bus networks. Moreover, an international airport is located in close proximity.

There are over 21,000 students, more than 4,000 employees and seven faculties at TAU (*Tampere University*, n.d.). The university supports the United Nations Sustainable Development Goals (SDGs) (Tolvanen, 2021) and the Finnish Universities' (UNIFI, 2020) 12 sustainable development theses (Viskari, 2023). Theses by UNIFI (2020) state that universities should be carbon-neutral by 2030, and TAU's goal is in line with it (Viskari, 2023).

According to Tolvanen (2021), the first major step towards carbon neutrality in TAU was the calculation of the university's carbon footprint. Before the COVID-19 pandemic, in 2019, the overall carbon footprint of the university was around 25,000 tCO_2eqv. The largest individual part of the footprint is caused by work-related travel (42 %). The calculation included pre-planned work-related travel and the travels of opponents in doctoral defences as well as event speakers' travel that the University has reimbursed. Out of the work-related travel emissions, approximately 92 per cent were caused by air mobility. This total share distributed for TAU's 4,000 staff members (25,000 tCO_2eqv*0,42*0,92/4,000 = 2,42 tCO_2eqv) was 2,42 tCO_2eqv per employee. By contrast, The Finnish Innovation Fund Sitra has recommended that the overall CO_2 emission target for 2030 ought to be 2.5 tCO2eqv per person to meet the 1.5 °C climate warming limit (Lettenmeier et al., 2019). One suggestion for cutting down emissions in the sustainability report of TAU is to decrease flying (Tolvanen, 2021). During the pandemic, travel-related emissions decreased, yet an increase is again anticipated.

Tampere Universities (2023) conducted a roadmap to sustainable development for the years 2020–2030 that includes steps to promote sustainable development. According to the vision of the roadmap, in 2030 the university will be carbon neutral, and its carbon footprint will be automatically monitored. Additionally, sustainable development will be integrated into all degree programs.

Environmental sustainability is always considered when new research projects are planned and the results are then disseminated locally nationally and globally to support climate action. (Tampere Universities, 2023a). The commitment to sustainable development in TAU gives justification to this study, it is meaningful to study the area that currently causes the most emissions in the university – work-related travel, and particularly air mobility.

3.2 Research design

The research question of the study is: *"How is academic air mobility understood from the sustainability perspective in the digital age?"*. The question was formed from the base of the literature review. This study adopts an interpretivist paradigm as its guiding framework. The interpretivist paradigm focuses on exploring contextual variables and factors in depth, recognizing the distinctiveness of humans compared to physical phenomena (Alharahsheh & Pius, 2020).

Qualitative research is a suitable research method for answering the current research question since it seeks to respond to questions regarding *what, how and why* (Lichtman, 2014). Qualitative research methods aim to describe, explain, or understand a phenomenon related to human experience (Gibbs, 2018; Lichtman, 2014). Qualitative research is not about testing theories, not about cause and effect nor is the aim to test hypotheses or predict results (Lichtman, 2014).

As the topic is multifaceted, interviewing is a suitable research method since the answers can go in multiple directions. Moreover, Hirsjärvi and Hurme (2022) imply that interviewing as a method is considered suitable for social sciences. Interviews are often conducted in a way that the participants can tell their stories in their own way (Lichtman, 2014). Hirsjärvi and Hurme (2022) imply that informal, deep discussions can reveal ideas, that otherwise would have stayed hidden. An interview is a discussion with a meaning. (Hirsjärvi & Hurme, 2022) . Gibbs (2018) describes qualitative research projects as open-ended and explorative. Therefore, the outcome of the research might not be clear before the data analysis. (Gibbs, 2018).

The interview type selected for the study is 'teemahaastattelu' established by Hirsjärvi and Hurme (2022). The interview type does not exist in other languages besides Finnish, in this study, it is referred to as 'thematic interview'. According to Hirsjärvi and Hurme (2022), one of the characteristics of the thematic interview is that the interview structure is based on themes rather than individual questions. The semi-structured interview method is characterized by the acknowledgement that the interviewees have experienced a certain situation. (Hirsjärvi & Hurme, 2022) Based on the findings of the literature review, it is evident that air mobility is an in-built aspect

of academia. Hence, the underlying assumption was that the chosen researchers have experiences in academic air mobility. Hirsjärvi and Hurme (2022) suggest that the researcher conducts a preliminary analysis of the presumably important areas of the topic before the interview. Based on this analysis the researcher sets certain assumptions about the consequences of the defining features of the situation for its partakers. These assumptions work as a basis for the interview structure. (Hirsjärvi & Hurme, 2022)

Hirsjärvi and Hurme (2022) imply that the interview is directed to the interviewees' subjective experiences of the analysed situations. During a thematic interview, specific themes are addressed and discussed in-depth. Flexibility is a key benefit of thematic interviews. However, the interviewer needs to know what information is essential and ask follow-up questions when necessary. The thematic interview does not strictly tie the interview into qualitative or quantitative analysis. (Hirsjärvi & Hurme, 2022) In this study, conducting individual interviews was deemed more beneficial than organizing a group interview.

3.3 Sampling strategy

The sample of the study consists of researchers from TAU. The sampling strategy was systematic: specific criteria were established for participant selection in the study (Table 2). The research participants were required to represent three different career stages. This approach ensured the authenticity of the study since the participants were different enough from each other. According to The Ministry of Education and Culture (2008), the career stages of researchers in Finland are four-stepped. The first level primarily consists of younger researchers working on their doctoral theses, the second level of those who have recently completed their doctoral degrees, researchers in the third level are already independent professionals capable of academic leadership in both research and education, and the fourth level is the professorial stage. (The Ministry of Education and Culture, 2008) The career stages in this study are referred to as: *"Early-state researcher"* (levels 1 and 2), *"established researcher"* (level 3), and *"leading researcher"* (level 4).

Furthermore, the participants were chosen from three different faculties of TAU: Educational Sciences (EDU), Information Technology and Communication (ITC), and Management and Business (MAB). The aim was to interview nine researchers: three from all faculties from all different career stages. However, this succeeded only in terms of ITC faculty and the early-stage researchers (Table 2), therefore the total number of respondents is seven.

TABLE 2. Criteria for sampling strategy and number of participants

	Faculty		
	EDU	ITC	MAB
Leading researcher (level 4)	1	1	-
Established researcher (level 3)	-	1	1
Early-stage researcher (level 1 & 2)	1	1	1

The faculties were chosen to each represent different areas of sustainability: social, environmental and/or economic (Venkatesan & Luongo, 2019) to achieve a holistic perspective on sustainability. Firstly, EDU represents social and environmental sustainability. Tampere Universities (2022a) reported that EDU had 305 staff members and 1,697 students in 2021. The faculty is a community focused on research and learning, analysing the state of education within society and transforming educational practices. (Tampere Universities, 2022a)

Secondly, ITC represents the social perspective of sustainability. Within this faculty, there is the master's program "Sustainable Digital Life," to which this thesis is closely related. According to (Tampere Universities, 2022b) ITC is the largest faculty at TAU, with 793 staff members and 6,299 students in 2021. The faculty has the know-how to address the challenges of a global, digital, and multicultural society committed to sustainable development. ITC's societal impact includes a central role in studying, defining and promoting the digital transformation of society. (Tampere Universities, 2022b)

Finally, MAB represents the economic and environmental sustainability perspective in this study. According to Tampere Universities (2022c), MAB had 323 staff members and 4,179 students in 2021. MAB strives for excellence in research and teaching through a comprehensive approach, a strong sense of responsibility, and a profound contextual understanding of management and business. (Tampere Universities, 2022c)

The thesis supervisor recommended a list of potential researchers to be interviewed for this study. Approximately half (4) of the recommended individuals, agreed to take part in the study. Therefore, a snowball technique was used in recruiting additional participants, which resulted in two additional participants. Moreover, the search function on the TAUs website was utilized to identify potential participants, who were invited to the study based on the relevant field and seniority. However, this technique resulted only in one interview, despite various invitations.

The selected participants were contacted via email, which included an abstract and the research plan (Appendix 1). The plan clarified the objectives of the interview, the estimated length of the

interview, how the results are used and how the data is stored. A total of seven researchers were interviewed in May of 2023. The research participants are listed in the table (3) below.

TABLE 3. Participants of the study

Name	Faculty	Career stage	Years in academia	Annual academic trips by air	Annual leisure trips by air	Finnish speaker
Ella	EDU	Early-stage	4	0	0	yes
Frankie	EDU	Leading	20+	2-3	0	yes
Frida	ITC	Early-stage	15	3	6	no
Otto	ITC	Established	25+	10-12	1	yes
Walter	ITC	Leading	25+	3	0	yes
Mona	MAB	Early-stage	9	0	0	yes
Anna	MAB	Established	9	2-3	2	yes

Ella was the only participant who has made the decision not to fly altogether, while the others who have zero air mobility, had not taken any flights in recent years. As the interviews were to be kept anonymous, the participants were given pseudonyms based on their gender identity. The research included four researchers who identified themselves as female, one as nonconforming and two as male. Participants from EDU and MAB reported studying a field directly related to climate change. Out of the seven participants, five were located in close proximity to the university, one was situated roughly 200 kilometres away from the university, and one split time between locations, spending part of the time near the university and part of the time approximately 200 kilometres away from it.

3.4 Data collection

The interview questions were formulated by drawing from the knowledge gathered from the literature review (Appendix 2). The interview framework included demographic questions and questions related to five themes:

1. Academic air mobility
2. Policies and decision-making
3. Sustainability of academic air mobility
4. International conferences

5. Suggestions on how to make academic mobility more sustainable.

The themes were identified from the literature review, and each of them contained a set of questions. Depending on the interviewee's stories, questions could be added, altered, or skipped during the interview. The participants could choose the form of the individual interview: either via Microsoft Teams or face-to-face in a preferred location in Tampere. Six interviews were conducted remotely via Microsoft Teams, and these interviews were recorded with the Teams platform. The one face-to-face interview was recorded using a mobile phone. To ensure a successful remote interview, the interviewer made some preparations, including selecting a distraction-free space and ensuring a stable internet connection. With the face-to-face interview, the participant had the freedom to select an interview location where they felt comfortable.

At the beginning of each interview, the interviewer welcomed the participant, requested consent to record, introduced the interview themes, and asked a vocal consent for participation on record. The participants had experience with virtual meetings and the remote interviews worked relatively well. However, an unstable internet connection and issues with the microphone caused some difficulties in writing a transcript of remote interviews.

According to Hirsjärvi and Hurme (2022), it is essential for the interviewer to facilitate the flow of information and motivate the interviewee. Thus, the interviewer should take into account the unique characteristics of the individuals being interviewed. (Hirsjärvi & Hurme, 2022) In the present study, the interviewees are researchers themselves, indicating that they expectedly have prior experience with interview situations. Therefore, the interview themes or questions were not provided for the participants beforehand. This decision was made based on the belief that the participants could discuss their personal experiences spontaneously without preparation or being hindered by nervousness.

The interviewer aimed to create an open and safe atmosphere for the discussion by being emphatic and listening attentively. To create a linguistically comfortable and appropriate interview environment, interviews were conducted in Finnish for native Finnish speakers, to ensure the best understanding of the issues. For one non-native speaker, the interview was conducted in English. Despite the interviewees being academics, the language in the interview was casual to enable a natural flow of conversation.

A pilot interview was conducted remotely in April 2023 to assess the viability of the interview structure. The pilot interview was initially analysed, which validated that the selected method and interview structure worked well. However, some questions still needed reframing to ensure clarity and two questions about the culture around academic air mobility in the university were removed

since the questions were difficult to answer for the participant and did not provide information relevant to the research question. Additionally, the pilot confirmed that the length of the interview was approximately one hour. The rest of the interviews were conducted in May of 2023.

3.5 Data analysis

The analysis process followed the guideline set by Braun and Clarke (2006), which consist of six phases for thematic analysis:

1. Familiarization with the data
2. Generation of initial codes
3. Search for themes
4. Review of themes
5. Definition and naming of themes
6. Production of the report.

The first phase of the analysis is familiarization with the data. The data was collected by the present author and therefore, the familiarization began already during the interviews. To make the interviews easier to analyse, the recordings were transcribed into text. The entire interview was transcribed with a chosen transcription style of denaturalized transcription, where the pauses and intonations were not described. Microsoft Teams platform, which was used for remote interviews, includes a live transcription option. The recording conducted with a mobile phone was transcribed with Microsoft Word Online. Each recording was listened to afterwards at least once, and the automatically generated transcriptions were corrected. During the transcription process, significant observations were already identified and highlighted within the transcript. Each transcript was thoroughly reviewed on multiple occasions.

In the second phase, initial coding was done manually in Microsoft Excel platform. Transcripts of the seven interviews were arranged within the interview framework in Microsoft Excel. In cases where respondents provided multiple answers within one question, the corresponding answers were transferred to their rightful questions. Once the information was appropriately aligned within the framework, all the responses to each question were analysed to identify the differences and commonalities among them. The data Microsoft Excel was carefully examined, and initial codes were created in different tabs in Excel. The relevant data of each code were pasted to these tabs.

Third phase, searching for themes, was completed by creating colour codes for different themes (e.g., blue = social sustainability), and colour coding the code tabs in Excel. The codes were sorted in 20 initial themes.

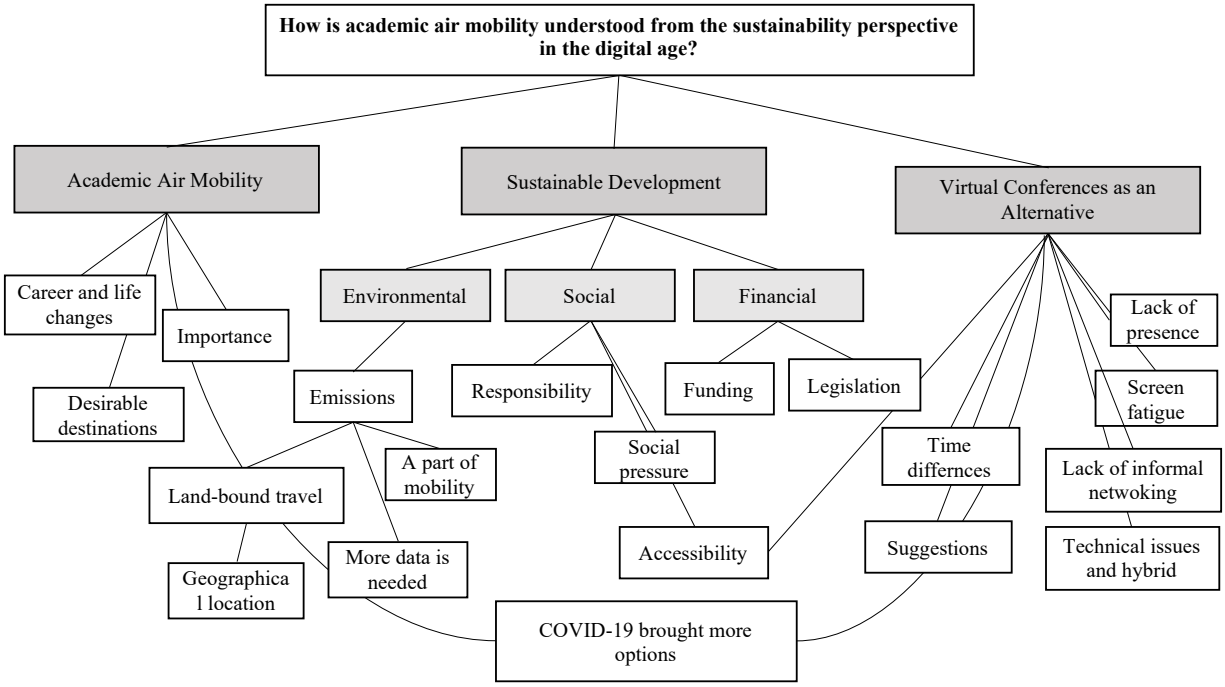

FIGURE 1. Thematic map

In the fourth phase, initial themes were revised in accordance with the research question. A thematic map was created (Figure 1). Validation and fine-tuning of the themes was done iteratively until the data was sufficiently aligned with the research question. During this phase some themes were eliminated, and some were combined, resulting in the final nine themes. Comprehensive list of the themes can be found from the Table 4.

Fifth phase is defining and naming themes. The essence of each theme was defined. Themes were named to illustrate the key findings of each theme. The themes helped to structure the findings.

TABLE 4. List of themes

Concept	Theme
	1. Motivations and Significance for International Researchers

Academic Air Mobility	2. The Impact of Career Stage 3. The Influence of Destination Choices and Leisure
Sustainability in Academic Air Mobility	4. Environmental Sustainability: Land-Bound Travelling and Offsetting 5. Social Sustainability: Responsibility, Accessibility and Social Pressure 6. Economic Sustainability: Funding Structures Creating Challenges for Sustainability Practices
Digital Life: Virtual Conferences as an alternative	7. Post-COVID-19 Perspectives on Virtual Conferences 8. Challenges From the Lack of Presence and Informal Networking to Screen Fatigue 9. Advantage on Accessibility and Suggestions for Technological Advancements

Sixth and final phase is writing the report with the support of the nine themes. Quotations from the data were extracted to support each finding. Data of interviews conducted in Finnish was translated into English only when it was quoted to support the findings. This approach helped prevent translation errors during data analysis.

4 FINDINGS

This chapter provides answers to the research question: *How is academic air mobility understood from the sustainability perspective in the digital age?* The findings are organized into three chapters in alignment with the conceptual framework. Quotes that most vividly illustrate the particular result have been extracted from the interviews.

4.1 Academic air mobility

Of the seven interviewed university researchers, six had generally considered the sustainability perspective regarding work-related air mobility, while only one had not extensively pondered the topic before the interview:

> *"I never thought deeply about that travelling as such, but it is very important to turn our - academical - thinking to the direction." (Frida)*

The participants had different purposes for flying in the past year. Two early-stage researchers (Table 3) had refrained from air travel during this period, although when they had previously flown it has been to conferences. One established researcher (Table 3) was significantly more aeromobile than other participants, flying every month due to an international collaboration in research projects. The other established researcher flies to conferences but reported flying more actively previously when they had an international project.

For the leading researchers (Table 3) the most common reasons were international project meetings. Ella implied that academics may not consider whether their research benefits of the conference visit *"Many people travel just for the sake of attending conferences, instead of carefully considering whether their research is at a stage where they can benefit from that conference." (Ella)* Otto, who flies frequently due to international projects, on the other hand mentioned expediency of the academic travelling several times during the interview and sees that his peers also travel expediently:

> *"For example, Tampere University - Here, people travel very expediently - I know many colleagues who also engage in similar thinking, that it's not necessary to attend every conference, that it's worthwhile to consider where to go and aim specifically for those high-quality conferences." (Otto)*

One participant had not made conscious choices to reduce academic air mobility, while others confirmed that they had taken steps to decrease their air mobility. Notably, two early-stage researchers mentioned that they have made concrete decisions to limit flying – one has committed to completely avoid flying, while the other opted to limit the flights to a maximum of one trip per year. The rest of the researchers stated that they assess the necessity of the trips on a case-by-case basis, considering the purpose and relevance of the trip for their career. For example, Anna, who has worked in academia for nine years, reported that she has certain conferences, which she attends and maintains the network created:

> *" I select carefully which conferences I attend. There are a few specific ones that I consistently visit. I don't explore new conferences with an experimental mindset to see whether they would suit me. I prefer to go to the few ones where the networks that I have created are and which I want to maintain." (Anna)*

The participants agreed that academic travelling is important to career development in their field. Some said that it is a necessity in some cases and one questioned whether it really is necessary anymore. Two participants from the ITC faculty reported that they have collaborative projects in countries of the global south, where face-to-face meetings hold significant importance. In addition to the different working styles of different cultures, unstable internet connection in the partnering country can make even simple project management duties hard to manage via the internet. They implied that more complex technologies cannot be presented remotely, and some might even need security classified space. Other participants reported that academic travelling is important due to meeting people and presenting their own work in person as well as learning from others. For example, Anna noticed the value of meeting people outside one's work community, especially during COVID-19:

> *"It is important, seeing people outside Finland, also in Finland of course, but outside of one's own work community. And during the corona times, I noticed that the in-person meetings are also valuable." (Anna)*

Most participants agreed that building and maintaining an international research network is important for researchers, especially if they want to pursue an international career: *"I think it is absolutely essential for becoming a truly international researcher." (Frankie)* According to

participants, an international researcher network helps to build one's researcher identity. One participant, who joined late in age to academia, said that academic travel has been life-changing and that the international spirit of the conferences made her change her career path: *"In my first conference, I realised that that international spirit is very tempting to me. That actually was the reason why I changed my life" (Frida)*. Participants who study a research area in the margins highlighted the importance of the international research networks, since they brought a sense of belonging. For example, Anna mentioned that the connections have been beneficial for her career:

> *"At the beginning of my career I worked at an institution where no one else was doing similar research to what I was doing. So those international communities were, in a way, the main community that I had in relation to research, and it was really valuable considering my dissertation." (Anna)*

According to leading researchers, the importance of travelling diminishes in their later career stages compared to earlier stages, when the research network is still forming. One leading researcher said that for the first time during their academic career, they has a permanent contract, which eliminates the pressure of continually seeking new funding and projects. Walter, who has been in academia for over 25 years, stated that attending conferences is no longer meaningful due to the considerable time consumed by administrative tasks:

> *"I was in England once and realized that during the week-long conference, I practically didn't listen to any presentations because I had to work on financial figures in Excel and respond to emails. It made me think that maybe it doesn't make sense for me to travel to conferences anymore."(Walter)*

One participant pointed out that flying simply enables collaboration meetings in places where one cannot travel otherwise. Most participants did not report having any sentiments towards flying itself: *"I've never liked flying and I would prefer to use other means if it made any sense in these time constraints or other pressures." (Walter)* Without academic air mobility, maintaining international networks is challenging. For example, Ella who had completely opted from flying expressed sadness due to not being able to meet her peers across the ocean anymore:

> *"I've decided that I won't fly, so it means that I won't meet people who live across the oceans in person unless they travel here. A researcher, whom I met in a conference in Finland, who lives in Canada, we met three times once the researcher was in Finland. During the last time, they said that they won't probably come here anymore, since they decided not to fly. That was extremely sad. Because I have decided that I won't fly, we will never see each other again. Unless we use some ship." (Ella)*

Participants reported that COVID-19 has affected the needs of academic air mobility. Some participants described changes in their lives or careers that occurred simultaneously with the COVID-19 pandemic. Consequently, they remained uncertain about whether the pandemic influenced their changed needs for flying. However, the prolonged period without flying due to COVID-19 had disconnected some participants from the lifestyle that previously involved frequent travel, resulting in a lengthier thought process when planning on travelling. One participant commented, that since academic travelling is so draining, there is now a problem with motivation to travel in the post-COVID-19 era. Mona, who had worked in academia for 9 years, for instance, was not sure whether the pandemic was the driving force, but thought more carefully about whether she needed to travel somewhere or not:

> *"I don't know about whether COVID-19 changed my needs for flying, but at least habits: now I consider it much more carefully. I don't what has influenced it in a way, but maybe the fact that couple of years passed without flying and there were no conference, it has caused me to think more carefully about whether it's necessary to go." (Mona)*

Participants experienced desirable destinations and exploration to be an extra facet rather than the driving force when travelling for academic purposes. As an example, Frida who flies approximately six trips for leisure in a year does not see the destination to be as important in her work travels *"Hmm it can be a drive, but let's say it is not a dominating motivator. I like that" (Frida).* However, some participants mentioned that they recognize that the destinations matter, though this aspect is not always openly discussed. For instance, Walter implied that in the previous decades, the benefit of academic air mobility was used excessively to explore desirable destinations:

> *"Well, I admit, especially when I was younger, it was certainly a way to explore the world and I used, maybe in hindsight, the opportunity to fly academically quite a lot. It is a well-known fact - I can say it out loud - that especially in previous years conferences have been chosen based on where they have been. It's a fact and nobody should hide it. It is still practiced." (Walter)*

Combining work and leisure travel divides the opinions of the participants. Some viewed it as a sustainable approach, as it eliminates the need for multiple flights for different purposes. Others argued that the timeframes are tight, and they want to designate the time for working. Typically, when participants described to combine work and leisure travel, they spend a few days extra days at the destination with their family or friends, who have travelled there. One participant reported that in history university has tried to limit combining work and leisure travelling. Conversely, talking about this issue one researcher said that TAU supports combining the two types of travel:

> *"As far as I understand, at Tampere University, there is a specific number of days that can be combined for leisure with a work trip—I can't remember the exact number of days. I haven't travelled anywhere yet, so I haven't had the opportunity to test it in practice. However, at some point, I did look into those travel guidelines." (Anna)*

According to a participant, academic air mobility allows travelling, that is not only useful but also enjoyable. Frankie, who has worked in academia for over 20 years, suggests that it can be challenging for academics to solely focus on the essential travel and that the topic is experienced to carry a certain taboo:

> *Well, it's probably something that you can't say out loud, but that it's a really big motivator many times, certainly because which conference you go to or don't go to, it's influenced by whether it's a nice place and whether it's a nice time and about that it is definitely one such challenge." (Frankie)*

In addition to the advantages, it enables for academic careers, participants also noted the drawbacks of academic air mobility. Several participants stated that academic travelling is exhausting. For example, one participant described having health issues, which make especially long flights physically painful. Time used travelling is out from other professional activities. Returning to work with jetlag is a reportedly taxing experience. The time devoted to academic travelling can also affect researchers' personal lives. One participant, whose partner is likewise a researcher, said that they used to enjoy travelling together before having children. In contrast, Frida, who has worked in academia for 15 years, shared an experience where her partner was unwilling to sustain the same dynamic lifestyle, which backed the end of their marriage:

> *"Partly I decided to get divorced because I was travelling all the time. And my ex-husband couldn't be at peace with my travelling. It was an issue, because it gives that opportunity, and you have somebody at home waiting always and not even being able - but willing to do the same dynamic of life." (Frida)*

The stage of life affects the intensity and opportunities of academic travelling. One leading researcher argued that some researchers are struggling with attending international gatherings if they cannot bring their families along. Anna, who has young children, commented that travelling is currently exhausting since she needs to rush back home:

> *"When in the past I travelled in a way, where I tried to stretch the trip, both at the beginning and at the end, so that there was also a little free time, nowadays travelling is about trying to fly at the very last moment and then again as soon as possible to get out of the conference or other meeting. It makes it quite heavy and intense." (Anna)*

4.2 Sustainability in academic air mobility

Participants discussed the sustainability of academic air mobility concerning all three dimensions of sustainable development. However, when the participants were asked what kind of sustainability issues they recognised in the theme of academic air mobility, most mentioned issues related to environmental sustainability. Environmental sustainability issues were mostly discussed from the viewpoint of emissions. Some participants mentioned the emissions caused by air mobility as a sustainability issue of academic air mobility. One of the seven interviewed researchers expressed sadness regarding to big environmental impact of academic air mobility. Two researchers suggested that more data about the issue is needed. For example, Mona said that finding out how big part of aviation-based emissions is caused by academic air mobility:

> *"Well, I don't have any data or information about how big part of air travel in general is from academic travel. That how big part of emissions globally or in Finland nationally come from aviation emissions come from academic travelling. If I had to guess, I wouldn't guess it's an awfully big part compared to tourism." (Mona)*

One participant from EDU suggested that sustainable academic mobility should be seen as an ensemble, in which air mobility could play a role. Frankie argued that flying should be considered as a part of sustainable mobility instead of creating opposition with other types of mobility:

> *"I believe that flying should be thought of as something that can be a part of the sustainable transportation system, but its role can be much smaller than it has been. By combining different modes of transportation and also by changing time scales like this, we can greatly reduce the carbon footprint of flying." (Frankie)*

A common view amongst participants was that land-bound travel options are environmentally more sustainable than flying. Train travelling was most frequently mentioned by participants as a more sustainable alternative due to smaller emissions. However, for academic purposes travelling by land internationally was not yet widely expended within the current sample. Ella, who has decided not to fly anymore, had scheduled two train trips to conferences in Europe in the current year. The trips were planned carefully also valid justifications for the longer travel duration were provided. The participant believed that academics have an interest in train travel, but the current system does not support it:

> *"The financial issue is perhaps the biggest barrier. I know several people who would've liked to come to a conference with me by train, but their financier didn't make it possible, so they flew there." (Ella)*

Some participants mentioned a benefit of longer journeys, the travel time can be used for working: *"It doesn't waste as much time as going to the airport first and waiting there. And then all those checks and systems, during that time, you can just sit on the train and work" (Ella).* The two leading researchers described that once they have travelled to the destination, they try to combine various duties and spend more time there. If the travelling is planned carefully different tasks can be combined into one journey and the researcher can spend a longer period in the destination. For example, Frankie suggested that mobility plans should prefer longer journeys so that the academic can combine various tasks during the trip. The longer time at the destination would also justice longer time for the travelling:

> *"It's essential that the academic organizations and funding bodies start emphasizing the need to plan travel carefully, so that when you go somewhere, you stay for an extended period and accomplish as much as possible while you're there. This way, you make the most out of each trip, reducing the need for frequent travel. But we should also allocate proper resources to make it entirely acceptable to travel by train or ship, even if it takes longer and uses working hours." (Frankie)*

According to participants, travelling to and from Finland is challenging without relying on air travel. Three participants reported that they visited Estonia or Sweden with a ferry-train combination. But even when going to the neighbouring country Sweden with alternative travel modes adds several travel days more. Walter for instance, argued that trips to Europe are challenging without air mobility:

> *"Finland is in a bad position in that sense, that even if we would like to do European trips in other ways, it has been limited to individual trips to Sweden, Estonia, nearby places." (Walter)*

One participant shared an experience from a project, where they organized network-building events for Nordic countries and ended up organizing the events in other Nordic countries instead of Finland. In that way, most participants could travel there by land. Participants reported that their peers elsewhere in Europe travel mostly by land. Some implied that the peers travelling with alternative modes of travel have even generated envy in those who had opted to fly. For example, Otto did not consider alternative options when he travelled to Sweden:

> *"I was at a conference in Sweden, where many people from Finland travelled by ship to Stockholm and from there by train to the conference destination. It did arouse a bit of envy in me, that why the hell did I fly - I hadn't even considered that as an option, but others were able to justify the longer journey. "(Otto)*

Ella, who intended to travel to Europe land-bound for academic purposes later, mentions that she has previously done international train trips for leisure purposes. She considers this to be an encouraging factor as it demonstrates the feasibility of such journeys:

> *"I went to a friend's wedding in central Europe by train, so I have some experience. In a way it also encourages, I've noticed that for many people it is unnerving to go for the first time on such a journey by train, it can be unnerving to know what it means and how tough it will be." (Ella)*

Three out of seven participants mentioned that the university should promote land-bound travel options more. The mindset of the decision-making could switch to considering flying as the last option when alternatives do not work instead of flying being the default option. One participant proposed that the university could limit flying by implementing a quota for flying, that would be at a faculty level rather than at an individual level. Each faculty could have a certain quota for travel, and if one faculty requires more quota than they have, they could exchange with another faculty that does not need their full quota. Another participant suggested that the university could hire a person dedicated to assisting with travel plans and the M2 travel planning application, which currently does not support train travelling: *"It would be great to have someone at work who plans that trip, helps you find the suitable routes" (Ella)* The participant reported spending several days to travel planning since there are many changing factors.

The two early-stage researchers, who have limited their air mobility, struggle with a moral conflict if they consider flying. A participant from MAB said that she teaches everyday environmental politics and if she flies herself, she will act against her own teachings:" So*, if I fly myself, it's like I'm not practising what I preach" (Mona)* However, two participants pointed out noticing a contradictory with some peers and even the university itself regarding sustainability focus and engaging in air mobility. One participant had promoted train travelling within her academic network but reports that even her peers in a climate-change-related area have excuses on why they need to fly to conferences. The excuses are related to health conditions and family situations, but she ponders that it is more of a planning issue. Similarly, another participant says that even some of his peers, who otherwise are sustainability-oriented, contradictorily fly without hesitation:

> *“Many colleagues who profess a commitment to environmental and sustainable development travel without hesitation. So, in a way, this is quite two-faced behaviour, in the sense that, in my opinion, there is a significant contradiction between words and actions.” (Walter)*

The contradiction is not limited only to individuals, but the university is seen also to have contradiction in their actions, since the university is a place of high knowledge about the sustainability issues, but the practices do not follow the knowledge:

> *"It feels really contradictory, and it feels like something very difficult to work in a place where this issue is acknowledged and it has been said that we want to be in line with sustainable development, but at the same time, the practices are something completely different."(Ella)*

Social sustainability was addressed by the participants by pondering questions of responsibility when considering the sustainability of academic air mobility. One participant from ITC commented that it is a matter of individuals' choices. One participant from ITC and all from EDU and MAB think that the responsibility should not be the individual's own. The participant from ITC suggested that the changes at the individual level are challenging and there should be a balance between guiding influence and individuals’ decisions:

> *” The same as in any sustainability-related matter, it's a matter of finding a balance between the guiding influence and individual-level decisions, so there should be a balance between them. Because significant changes are, on an individual level, often at the end of a very long thread.” (Walter)*

Shaming individuals for their air mobility was not seen as an effective approach to fostering sustainable academic mobility. As an alternative approach, encouraging the usage of alternative modes of mobility is mentioned by some participants. Some participants suggested that flying should be made harder than other modes of travel. For example, Frankie thinks that flying should not be approached as a consumer issue, but at the same time finds it absurd that people just fly for fun around the world:

> *“There has been a lot of talk about flying as one of the issues related to the climate crisis. I'm somewhat critical of the idea that the consumer is king in this context. I believe it shouldn't primarily be approached as a consumer issue. However, the fact that people use their resources and leisure time to fly around the world just because it's fun, in my opinion, is quite absurd.” (Frankie)*

Conferences and networking events were a major reason for the travelling within the sample. The participants described that they decided themselves which international conference they wanted to

travel to, but their supervisor at the university gave the final permission. *"When it stays within reasonable limits, I usually get permission from the project manager or my immediate supervisor, especially if there's funding available" (Anna)* Two early-stage researchers reported that senior colleagues may give recommendations to travel to a certain conference. The researchers in the leading positions make decisions over the early-stage researchers' travel plans. A leading researcher implies that the power to influence grows with seniority in the field. Leading researchers make decisions about the travels of researchers in early-stage career positions. An individual early-stage researcher cannot do much about it, besides skipping the unnecessary travel. However, early-stage researchers do see opportunities for influence. Ella for example, mentions influencing attitudes: one can lead with an example and by spreading knowledge about opportunities:

> *"Encourage others to travel by land and share the knowledge and experiences. I was thinking I could create an Instagram account and blogposts about it as an encouragement to those who think about it." (Ella)*

Some participants indicate that academia carries the responsibility to raise knowledge of the harmful effects of air mobility on the environment: "*Academia has the responsibility to make the red lights blinking"* (Frida). Whether there is an issue, it should be brought to the daylight. One participant suggested that academic organizations could have a significant role in generating scientific evidence about the damage that is done. Additionally, another participant noted that it would be beneficial to calculate how many per cent of the air mobility is directly caused by academia.

One issue regarding the social sustainability of academic air mobility mentioned by the participants was that it is not accessible to all academics equally. A leading researcher implied that some researchers from one's research group have difficulties attending international gatherings if they cannot bring their family along. Mona, an early-stage researcher, said that whenever organizing events, there are questions regarding social justice since not everyone has the same opportunities to participate:

> *"In terms of social sustainability, its social justice or such, that not everyone has the opportunity, and others do. It raises questions about whether it's okay to organize events, when not everyone has access there, even though they are representatives or researchers from all universities and so on." (Mona)*

Two early-stage researchers who had both limited their academic air mobility due to environmental reasons, reported experiencing a pressure to network while they travel. They put emphasis on the positive career and research outcomes they achieve from these trips to justify the caused emissions.

However, if the expected benefits of the career are not filled, the guilt will follow. To illustrate, Mona described the pressure to network to justify the emissions caused:

> *"From the networking-point of view, the on-site events are important, but there can also be terrible pressure. If you are not a natural networker or such a mingling person. Then you go to some event: "okay, now I only talked to one person here, was this worth the emissions?". Then you can feel the same guilt and some kind of pressure to network if you start thinking about it too much. "Okay, what do I need to achieve? How it needs to benefit my research? What kind of networks I need to create so that it's OK to travel like this?". It doesn't always go like that, and it might not be that useful, then I scold myself if I wasn't able to talk in this situation and pull the sleeve of every professor, who would have been here. These are very interesting questions, but a little heavy, and quite difficult." (Mona)*

In senior career stages, the existing networks affect travel decisions, take off the pressure to build networks and make it easier to be environmentally aware. For example, Anna, who has worked in academia for nine years, mentioned that since she had the opportunity to explore the world in the early stages of her career years, it is now easier for her to be environmentally conscious about flying:

> *"We have been lucky in that sense that we were able to travel quite a lot between 2014 and 2018. So now it's easy to say now I'm environmentally aware and climate aware when I already have those networks and I've explored cool places and I've gotten to know the people and the cities." (Anna)*

A participant suggested that there should be guidelines on who's travel is favoured and indicates that it should be the early-stage researchers whose career benefits the most from international gatherings. Walter commented that he does not see any scientific benefit for senior researchers in organizing events, many just do it because they enjoy it:

> *"Organizing conferences is often appreciated. But what's the point of a senior professor coordinating coffee catering? It doesn't make any sense. Doing these chores, for example when you deliver some procedures. Postgraduate students are good at that, as it's really an interesting task for them. In my opinion it's a bit like I'm here because I can drink beer with my colleagues in the evening". (Walter)*

Participants addressed economic sustainability by considering factors such as travel costs and funding structures. Travelling is reported to be an in-built feature in the funding structures. A participant argued that to receive funding from major funding bodies, international research exchange is a prerequisite, which often leads to flying. The mindset of the funders follows a time pre-COVID resulting in pressure to engage in academic air mobility. Walter, who travelled by air

three times per year for academic purposes, expressed that he has also participated in international research exchanges simply to meet the criteria of funding:

> *"As an example, if you want a project type from Business Finland with solid cooperation, there must be 24 months of research exchange over the course of a couple of years. It's quite a lot because we rarely go there for a long time. So that means at least 3 months, for some reason the minimum is this 3 month. Frankly speaking, I have personally been involved in similar exchanges that were made only because the financier's conditions were met." (Walter)*

One major issue noted by the participants was that land-bound mobility is not supported financially by the structures. Another issue mentioned is that the funders do not recognize the cooperation that does not include travelling, such as remote meetings and researcher exchange: *"Today, we have learned efficient collaboration practices, and the requirement for physical presence has become outdated" (Walter)* Therefore, it was suggested that the funders should change the criteria for international cooperation. Similarly, some participants suggested that the funding structures should take responsibility for supporting more sustainable travel practices in academia. They could update their requirements and contemplate sustainable mobility in the fundings by, for example, assigning a larger amount to the travel fundings, since land-bound travel is currently more expensive than flying.

An established researcher from MAB said that her project had received funding, which encompassed a strategy for offsetting the emissions generated by their meetings. However, a Finnish university, where she previously worked rejected the allocation of research funds for the purpose of emission offsetting due to legislation from the Ministry of Education and Culture:

> *"The university did not allow emissions offsetting because there is apparently a directive from the Ministry of Education and Culture that project funding cannot be used for emissions offsetting." (Anna)*

The participant suggested that the regulations should be changed immediately: *"If academics choose to fly, they should, at the very least, offset the emissions." (Anna)* The other member of MAB also mentioned carbon offsetting as something that the university could do to promote more sustainable travel practices, however, it is not a straightforward solution to the issue: *"But it's not advisable to be complacent about the idea that I can now fly as much as I want because they will be offset, and three trees will be planted there." (Mona)* An established researcher from ITC implied that they aim to publish more in channels that do not require physical travel, such as conferences that offer hybrid participation as an option.

One participant noted that the desire for enjoyable travelling is also recognized by conference providers. Otto reports that commercial conferences take advantage of desirable destinations and vacation times to attract paying customers:

> *"I receive quite a lot of invitations to participate in conferences, and conferences have become somewhat commercialized. It's clearly noticeable that there are established, high-quality, recognized academic conferences that either change locations, rotate between a few, or maybe even stay in the same place. Then there are these commercial, non-profit-seeking actors that seem to organize conferences, for example, during vacation periods or in winter in a location with suitable conditions... Conditions attract. (Otto)*

4.3 Digital Life: Virtual conferences as an alternative

The participants reported choosing international conferences for scientific reasons; based on the relevance of theme and research area. Senior members from ITC said that publishing determines to which conferences researchers in their field travel. *"The rules are that you should publish where others who research the same topic are publishing." (Otto)* Therefore, the content of the conferences is a significant factor for the members of ITC in making travel decisions. Conferences are the main publishing channel and therefore have different purposes in their research. Walter for instance, implied that the fast-paced field requires fast-paced publishing, which is facilitated by the conferences:

> *"In our field, conferences have a very different character than in other fields - they are the main publication channel. This is what distinguishes our field. In almost all other scientific fields, journals are the main publication channel, but in computing, because it is such a fast-paced field, conferences are the main publication channel¨ (Walter)*

Other participants commented that their research field determines which conferences they attend. Two early-stage researchers imply that they note recommendations from senior colleagues when choosing the conferences.

Five out of seven participants shared the idea that COVID-19 made virtual events more common and created new possibilities and practices in academic work: *"It made all Zoom, Teams meetings much more natural, so they are organized more nowadays." (Anna)* However, virtual conferences divided the opinions of the participants. The leading researchers had the strongest opinions regarding virtual conferences. One strongly disliked them: *"My experiences with virtual conferences are terrible - I never participate unless it's absolutely necessary." (Frankie)* in contrast,

the other had an optimistic view: *"I strongly believe in virtual conferences and this approach. They have already proven to be the future of travel." (Walter)* Others were in the spectrum of views in between.

Issues related to presence in virtual conferences were prominent in the interview data. In virtual conferences, participants said they could not tell whether other participants were present or not. Presenting was seen boring since the audience feels distant. Therefore, participants' contribution to the conference community remains low. One participant suggested that it could be a fault of Microsoft Teams and Zoom as they have their limitations as interaction systems and do not work well with multiple people. Otto described that the interaction between more than two people is challenging in Zoom and Teams:

> *"Maybe it's partly since they're organized with Zoom or Teams, which have their own shortcomings as interaction systems. These platforms work well for this, when we are just two people here, I talk, you ask, and this way we have an immediate interaction. But what happens if there's a third person here? The camera would probably be off because he wants to pick his nose or something." (Otto)*

Most participants shared an opinion, that physical co-presence in conferences is important. Two respondents of ITC faculty suggested that the importance of physical co-presence is getting smaller over time. Conversely, both participants from EDU underscored the importance of physical co-presence, noting that this facet is attenuated within virtual environments. For example, Frankie suggested that digital communication systems should not be at the forefront of development since they can erode the scientific community:

> *" I wouldn't advocate pushing academic life entirely towards the notion that since everything can be done on Zoom and Teams, why shouldn't we do it all that way? Why should people commute to the university for work when they can just as easily do these tasks from their homes or cottages? Because, in my opinion, what it erodes is precisely those democratic elements present in academic and scientific communities. So, it wouldn't be wise to entirely dismiss the significance of physical encounters. It should be taken into account when considering the environmental impact of activities like flying and other forms of transportation that produce emissions." (Frankie)*

In addition to the lack of presence, another significant drawback identified by the participants was the limited existence of informal networking in virtual conferences. Six out of seven participants expressed their belief that networking opportunities are worse in virtual conferences than in face-to-face conferences. Some participants reported that idea formation is often a result of informal networking, which naturally occurs when academics gather in the same physical space. Participants

had noticed virtual conferences offering sessions, that replicate informal networking. Nevertheless, the experiences of the participants were mostly negative, and they do not want to attend such sessions anymore, since they do not get any benefits from them. Otto for instance shared his experiences from the virtual networking session that he found to be a poor use of time:

> *"A couple of times during a conference, there has been this kind of virtual social session, and it was instructed like this: "Prepare some snacks and your favourite drink for yourself" So, I didn't feel like getting beer and potato chips for that, so I followed it maybe for 5 minutes and thought: Well, this isn't going anywhere. "(Otto)*

Conversely, one participant, who finds it challenging to physically travel due to a busy timetable, said that even though the virtual conferences lack informal networking, the networking can be done even more effectively virtually, but people might not know how to use the opportunities of virtual presence:

> *"When I see something interesting in a virtual conference, I immediately start searching the guy's background, Google what they have published. If it is interesting, I immediately send a connection invitation on LinkedIn. In this way, I can network online so effectively. So, I think is really good. People just might not know how to take advantage of it. Maybe I've been able to grow my network more in this way, specifically in virtual conferences because it's so effective. And that browsing in the background, you can't do it now in a way as effectively offline that you start fiddling with your cell phone like "Hey, who's this guy?". (Walter)*

Two participants mentioned that the digital skillsets of academics are lagging. However, most of the participants express that their IT skills are good or excellent since technology is necessary in their work. Insufficient skills and effort dedicated to organising hybrid conferences lead to poor conference experiences, primarily due to disruptions caused by technical issues. One participant noted that there are already good practices, but they should be used on a larger scale.

Some participants said that the virtual conferences are exhausting in a different way than face-to-face conferences. The participant reports that her range of focus is better in face-to-face events since with the computer she tends to multitask and experiences screen fatigue:

> *" So, when you're somehow there in front of the screen all the time, and then they're still very intensive. I notice that my concentration is much better when I'm physically present somewhere, so when I'm at the computer, it's easy to check emails or do something else." (Anna)*

Two participants reported that the time difference can sometimes be intolerable in virtual conferences. One said that attending a conference at night would mean working around the clock,

which would not be feasible. In contrast, the other participant said that he has also had a great experience in a virtual conference, with a time difference that suited one's schedule, but noted that it does not always work as well:

> *"For example, I had one good experience with a virtual conference where I had a busy schedule, and there was an interesting conference in Asia. It was great to wake up at 2 AM, participate in conference sessions, and then continue with a somewhat normal workday - well, not entirely normal but still doing other tasks. Then have meals, take a nap, and continue evening tasks, go to bed early, and so on. So, at least in that case, it worked quite well. It doesn't always work that way, though. (Otto)*

When asked about the benefits of virtual conferences, some participants mentioned that they can be more accessible than face-to-face conferences. Virtual conferences enable participation for people who are unable to travel on-site for financial or other reasons. A participant noted that for even less money than one PhD student would use to travel on-site to a conference, the entire research group could join. One noted that acceptance to a conference is easier achieved in a virtual conference. The leading researcher from ITC implied that the virtual events are easier to make accessible not only to people with sensory impairments but for participants from countries of the global south:

> *"One advantage of virtual conferences or events is that they become more easily accessible. Nowadays, we can provide online interpretation and translation, which makes them much more accessible. I mean this not only for individuals with sensory impairments but also for those coming from developing economies. It's often very challenging for them to attend conferences or physically be present" (Walter)*

One participant commented that since conferences allow participation for a larger group of people the information spreads wider. In relation to this, some participants reported that virtual conferences work well for the dissemination of results and informational events since there are fewer distractions*:" If you approach it as more of a study session, then it could indeed be easier to focus on your own quiet space and concentrate on listening." (Mona)*

One participant noted that especially in discrete places, like Australia or Finland, virtual conferences should be preferred, since travelling there often includes flying. Another participant found it hard to find other benefits of virtual conferences than that they do not require flying.

Participants suggested ideas on how technology could be used to promote sustainable practices in academic mobility. Two participants shared the idea that various types of trials should be conducted. One participant from ITC implied that the trials could focus on technological aspects,

while the other participant from EDU suggested that they could focus on pedagogy. The main objective would be to enable remote connections between individuals.

A participant mentioned that there already are hubs that are utilised in some large-scale international conferences. The hubs are located on different continents and allow physical copresence for the participants without transcontinental travelling. Another participant suggested a model like how open access publishing is supported but for virtual conferencing. For example, the university could cover the attendance fee of virtual conferences, supporting the use of virtual platforms as an alternative to physical travel. A participant who expressed negative feelings about virtual conferences implied that technology should be employed by using elements of hybrid and virtual meetings while travelling. The academics could solely focus on their journey while they are on the move without pressure to return for a class.

5 DISCUSSION

5.1 Significance of air mobility varies among academics

An initial objective of the study was to identify how academic air mobility is understood from the sustainability perspective in the digital age. Out of the participants, six had previously given thought to the sustainability aspect of work-related air mobility, whereas only one had not delved deeply into the subject before the interview. A comparison of the findings with those of other studies (e.g., Lassen, 2022) confirms that university researchers have a high self-determination score in terms of travelling. Therefore, it is meaningful to study the individuals' thoughts about academic air mobility.

The study failed to recognize whether the COVID-19 pandemic affected the travel habits of academics, since some had life and career changes simultaneously, which also affected the travel habits. However, the prolonged period without flying due to COVID-19 had disconnected some participants from the previous lifestyle involving frequent travel, leading to a lengthier thought process when planning on travelling. One participant reported having a motivation issue towards travelling since travelling is draining. This aligns with the findings of Jacobson (2022), which suggested that academics will become pickier with their travelling following the pause imposed by the pandemic.

The findings of this study aligned greatly with the cognitive norms mentioned by Tseng et al. (2022) which refer to academics' attitudes, values, and beliefs about the need for frequent travel, often driven by university expectations tied to career advancement, internationalization, and academic achievements. For early-career academics, networking is a key motivator for participating in academic air mobility. (Tseng et al., 2022) This study found building a network in face-to-face events was seen particularly important for researchers aspiring for an international career. Moreover, for the researchers studying a research field in the margins, where they may be the sole practitioners in their country, connecting with international peers who are also studying the same field carries significant importance in shaping their research identity.

One of the key findings is that the significance of travel decreases as researchers progress through their academic careers, especially from the networking point of view. A possible explanation

for this might be the nature of research work, where projects often determine the length of the work contract. The researchers in the earlier career stages need to find funding for their research, and their networks can facilitate international collaboration, a factor valued by funding bodies. These results reflect those of Lassen (2022), who suggested that engaging in a structured networking environment offers opportunities for scholarly collaboration. Ahonen et al. (2021) also suggested that the need for physical presence should be considered case-by-case basis, preferring in-person attendance during events where new connections need to be established. The findings of this study support the previous literature by suggesting that the travelling of early-stage researchers should be favoured.

An increase in the level of flying is associated with a higher level of seniority has been reported by Whitmarsh et al. (2020). This study did not confirm the previous findings, since the level of flying did not grow similarly in the current sample. It seems possible that these results are due to that most participants had already made conscious choices to reduce flying. However, the opportunities to join international events may grow with seniority, but the senior members of this study had chosen not to use all these opportunities.

The findings of this study align with the previous studies (e.g., Whitmarsh et al. 2020) suggesting that academic air mobility is often powered by the 'conference culture' since conferences were mentioned in the means of their travel by most participants. One interesting finding is that the means of going to conferences vary regarding the field of study. Participants in senior career stages from the ITC reported that conferences are the dominant publishing channel in their field. For the other faculties, the reasons were disseminating results and networking. In addition to conferences, another significant reason for the participants to fly was international project collaboration.

Whitmarsh et al. (2020) indicated that the most efficient way to predict the amount of work-related travel is to examine the amount of air mobility for leisure. This differs from the findings presented here, where there seems to be no strong relationship between those two factors. For example, Otto who is the most active air traveller in academic purposes, flies only approximately once per year. Frida on the other hand, who is the most airmobile in leisure time, flies for academic purposes 2-3 times per year. Demographic factors do not show links to academic air mobility. The most efficient way to predict the amount of work-related travel within this sample seems to be whether the researcher has international projects. Face-to-face meetings are often required in collaborative projects especially when including countries, where there are different working styles or technological possibilities. Face-to-face meetings hold different importance in different cultures.

All researchers participating in this study agreed that academic travelling is important to career development in their field. This finding is linked to the previous findings of Lassen (2022), who

noted that the culture around academic air mobilities is connected to a larger transformation of work culture. He implied that contemporary work culture is becoming increasingly mobile, and global professionals view air travel as a means of travel without the sentiments that flying used to have (Lassen, 2022). The results of this study were similar; flying was thought more as a necessity than a novelty.

Previous studies have noted that desirable destinations can create greater interest in conferences (e.g. Poggioli & Hoffman, 2022). Travelling has been regarded as a 'perk' of academia (Whitmarsh et al., 2020). Some participants of this study expressed that they have enjoyed the benefit of academic travelling in history more wholeheartedly. Interestingly, during the time of the interviews, six out of seven participants reported that they had made conscious decisions to decrease their air mobility.

Some participants said that travelling for other than scientific reasons still occurs in academia, though to a lesser extent than in history. This is a topic that is often discussed discreetly. This finding broadly supports the work of other studies in this area linked to the 'academic paradox', where knowledge does not translate to action (Ahonen et al., 2021) and even scholars working in fields related to climate change prefer air mobility to stay absent from everyday consciousness (Glover et al., 2022). Though the participants themselves reported travelling expediently, some of them had noticed a contradiction with some of their peers' actions and values. For instance, sustainability-oriented academics may fly without hesitation, presenting a contradiction. This finding supports the findings of Eriksson et al. (2022), that arguments of evading responsibilities were found regardless of the high knowledge.

The study found that destinations are seen rather as an extra facet than as a driving force when travelling for academic purposes. Opinions varied regarding the practice of combining work and leisure travel. While some saw it as a sustainable approach to reduce multiple flights, others felt that the tightly scheduled trips should remain dedicated to work-related purposes. The matter is not straightforward. Opinions may be affected by how important the participant sees leisure travelling.

This study revealed that academic air mobility is seen as exhausting by some academics. It consumes a significant amount of their time, which is out of other valuable things. The findings align with prior research by Tseng et al. (2022), suggesting that managing the balance between personal life and academic travel can be challenging. Consequently, this study proposes that academic air mobility can significantly influence the well-being of academics and have a great impact on their work-life balance.

5.2 Academia's responsibility to raise awareness

Venkatesan and Luongo (2019) indicated that sustainable development requires development in three primary areas: environmental, social, and economic sustainability. Given TAU's goal to achieve carbon neutrality by 2030, it is urgent to integrate sustainability across its strategies, actions, and incentives. Before the pandemic, flying was the biggest individual source of emissions in TAU (Tolvanen, 2021). Stopping academic air mobility in total, would be an environmentally sustainable option, however, it would not currently be in harmony with social or perhaps economic sustainability goals in academia. Internalisation is seen as a key component of academic work and international networks are valued as well as physical copresence. Consequently, efforts to reduce emissions must be thoughtfully designed to minimize the adverse impacts on academia.

In this study, the participants engaged in discussions that intertwined various aspects of sustainable development. The findings confirm that a structural change in legislation, universities and funding bodies is needed.

Several reports (e.g., Jäckle, 2022) have suggested that land-bound travel modes should be actively promoted since flying is a particularly emission-heavy mode of mobility. However, land-bound modes of travel should be as, or even more, attractive than flying to academics (Whitmarsh et al., 2020). One finding is that currently, there is a group of academics, that would prefer train travelling, but face rejection by the university or the funder due to the increased costs and travel time. Therefore, promoting land-bound mobility alone is not enough if the structures do not permit it. A comparison of the findings with those of other studies (e.g., Klöwer et al., 2020) confirms that the universities and funding bodies should update their travel guidance to favour land-bound travel to promote sustainable travel practices. Rather than viewing the extended travel time as a drawback, it could be recognized as a valuable opportunity for productive work.

Concerning this finding, participants even reported feeling envious when they had travelled by air, while their peers had travelled by land. This finding is contrary to previous studies which have suggested that academics can experience a 'fear of not flying' demonstrating the power of the flyout culture. This rather intriguing contradiction could be partly explained by the difficult geographical location of Finland, concerning available land-bound alternatives. As six out of seven participants had considered the sustainability of academic air mobility, it could indicate that the sample group would travel by alternative modes if it were easier.

Travelling from Finland without flying is not impossible, as one participant demonstrated by making land-bound travel plans to Europe. Nevertheless, such journeys often necessitate the use of

sea transport connections. Conversely, the geographical location could be a convenient excuse, allowing academics to opt for the more familiar choice of flying. However, it is evident that travelling from Finland without flying requires more time and effort compared to, for example, from central Europe, where the train network is extensive.

According to the findings of this study, alterations in legislation and transportation taxation could have a large impact on academics' air mobility patterns. As previous studies have also suggested (e.g., Poggioli & Hoffman, 2022), offsetting emissions could be one way to mitigate the environmental impact of air mobility. This study confirms that academics think that offsetting the emissions caused by aviation should be the bare minimum effort for academics: "*If academics choose to fly, they should, at the very least, offset the emissions. (Anna)* However, they recognize that is not a simple answer to the issue. Compensating emissions has been rejected in terms of legislation by the Ministry of Education and Culture even when a project had funding to compensate for the CO_2 emissions caused by a project meeting with a legit compensating organization, but the legislation prohibited allocating project funding to offset emissions.

Participant viewpoints regarding the responsibility for sustainable mobility practices in academia displayed diversity. Some believed it was primarily a matter of individual choices, while others argued that the responsibility should not rest solely on individuals. Participants emphasized academia's responsibility to raise awareness of the environmental impact of air mobility and to generate scientific evidence about its effects. The participants expressed that academia has the responsibility to bring issues to the daylight. In accordance with the present results, previous studies (e.g., Eriksson et al., 2022) have demonstrated that consumers turn to academia with the super wicked problem of climate change. Additionally, emission calculations should be made equivalent and more data on the academics' mobility patterns and larger patterns of the issue should be gathered (Ahonen et al., 2021).

TAU has presented calculations of emissions caused by work-related air mobility (e.g., Tolvanen, 2021), but they might be challenging to grasp without contextual reference. In this study, some participants raised concerns about the scale of the problem of academic air mobility in comparison to tourism and other business travel. Consequently, there is a need for additional data or further information regarding the existing data. Previous studies (e.g.m Baer, 2022) indicated that academics are among the most frequent flyers. Hence, emissions resulting from academic air travel could be compared to those of the general population.

A proposal to view the transportation system holistically rather than targeting flying was raised. Careful planning and calculation can enable flying to be a part of the sustainable

transportation chain, where different modes of travel are combined to reduce emissions. This approach would align with the principles of the NPM, which also takes a holistic view of mobility (Aldred 2013).

This study confirms the notion from previous studies (e.g., Lassen, 2022). that networking holds a significant importance in the realm of academic travel. Noteworthy is that two early-stage researchers reported having pressure to network due to the emissions caused by travelling in person. A possible explanation for this might be that in the early career stages building networks is more important. When this factor is combined with the environmental awareness of the emissions caused by air mobility, it can create pressure to succeed in networking.

One interesting finding is that the academics perceive criteria set by funding bodies for international collaboration to be outdated, as they do not acknowledge collaborations that do not require physical travel. They often require international research exchange, which encourages academic air mobility. Participants recommended a change to the criteria as an option to promote sustainable mobility practices in academia. NPM also recognizes virtual and imaginary mobility (Aldred 2013), but based on this study, the funding bodies seem to still to stuck with the idea of transportation. Additionally, one researcher from ITC, where the conferences are the main publication channel, said that they aim to prefer publishing in channels which do not require physical travelling, such as hybrid conferences.

The participants shared various university initiatives, including implementing flying quotas at the faculty level, promoting land-bound travel options, and hiring dedicated personnel to assist with sustainable travel planning.

5.3 From virtual to hybrid modes of academic conferencing

The move to digital meetings in response to the pandemic has not become a norm by default (Klöwer et al., 2020). Calculations by Jäckle (2022) indicate that emissions from virtual conferences are low in comparison to traditional in-person ones, especially given that academics commonly work on their computers anyway. While discussing the broader concept of virtuality is a separate issue, a specific aspect in virtual environments, virtual conferences, does not significantly contribute to increased emissions. A study by Whitmarsh et al. (2020) indicated that academics experienced virtual meetings to be worse than face-to-face meetings. One finding of this study is that despite the push to digital transformation accelerated by the COVID-19 pandemic academics agree that virtual meetings are now more common and fluent; the findings of this study still support the previous

studies. Six out of seven participants thought virtual conferences were worse than face-to-face conferences. During the pandemic, some academics started to value face-to-face meetings even more than before.

Whitmarsh et al. (2020) suggested that climate change experts had a less pessimistic view of virtual meetings than non-experts. This differs from the findings presented here: the researchers specializing in fields directly related to climate change (EDU and MAB) had more negative attitudes towards virtual conferences, than participants from ITC. Several factors could explain this observation. Firstly, the participants from ITC study fields related to technology, which can make their digital literacy better. Secondly, the research fields of the participants from EDU and MAB are not solely focused on climate change. Lastly, within the small sample, there may be variables between individuals, which cannot be explained by their expertise.

This study found that academics are still reluctant towards virtual events and shared a variety of reasons why they dislike them. The most frequently mentioned drawback was the lack of presence. Academics cannot be sure how present the other participants are. Prior studies (e.g., Lassen, 2022) have noted the importance of physical co-presence for social relationships. This study confirms that academics emphasize the importance of physical co-presence. However, two respondents of ITC faculty suggested that the significance of physical co-presence is getting smaller over time. Conversely, both participants from EDU underscore the importance of physical copresence, noting that this facet is reduced within virtual environments. These differences between faculties can be explained in part by their study field. The participants from EDU demonstrated a clear understanding of the concept of physical co-presence, while participants from the ITC on the other hand are closely involved in the digital environment and view its potential benefits more optimistically.

One of the key findings of this study is that virtual conferences have failed to fulfil the purpose why most participants partake in academic face-to-face conferences: networking. Six out of seven participants expressed that the networking opportunities of virtual conferences are worse than in face-to-face conferences. These findings match those observed in earlier studies (e.g., Seidenberg et al. 2021), which have indicated that the most challenging part of transforming the academic world into virtual is social networking. However, one participant from ITC was optimistic about the networking options in virtual conferences and another one agreed that the skills in virtual networking should be developed to benefit from virtual networking sessions. It seems possible that these results are due to that informal virtual networking sessions try to replicate the experience of face-to-face networking sessions, leading participants to view virtual sessions as cheap alternatives. It is possible, therefore, that if virtual informal networking sessions would adopt a different approach, it could

change the perspective of academics. A leading researcher from ITC demonstrated, how networking virtually can be effective, at least for a researcher in the senior career stage. The effectiveness of networking is reached by actively researching interesting people in online conferences and connecting with them on LinkedIn.

This study found that participants can experience screen fatigue during virtual conferences and concentration is challenging since the urge to multitask is high. This finding was also reported by Foramitti et al. (2021). Especially when participants keep their cameras off, the contribution to the conference remains low. However, as Salomon and Feldman (2020) noted, keeping cameras on could cause safety issues and could overload the system. The issue could be related to virtual communication platforms such as Microsoft Teams or ZOOM, which work well for direct communication between two people or even small groups, but not so well with larger groups of people. Various types of trials could be implemented to develop communication systems to match the purpose of academic gatherings and environmental sustainability.

The findings of this study support the previous studies (e.g., Foramitti et al., 2021) by indicating that alongside the fewer emissions, a significant benefit of virtual conferences is that they are more accessible to a wider audience due to lower costs and reduced barriers to participation. In online format, the transcription and translation are easier to manage. Additionally, participation in online conferences eliminates travel costs, and the attendance fee is typically smaller. Therefore, as virtual conferences allow participation for a larger group of people, the information spreads wider.

The suggestions on how technology could be used to foster sustainable travel practices in academia included conducting trials focusing on both technological and pedagogical aspects to enable remote connections between individuals, reducing the need for physical travel. Jäckle (2022) implied that in technical means virtual and hybrid conferences already work well. The findings of this study support the previous those of earlier studies by indicating that there are already good practices, but they should be put to a larger scale. However, this study revealed that organizing hybrid conferences requires more skills and therefore, due to technological issues, the conference experience in hybrid conferences is often experienced to be poor.

The social interaction is the most challenging part of the digital transformation. Universities could support academics attending virtual conferences by, for example, covering the attendance fees. Following the ‘three-hub model’ introduced by Klöwer et al. (2020) to lower the emissions caused by conferences, establishing physical hubs on different continents was also suggested in this study. The hubs allow conference participants to meet in person without the need for transcontinental travel.

This idea is already used in some large transcontinental conferences. This way, the important physical copresence would still be established and transcontinental travelling would decrease.

6 EVALUATION AND ETHICAL ASPECTS OF THE STUDY

6.1 Trustworthiness and limitations of the research

This chapter delves into the trustworthiness and limitations of the research. Lincoln and Guba (1986) introduced a set of rigorous criteria in qualitative research to ensure the trustworthiness of the research, which is known as credibility, dependability, confirmability, and transferability (Lincoln & Guba, 1986, as cited in Forero et al., 2018). With this criterion, the trustworthiness of the results is reviewed.

Credibility

A qualitative research method was selected, and its application has been rigorously explained in the Methodology chapter. The purposeful sampling gathered participants, who were different enough from each other, with expertise in different areas of sustainability, which enhances the overall credibility of the study. The findings of this study primarily support the previous literature. Furthermore, the researchers' transparency regarding their own biases supports the trustworthiness of the findings.

Dependability

The dependability of this qualitative research has been influenced by factors such as labour economics and the fact that the case study is of one university. The recommendations of the study are all based on the interview data findings. The significance of the recommendations is evaluated with the existing literature.

Confirmability

Each interview transcript was analysed thoroughly individually and collectively several times. The process of data analysis is cautiously described in the Methodology chapter to ensure the confirmability of the research. The literature review consisting of peer-reviewed articles, was used

to reflect the research findings in the Discussion chapter, contributing to the confirmability of the research. Grounding the research findings in established scholarly work ensures that the study has a strong foundation and a link between the data and the interpretations presented.

Transferability

The participants and the context of the study are described to an extent so that the transferability can be done in a similar setting. Transferability is supported by the English language used in the thesis and the use of international literature. The transferability should be studied with a larger set of data, but the context is close to in the other Nordic countries.

6.2 Ethical considerations

According to CORE (2022), research ethics involve applying ethical principles like reliability, honesty, respect, accountability, and justice to research activities. Researchers aim to create accurate knowledge by following these principles. (CORE, 2022) The research ethics were considered before gathering the data by following the open-source handbook by Staksrud et al. (2022). It was acknowledged that as the participants are researchers themselves, the research ethics should be well concerned.

The present author considered the unique characteristics of the individuals being interviewed and they could decide the desired format and location of the interview. According to British Psychological Society (2021), every individual has inherent value and deserves equal moral consideration, regardless of their perceived or actual distinctions, including factors like gender or social status. This was kept in mind when interviewing and presenting the results. For example, the senior researchers with more experience, held greater confidence on certain matters. However, the analysis considered all the perspectives.

The invitation to the research (Appendix 1) included relevant information about the research ethics, such as notion that the participation is voluntary, what the participation research involves, how the interview is recorded, where the data will be stored and how they can access the results found by the researcher. The participants agreed to be interviewed voluntarily, and they were not pressured into participation. Each participant gave an oral consent before the interview. The data was stored in TAU's cloud service Microsoft OneDrive since it was considered as the safest place to store the data. Recorded interviews were uploaded to Microsoft OneDrive and the transcriptions were likewise saved to a particular folder in the cloud until the thesis was accepted and after that

they were deleted. During the interviews, the interviewer maintained an open view towards to the participant's perspective by employing an emphatic approach. To ensure the privacy of the participants, the results was presented anonymously. In the report, each participant are referred with a pseudonym based on their gender identity (Table 3). The data was carefully edited to fade responses containing personal information, that could damage the anonymity. The participants have a right to know what the researcher found, which will be available in Trepo once the thesis is published.

Furthermore, the study utilized artificial intelligence tools such as ChatGPT 3.5 and Grammarly to explore alternative ways to articulate the ideas and to prevent spelling errors. The tools were used to enrich the language and presentation of results, but the foundational research has been conducted by the present author, and the raw interview data was not input into the AI system. Additionally, other master's thesis were used as models for the structure of the theses. Plagiarism was avoided and the theses was run through a plagiarism checker programme Turnitin to ensure the authenticity of the theses.

6.3 Limitations

Most apparent limitation of this study is the small sample size. The goal was to interview three researchers from each faculty and career stage. Conducting the interviews in the end of the academic year posed a challenge due to busy schedules of academics. Nevertheless, it was necessary to conduct the interviews before the summer vacations of the academics to advance the thesis process during the summer. Due to the considerable time and effort required for respondent recruitment, a sample size of seven participants was deemed satisfactory to adhere to the desired timeframe. Due to the small sample size and the variance of the participants, saturation was not achieved, and the differences between faculties could not be observed properly.

One limitation observed during the interviews and data analysis was that it is challenging to distinguish academic air mobility from academic travel in general. It necessitated a thorough examination of the dataset to ensure the correct context for each case.

The present author's perspective on academic air mobility may be biased due to her concerns in environmental sustainability issues. This bias was recognized, and the present author aimed to maintain an objective approach and therefore, the data was analysed several times.

7 CONCLUSION

7.1 Summary

This study set out to gain a better understanding of how academic air mobility is seen from the sustainability perspective in the digital age. Participants of the qualitative research included seven researchers from different career stages and three faculties of TAU. The study was prompted by the emission reduction targets established by the Finnish government and universities. This encouraged investigation into a major contributor to the emissions of the university: air mobility. Furthermore, considering the digital transformation accelerated by the COVID-19 pandemic, the study aimed to investigate whether academics who may have been previously hesitant towards virtual conferences had reconsidered their views.

The most obvious finding to emerge from this study is that the significance of travelling decreases with seniority, especially from the networking perspective. This may be related to the nature of research work and project-driven contracts, where early-career researchers need to build networks and secure funding. The study also reaffirmed the importance of academic travel in career development, with researchers viewing it as a fundamental part of their professional growth. The study supported the notion that academic air mobility is, in part, a product of structural and cultural expectations within academia.

Interestingly, the study did not observe a strong support between leisure air travel and work-related air mobility, contrary to expectations. Instead, it found that having international projects played a significant role in determining the need for work-related air travel, emphasizing the necessity for face-to-face meetings in collaboration with countries of the global south.

Another interesting finding is that there is a group of academics, who would prefer travelling by land instead of flying due to environmental concerns, but face rejection from the university. Consequently, it is evident that merely advocating for increased land-bound mobility within universities, as recommended by previous studies, falls short if the institutional structures do not support this approach. The study highlights the need for universities to update their travel guidance

to favour land-bound travel. The study found that academics had experienced envy when their peers travelled by land, contradicting the "fear of not flying" phenomenon found in previous studies.

This study highlights that individuals should not bear the sole responsibility for deciding whether to fly or not. The role of academia is perceived to be spreading knowledge and acting upon the knowledge. Currently, academics recognise a contradiction regarding sustainability between knowledge and action both in the actions of individual academics and the actions of the university.

This study has identified that the criteria of funding bodies for international collaboration are outdated since they do not recognize collaboration that does not require physical travel. Yet to receive funding for a project, international collaboration is often required, thereby contributing to the increase in academic air travel.

Despite the push to the virtual accelerated by the COVID-19 pandemic, this study showed that academics still value face-to-face conferences over virtual ones, particularly for networking purposes. This resistance to virtual conferences suggests that virtual conferences becoming a new norm, is not desired by academics. The members of ITC were more positive towards virtual conferences than participants from other faculties possibly due to their affinity for technology. Virtual conferences are seen as a cheap alternative to face-to-face conferences, which could result in reluctant views.

The study also identified positive attributes of virtual conferences: their accessibility and cost-effectiveness contribute to greater inclusivity, which aligns with previous research.

7.2 Implications

Scholars have a consensus about the steps to promoting more sustainable academic mobility. In this study, the participants provided suggestions to promote sustainable academic mobility from the viewpoints of individuals, academia, funding structures, and technology. This study has found that promoting sustainable academic mobility practices requires collaboration and changes at various levels, including legislation, funding bodies, academic institutions, and individuals.

Based on this study, here are 7 key suggestions for academia to promote sustainable mobility practices:

1. **Updating the mobility guidance** - There exists a group of academics, who are interested in land-bound travel, but face rejection of their travel plans due to the increased travel time and costs. However, the increased travel time could be allocated to working.

2. **Providing more data** - Academia, as a place of high knowledge, should make decisions based on relevant data. The magnitude of the emissions caused by academic air mobility can be hard to grasp without contextual references to, for example, tourism.
3. **Advocating for revised funding requirements** - Encouraging funding bodies to update their criteria and structures to support more sustainable travel practices in academia.
4. **Making experiments with virtual conferences** - Currently virtual conferences have failed to meet the social needs of academics travelling to conference. There is a need for diverse experiments in virtual conferencing to enhance the experience.
5. **Supporting attendance to the virtual conferences –** Supporting could involve for example, covering the attendance fees.
6. **Setting guidance on whose travelling is preferred** - The early-stage researchers benefit more of the international gatherings, since their network is still forming. Therefore, their travel should be favoured.
7. **Promoting task consolidation:** Encouraging academics who are scheduled to travel to consolidate multiple responsibilities and make efficient use of their travel time. Once they travel, they should be able to accomplish multiple tasks during a single trip, reducing the need for multiple annual journeys.

7.3 Future work

This research raised many questions in need of further investigation. Participants expressed a desire to study the extent of academic air mobility. Future studies could investigate how big of an environmental impact academic air mobility has in Finland, especially in the time after the COVID-19 pandemic. While there are existing calculations and research on the topic, they appear to have limited reach among academics. Furthermore, studies could explore the most effective ways to present information to academics who may be hesitant to change their mobility patterns. This data should be used in decision-making in addition to strategy and made visible to people working in academia.

The study included academics whose areas of expertise were focused on sustainability and who had already thought about the issues related to academic mobility. Additionally, it would be valuable to explore the viewpoints of academics who do not specialize in sustainability to get a more comprehensive understanding of the matter.

Future studies could delve into informal networking within virtual conferences. The research could aim to understand how these virtual interactions compare to in-person networking and how they can be further developed to enhance collaboration and knowledge exchange.

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9 APPENDICES

9.1 Appendix 1 Email invitation to participants

Hello (Name),

I am writing to invite you to a thematic interview about academic air mobility. I am writing a master's thesis with a working title: **Towards Sustainability in Academic Air Mobility in The Digital Age, for the programme of a Sustainable Digital Life at Tampere University.**

I am interviewing researchers from different levels of seniority and expertise from different areas of sustainability. Your experiences and insights would be valuable to my research.

If you choose to participate, you will partake in a thematic interview about your experiences of academic air mobility and related topics as a researcher in your faculty at Tampere University.

The interview will take approximately an hour and can be done via Teams or face-to-face in the preferred location in Tampere. However, if the timetable is insufficient for you, an alternative time can be agreed upon. Depending on your chosen format of the interview, the recording will either be done via Teams or a mobile phone. Participation is voluntary, and all the information will be kept confidential and anonymous. The recording of the interview will be stored in Tampere University's cloud service OneDrive until the thesis is accepted.

The results of the research will be visible in my master's thesis once it is published in Trepo.

Best Regards,

Peppi Borgenström

Below is an abstract about the topic studied.

Abstract: Towards Sustainability in Academic Air Mobility in The Digital Age

The research aims to examine "How is academic air mobility understood from the sustainability perspective in the digital age?

A complex set of incentives supports air mobility in academia. The globalisation of modern work life is one significant factor that surges academic air mobility. Today, most academic air mobility is conference related. Conferences are great networking opportunities and offer co-presence, which is fundamental for social relationships. However, the scientific value of international gatherings is questioned by critics.

Climate change is a super wicked problem, without a central authority to turn to, and therefore people turn to academia due to a high level of knowledge. Work-related travelling covers a large share of the overall emissions of universities. Flying is known to be a particularly emission-heavy mode of travel, yet academics even with high knowledge often choose to fly to the desired destinations and academics are among the most aeromobile groups in society. The culture of academic air mobility is now being challenged, both within and outside academia, as climate change becomes a pressing issue.

The COVID-19 pandemic had an impact on the entire society, including academia. It not only seized global travel but also prohibited physical co-presence, which is often the primary reason for academic travel. Before COVID-19 academics have been reluctant towards virtual communication channels. The pandemic has accelerated the shift towards virtual communication channels in academia, but it remains unclear how these changes are perceived.

9.2 Appendix 2 Interview questions

Academic air mobility

1. How important do you think work-related travelling is for professional advancement in your field?
2. Have you combined work and leisure travel; can you describe how?
3. In the last year, describe for what kind of academic purposes have you have flown?
4. Has the COVID-19 pandemic changed your needs for flying for academic purposes?
7. What kind of advantage has academic flying brought to your career? What about personally?
8. Has flying for academic purposes caused any negative impacts on your career / personal life?

Policies & Decision making

9. How do you typically fund your academic travel?
10. Who makes the travel decisions? Can you describe the process?
11. What kind of restrictions on flying and travelling have come from the university?
12. How effective you consider these policies are?

Sustainable development

13. What kind of sustainability issues can you uncover from the topic of academic air mobility?
14. How do you perceive the environmental impact of flying for academic purposes?
15. Have you made conscious choices to reduce flying, Describe what kind.
16. Besides air travel, have you used other travel modes to get to the desired destination?
17. Have you participated in an academic event that prioritized sustainability, can you elaborate? Which event and how the sustainability was considered?

18. What kind of role should academic organisations and funding bodies take in promoting more sustainable travel practices in your opinion?

International Conferences

19. Globally, how widely have you attended to international conferences, and which conferences?
20. Have your conference habits been affected by the COVID-19 pandemic, how?
21. On what basis do you choose international conferences you participate?
22. What kind of benefits has international conferencing provided you?
23. What is your experience with attending international virtual conferences?
24. On what basis do you choose international conferences you participate?
25. How long do you typically participate in an international virtual conference compared to f2f conference?
26. What kind of advantages do you perceive international virtual conferences have over f2f conferences?
27. What kind of disadvantages have you experienced on international virtual conferences over f2f conferences?
28. How do you perceive the academic networking opportunities in an international virtual conference compared to f2f conference? Can you explain.
29. How important is physical copresence in conferences?

Suggestions how to make academic travelling more sustainable.

30. In your view, what steps can individual academics take to make academic travelling?
31. What innovative approaches or technologies do you think can be utilized to promote sustainable academic travelling?
32. Did I ask everything; do you want to add anything?"
33. How did this interview feel as an experience?