Flying towards a Carbon Neutral future

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ABSTRACT

Climate change is a widely accepted phenomenon that has led to and will lead to more catastrophic consequences such as extreme weather conditions, erratic snow schedules, and extreme temperature to name a few all over the globe. The aviation industry is a major contributor to climate change and is likely to contribute more carbon emissions given the rate at which globalization is spreading. While there is a lot of information about what should be done to reduce and neutralize emissions, there is very little information about who should be held responsible for it. I look at agents within the aviation industry to assign responsibility to them based on the three principles of distributive justice. The research helps conclude that it is possible to apply the principles of distributive justice in the aviation industry and justify assigning responsibility to the agents with financial legal entities based on the principles. The thesis helps introduce the aviation industry through a perspective that takes the responsibility to neutralize carbon emissions using carbon offsetting into account.

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INTRODUCTION

What is Climate Change

Climate change can be described as the change in the average weather conditions of an area over many years. The rapid change we see now is a direct result of humans using oil, gas and coal for their homes, factories, transport etc. The world is now about one point two degree Celsius warmer than it was in the 19th Century - and the amount of CO2 in the atmosphere has risen by fifty percent. The rate at which temperature is rising must be slowed to avoid the worst possible consequences of climate change ("Climate change has different effects “, 2021). While there are several methods to reduce carbon emissions, carbon neutralization is highly debated and should be implemented in addition to emission reduction for maximum benefits.

Aviation industry and climate change

The aviation industry can be described as one that includes almost all aspects of air travel and covers activities that help facilitate it. It is the safest and most efficient mode of transportation to cover long distances. No alternatives exist to cover long distances and geographical barriers, making flying from one place to another a necessity for some. It offers relatively affordable transportation services and promotes cultural and social ties (Karaman et al, 2012, p. 158). Air travel accounts for two percent of artificial CO2 emissions and one can assume that this proportion is set to grow in the future. The authors also argue that if no changes are made, this ratio is expected to increase to twenty two percent by two thousand fifty (Kim and Hyun, 2021, p. 1082). Since most people have a purpose for flying and very rarely fly just for the sake of flying, it is difficult to prevent people from flying altogether. While some may argue in favour of applying a limit to the number of times an individual can travel, the question around the morality of preventing people from flying is also unclear and beyond the scope of this thesis.

For this thesis, the aviation industry will be treated as consisting of passengers, airports, and airlines. Passengers can be described as those who travel from one place to another by availing services offered by airlines and airports. While airlines mainly provide a means to cover large distances over short periods of time by selling tickets to passengers, airports on the other hand are the physical locations where airplanes land and take off, are parked, and maintained. Thus, while

passengers will be treated as social entities units, airlines and airports will be treated as financial legal entities respectively.

Thus, a framework or committee should be set up to monitor the neutralization of emissions that are created by the aviation industry. Given the importance of the aviation industry in the contemporary and globalized world, it is important to explore the distribution of responsibility to neutralize emissions within the aviation industry. Even though Alamdari and Brewer (1994) suggested the increasing importance of the principles of distributive justice such as the polluter pays principle in the aviation industry, very little literature is available (p. 158). Thus, in this thesis, I will focus on carbon emission neutralization in the aviation industry to add to the literature gap that exists in the sphere of responsibility distribution in the industry.

Measures to control climate change

Researchers are already looking into possible alternative measures to reduce the number of emissions and considerable progress has been made in increasing fuel efficiency of aircrafts. Green technology is one such example. Although it is a relatively new field, it has received a lot of attention in the research community and academic sector because of its promising potential. The main objective is to ensure safety of the earth by providing potential solutions to environment and global energy crises across the globe by using green technology for instance. Green technology can be explained as using science and technology to produce clean services (Aniyikaiye et al., 2021, p. 33). Green tax is another such alternative that has been pushed by researchers. Hyun and Kim argue that the aim of green taxes is to raise awareness on environmental policy and achieve public financial reform (2021, p. 1083). In addition to this, several initiatives are taken specifically by airlines to reduce carbon emissions. For instance, in France and the Netherlands environmental aviation taxes are applied to passengers in the aviation industry. The “Fly Responsibly” campaign is another example of an initiative taken by KLM The Royal Dutch Airline to reduce carbon emissions. This campaign encourages travellers to travel light which in turn diminishes emissions by reducing the amount of fuel used and burnt by the aircraft. United Airlines introduced a carbon offsetting program that calculates each traveller’s carbon footprint to neutralize their emissions (Hyun and Kim, 2021, p. 1084).

Finally, the European Union has also made initiatives to reduce carbon emissions by creating the Emission Trading System (ETS) which works on the cap-and-trade principle. The European Commission explains the ETS as setting a cap for the maximum number of emissions. This cap is reduced over time to ensure that total emissions eventually fall. This system also allows all member countries to trade emissions with one another. For the aviation industry, participating in the EU ETS is mandatory for flights operating between the European Economic Area until December 31, 2023. This allows airlines to limit their emission levels by trading emissions when they have excess or need more. Moreover, in 2016, the International Civil Aviation Organization agreed on a Resolution for a global market-based measure to address global carbon emission contributed by the aviation industry as of 2021. The Carbon Offsetting and Reduction Scheme for International Aviation or CORSIA, aims to stabilize CO2 emissions at 2020 levels by requiring airlines to offset the growth of their emissions after 2020 (European Commission, n.d.).

Although some may argue that green tax and carbon offsetting, i.e., penalizing agents for polluting, are the same in practice; however, it is important to understand the difference. While in carbon offsetting, the fee goes to those who run the offsetting projects, the revenue collected from green tax goes to the government. While green taxes can be mandatory, offsetting projects are voluntary and can be seen as business models. Additionally, in reference to the efforts, it is also important to understand the difference between emission neutralization and emission reduction since they are often used interchangeably (Suzanna, 2020). While emission neutralization refers to counterbalancing carbon emissions, emission reduction implies cutting down the number of emissions created in the first place (Sphera, 2020).

Future of aviation industry

Given the rate at which globalization is spreading, the aviation industry is constantly growing. This is especially because there is no close alternative to how airplanes can cover large distances over short periods of time. Moreover, according to the number of emissions reported by the tourism industry in 2008 by the World Tourism Organization (UNWTO), air transport is expected to increase to fifty-three percent by 2035 (Huyan and Kim, 2021, p. 1082). The authors also argue that airlines have a great impact on the development of modern society as a part of the modern

transport system, thus reiterating the importance of the aviation industry (p. 1083).

As the aviation industry becomes increasingly important and irreplaceable, it becomes even more important to address the problem around carbon neutrality and who is responsible for neutralizing these emissions. I argue that while it is still necessary to develop a framework/committee that holds agents accountable for the emissions they create, it is important to assign responsibility to non-state agents within the aviation industry in the first place. I will do this by exploring the three principles of responsibility distribution to better understand how the agents benefit, are made more able, and create emissions.

To fit within the scope of this thesis, not all agents within the aviation industry will be looked at. Passengers, airlines, and airports will be looked at as agents to which responsibility will be assigned. These agents will be further divided into different categories based on their financial capabilities, their direct or indirect contributions to the emission levels, and the benefits they receive from the activity.

The thesis works towards answering the research question how should the *principles of distributive justice be used to assign the responsibility to offset in the aviation industry*? Sub questions surrounding the applicability of the principles of distributive justice in the aviation industry and the efforts and measure that have already been made to reduce emissions will also be explored. The thesis will start by assessing the applicability of the principles of distributive justice in the aviation industry whilst looking at the effect of the emissions on the environment. Next, the applicability of the principles of distributive justice on the specific agents will be analysed. Finally, the thesis will evaluate which criteria reflects the benefits that agents receive, their ability to pay, and the number of emissions they release. I use this to determine the degree to which the responsibility to offset should be assigned to the agents. The thesis finally concludes by finding that the criteria that satisfies all three principles of distributive justice should be used to assign the responsibility to neutralize carbon emissions to passengers, airlines, and airports respectively.

Applying principles of distributive justice to the aviation industry

Although several efforts have been made to neutralize and reduce emissions in the past, there is still very little accountability around the neutralization of emissions within the aviation industry specifically. While passengers are provided with an option to offset their emissions, many may refrain from doing so given the lack of clarity around the offsetting process and benefactors. In the case of the European Union Emission Trading System, for instance, countries are part of a trading system which helps regulate emission levels (European Commission, n.d.). Since most initiatives taken to reduce and neutralize carbon emissions focus on states, to fill the gap in literature, this thesis focuses on non-state agents within the aviation industry instead.

For the purpose of this thesis, the aviation industry refers specifically to the civil aviation industry. Furthermore, the agents that will be considered within the aviation industry are limited to airports, airlines, and passengers. For the sake of uniformity, these agents will also be treated as financial legal entities because the financial nature of carbon offsetting forces the discussion to focus on profit and loss.

Principles of responsibility distribution

To address the question of who should bear the burden of dealing with the emissions created that lead to climate change, authors have introduced three principles of distributive justice. The different principles of distributive justice are the Ability to Pay Principle, the beneficiary pays principle, and the Polluter Pays Principle. As the names suggest, these principles focus on assigning responsibility to agents who are financially able to, benefit from the activity, or are directly responsible for the emissions created respectively (Page, 2012; Huseby, 2015; Heyward, 2021).

Polluter Pays Principle

First of all, the Polluter Pays Principle argues that actors who create carbon emissions are responsible to neutralize their contributions and pay for adaptations (Caney, 2010, p. 211). While many may criticize the Polluter Pays Principle for applying to entities with a finite lifespan, in the

aviation industry, airports and airlines are financial legal entities with an infinite lifespan. While the human beings in the positions have finite tenures and lifespans, they keep replacing each other thus continuing the financial legal entity of airlines and airports. In this context, airlines and airports can be best explained as corporations that cannot die and will thus exist for several human lifespans. Even though the person in charge will change, the organization remains the same making it possible to assign responsibility over several decades as well. Thus, the idea is to assign direct responsibility to the administration of the corporations i.e., airports and airlines. The Polluter Pays Principle is difficult to apply to passengers in isolation since it does not take passengers who have already died into account. Thus, the following chapters will look at how passengers should be assigned the responsibility to offset carbon emissions.

Caney (2010) argues that the Polluter Pays Principle applies to emissions that stem out of human activities (p. 211). While airports and airlines are corporations and have legal personalities, as corporations they perform human activities. Thus, one can argue that this puts airlines and airports in a grey area where they are categorized as corporations and also perform human activities. In the case of passengers as well, they perform human activities. This makes it possible to apply the Polluter Pays Principle to the aviation industry as a whole as long as airports and airlines are looked at as having legal personalities throughout time.

Ability to pay principle

Next, the Ability to Pay Principle argues that those who have the resources must pay in proportion to their abilities (Page, 2012). In the context of the aviation industry, those actors who have the ability to neutralize carbon emissions must pay and work towards neutralizing those emissions. The Ability to Pay Principle is based solely on financial abilities and does not take the actor's contribution to global carbon emissions into account (Caney, 2010, p. 213). This can be seen as unethical and rejected by people for being unfair. For instance, it is morally unjust to assign the responsibility to neutralize emissions to an airline that creates relatively less emissions solely because they are financially better off than the other airlines.

Other objections attached to this principle include not taking efforts made by agents to reduce

carbon emissions into account and assigning responsibility solely based on financial abilities instead. This includes assigning equal responsibility to neutralize global emission levels to those who use carbon reduction tools like clean technology (Caney, 2010, p. 216). This in turn could demotivate agents who are emission conscious to not take those steps since they would be assigned the same responsibility to reduce global carbon emissions either way. Thus, while the Ability to Pay Principle can help assign responsibility to neutralize emissions, it should not be done in isolation. Factors such as the quantity of emissions made in the first place should be taken into account.

Beneficiary Pays principle

Page (2012) advocates for the responsibility to neutralize emissions to be assigned based on the benefits received from activities that contribute to climate change from the past and present (pp. 302-303). The Beneficiary Pays Principle argues that if states benefit from activities within or beyond their border at the cost of one or more states, the beneficiary must surrender the benefits up to a point that the benefits don't put the other state (or states) in a disadvantaged position (Page, 2012, p. 306). This principle can be modified by looking at the agents within the aviation industry instead of states and be applied to the aviation industry.

Page explains that the Beneficiary Pays Principle can be seen as a way to hold those who benefit from the aviation industry, by releasing emissions, responsible and accountable for their contributions (2012, p. 306). Especially because airports and airlines are seen as financial legal entities, it is easier to assign the responsibility to offset based on their financial benefits. For passengers, material benefits can be looked at specifically in terms of the purpose of their trip. While the purpose of different trips should also be factored in, addressing the morality around it is beyond the philosophical scope of this thesis.

Thus, as long as airports, airlines, and passengers benefit from activities that fall under the aviation industry, they can be assigned the responsibility to neutralize carbon emissions. The responsibility assigned to the agents is proportional to the extent to which they have benefited from the activities (Page, 2012, p. 3016). One can argue that the Beneficiary Pays Principle not only holds the

privileged responsible based on their abilities, but also creates a sense of accountability and responsibility among those who benefit as a result of the contributions.

Huseby (2015) criticize the Beneficiary Pays Principle for potentially overlooking beneficiaries who are dead (p. 213). However, airlines and airports are treated as corporations who are legal entities that go beyond human lifespans. While this criticism holds true in the case of passengers, the responsibility to neutralize the emissions created by those who have died can be transferred to airlines. This can be based on the assumption that airlines benefited from the profits they made by providing services to passengers who have already died.

Thus, if applied in isolation, the principles can be seen as unjust and could do more harm than good. Within the aviation industry, these principles should be used collectively to assign responsibility to neutralize carbon emission levels especially because in this thesis, I look at agents as financial legal entities instead of analysing the sub agents of the aviation industry.

Carbon offsetting

Carbon offsetting is a highly contested method to neutralize emissions and can be explained as pay a fee to invest in projects to reduce emissions created because of specific activities. Broome (2012) describes the act of offsetting as ensuring that for every unit of carbon emission created, the agent also subtracts a unit from it.

Spierkermann (2014) argues that offsetting practices rest on the motivations of the agent who offset making offsetting as a practice relatively unstable (p. 914). Adding to this, the voluntary nature of carbon offsetting makes it unpredictable. Finally, the author also argues that current offsetting prices are low, which can be seen as a problem (p. 915). Another criticism presented by Broome (2012) highlights that while offsetting may slow the progress of climate mitigation, it will only affect the actions of the governments. However, the thesis focuses on agents as non-state financial legal entities. Moreover, the author argues in favour of assigning offsetting responsibilities to individuals.

CORSIA

A specific example based on carbon offsetting in the aviation industry is the Carbon Offsetting and Reduction Scheme for International Aviation (CORSIA). It is the first global framework to limit and neutralize carbon emissions produced by states in the aviation sector which will be mandatory by 2027 (Maertens and Scheelhaase, 2020, p. 109). Although carbon offsetting is criticized for being inconsistent and unaccountable given its voluntary nature, CORSIA could help solve the inconsistency given its mandatory nature. This framework could also help address concerns around low participation and low prices that are highlighted by Spiekermann (2014). Moreover, especially since CORSIA was developed recently and specifically for the aviation industry, it makes carbon offsetting an interesting method to analyse responsibility distribution to neutralize emissions.

From the increased implementation of carbon offsetting in the form of different schemes in the aviation industry, one can infer that making offsetting mandatory and assigning responsibility to offset in a structured manner helps overcome the criticisms attached to it. Assigning the responsibility to offset not only creates more awareness about offsetting as a practice but also assigns specific roles to different agents. This helps overcome the problems created by the voluntary nature of offsetting and the miniscule offsetting fee attached to it.

Thus, the thesis further explores how the principles of distributive justice should be used to assign the responsibility to offset emissions in the aviation industry.

Applying principles of distributive justice to agents in the aviation industry

The aviation industry contributes to air pollution through a variety of sources such as aircraft engines, ground transportation, refuelling, and power generation equipments. Karaman, Yildiz, Zafer, and Kavik (2012) argue that technological advancements, operational measures, and air traffic management can improve fuel efficiency and reduce the amount of emission that are created. The authors also argue that current emission levels can be reduced more by switching to biofuels derived from sustainable oil crops such as jatropha, camelina, and algae or from wood and waste biomass instead. Biofuels test flights carried out by seven airlines have proven that biofuels work and can be mixed with existing jet fuel (2012, pp. 160-162). Several other efforts have been made to reduce emissions created by the agents, for instance, using electric vehicles to transport luggage from the airport to the aircraft (Karman et al, 2012, pp. 163-164).

Agents within the aviation industry

Passengers

Passengers directly benefit from air travel and add to the global emission levels depending on the luggage they carry since it increases the amount of fuel burnt while flying in addition to general emissions released by the engine (Hyun and Kim, 2021, p. 1084). Although passengers may not benefit financially directly from air, they benefit materialistically as a result of the easy air travel and should be held responsible for the emissions that are created as a by-product of the journey.

Airports

There are several models around which airports are developed. While some are owned by the government and fall under specific ministries, for others, the main control remains with the government. Some airports are also owned by corporations such as the Changi Airport in which individual entities are created for planning and operating an airport. A third type is the not-for-profit model which is used for regional and community airports while offering other important services. Service contract is another model that allows publicly owned airports to buy private capabilities such as airport baggage handling services. Management contracts on the other hand means that the ownership of the airport remains with the public sector and contractors can be

appointed to perform specific tasks or run the entire airport. The public private partnership model transfers most risky responsibilities such as financing, executing, and operating to the private sector by signing long term contracts. Lastly, the majority equity sale model transfers control from the government to the private sector. This model can be used when the government has a financial incentive to monetize its investments (De La Pena, 2018). However, for the purpose of this thesis, only airports models that can be treated as financial legal entities and fall under the non-state owner category will be looked at.

Airlines

While airlines in civil aviation can exist as public and private entities, this thesis will look at non-state airlines that can be treated as financial legal entities. Airlines that are wholly or partially run by governments are describes as public airlines, while airlines covered by corporations and shareholders are defined as private airlines. Sometimes, the distinction is not very clear as in the case of British Airways, for instance. Although it was once state owned, British Airways is now a private airline (Curran, n.d.). Thus, for the purpose of this thesis, airlines that are not wholly or partially run by the state will be looked at.

Principles for distributive justice for agents

Polluter Pays Principle

First, the Polluter Pays Principle holds the polluter responsible to neutralize their contributions (Huseby, 2015). However, there are a large number of individual components within the agents that fall under the aviation industry. However, assigning the responsibility to neutralize emissions to individual agents could lead to the collective action problem as well. As Alamdari and Brewer (1994) highlight, the Polluter Pays Principle can be seen as an appropriate justification for assigning taxation responsibilities. However, it is difficult to use this principle to assign the responsibility to offset specifically as is the aim of this thesis. This is because the Polluter Pays Principle alone cannot be used to differentiate assignment of responsibility between different agents like employers and employees. Thus, for the purpose of this thesis, the collective agents like airports and airlines that could ideally be further divided into individual components will only be looked at as corporations with financial legal personalities and not be divided further.

Ability to Pay Principle

Next, the Ability to Pay Principle distributes responsibility based on financial capabilities (Caney, 2010). While this is partially possible for the aviation industry given the financial diversity within airports and airlines, it still does not take factors such as direct and indirect responsibility into account. For instance, if an agent is financially able but opts for less pollutive methods to perform their responsibilities (such as biofuels, electric vehicles for on ground transport etc.), it is unfair to assign responsibilities to reduce emissions to them. It is not only unjust but also counterproductive as if an agent is producing less emissions, still having the responsibility to offset may demotivate agents to reduce their emissions in the first place.

The Ability to Pay Principle further highlights the importance of gauging the number of resources the agents have. Agents with more resources should contribute more to neutralize the emissions (Page, 2012, p. 305). To add to this, Page (2012) also argues that based on the beneficiary pays principle, the burden to neutralize emissions should be divided within actors based upon their involvement in the past and present (p. 303).

From this, one can argue that the burdens should be divided among agents within the aviation industry based on their contributions in the past and present keeping their consequent abilities in mind. The benefits they receive as a result of participating in the activity that leads to the creation of those emissions should also be considered while assigning the responsibility to offset.

Beneficiary Pays Principle

Finally, Huseby (2015) argues that the Beneficiary Pays Principle can be used to assign responsibility in situations where there might otherwise be none as in the case of responsibility to offset for non-state agents (p. 219). In case of the aviation industry, there is no mandatory responsibility to offset emissions for non-state agents despite the large number of emissions that have been created in the past and continue to be created. While frameworks like the European Union Emission Trading System exist to keep emission levels in check will be mandatory for states in 2027, there are no specific frameworks that apply to non-state agents in the aviation industry. Broome (2012) argues that offsetting helps agents reduce climate injustice by offsetting and

neutralizing the emissions they create. To add to this, Becken and Mackey (2017) use International Air Transport Associations description of carbon offsetting to highlight that within the aviation industry, airline passengers and corporate customers can neutralize their proportion of an aircraft's carbon emissions on a particular journey by investing in carbon reduction projects. They also help clarify that in this context, compensating and neutralizing refers to activities that prevent, reduce, or remove greenhouse gas emissions from being released into the atmosphere of one location to compensate for emissions occurring elsewhere (p. 72).

Moreover, there is a lot of ambiguity around the topic of emission neutralization and most actors do not have enough information about emission neutralization as well as emission reduction. This can potentially be solved by looking at different agents within the aviation industry through a lens that accounts for all principles of distributive justice. Thus, in the context on offsetting, the Beneficiary Pays Principle should hold agents who benefit from the activity responsible to neutralize their emissions. In the aviation industry, for instance, different agents are beneficiaries in different contexts. The passengers benefit because they are able to travel long distances in short periods of time while the airlines benefit monetarily. Other agents like airports benefit through the profit they get from leasing store spaces and lounges for instance.

Efforts to reduce emissions

Different ways to neutralize and reduce carbon emissions range from offsetting and green tax to emission trading. This section will focus on the different ways to neutralize and reduce carbon emissions. Becken and Mackey (2017) argue that the aviation industry is very conscious of the emissions it creates and aware of the consequences it has on the environment and climate change.

Several agents within the aviation industry also take steps to reduce the emissions they create by adopting sustainable practices, biofuels, and carrying less luggage. In addition to this, some agents also participate in carbon markets, trading emission schemes (EU ETS), green tax, and voluntary carbon offsetting. However, the progress is very often hampered by different level policies, inconsistent measuring and reporting of emissions, and lack of commitment and motivation (Becken and Mackey, 2017, pp. 71-72). In addition to this, private companies such as those that fall under airports and airlines, also engage in voluntary efforts to make positive changes (also

known as Corporate Social Responsibilities) to reduce the amount of carbon emissions created in the first place.

Taxes and technologies

Green tax is a method to neutralize carbon emissions in a way that raises awareness on environmental policy as well as achieve public fiscal reform. Kim and Hyun (2021) conducted a study on nudging travellers to pay a green tax in the aviation industry. The study helped conclude that it is possible to help travellers' increase their willingness to pay green tax for the aviation industry, share the burden of environmental financial support, and to raise environmental issues with passengers (p. 1094). However, since the study focuses solely on South Korea, there is not enough data to justify levying green tax globally as an attempt to neutralize carbon emissions. However, it is worth researching and looking into (Kim and Hyun, 2021, p. 1094).

Other efforts to reduce emissions include taxation plans and technological advancements. Alamdari and Brewer (1994) talked about several regulatory interventions to reduce the emission levels, especially resulting from the aviation industry. One of these interventions is based on taxing those who created the emissions. By taxing the actors that create carbon emissions, the authors argue that the taxation regulation is based on the Polluter Pays Principle (1994, pp. 151-152). However, the tax regulation can be further criticized for not being able to tax actors for their old travels and not taxing those who have died already.

The authors also argue that since technology development only offers a partial solution, the Polluter Pays Principle should be used to further alleviate the problem within the aviation industry (Alamdari & Brewer, 1994, p. 158). For instance, technology can help reduce emission creation by creating alternatives such as electric on ground transportation that release less emissions. Thus, from this one can infer that the principles of distributive justice can be used as a combination with other sustainable and frugal initiatives.

Offsetting

Some may also view offsetting as permission to create emissions. However, since offsetting will

reduce emissions, individuals may feel morally entitled to polluting in the first place. However, given the lack of alternatives to cover large distances, the aviation industry is increasingly becoming a necessity rather than a luxury given the rapid rate at which globalization is spreading. This implies that people are going to fly with and create carbon emissions even if it worsens the current climate scenario. While several individual cars would also create a lot of emissions, trains could be used as alternatives for short distances. However, the vastness of the globe makes it harder to cross continents by trains and traveling by water is not always an option given the large distance. Thus, aviation is the quickest and efficient method of transport to cover large distances.

Given the number of frameworks using carbon offsetting to neutralise emissions created by states in the aviation industry, the thesis will use carbon offsetting as the method to neutralise emissions while assigning responsibilities to non-state agents within the industry.

Assigning the responsibility to offset emissions to agents based on specific criteria

This thesis advocates for the use of carbon offsetting to neutralize emissions even though some may suggest and argue for adopting measures to cut carbon emissions altogether. However, it is the government's responsibility to adopt policies that make emission reduction possible. This thesis focuses on the application of principles of distributive justice to non-state agents within the aviation industry. Moreover, it would be most successful to apply carbon offsetting in addition to carbon emission reduction. This will help reduce current emission levels while neutralizing carbon emissions as and when they are created. Policies to reduce carbon emissions are the government's responsibility and do not fall within the scope of this thesis. This section will focus on shortlisting criteria's that should be used to justify the responsibility to offset based on the principles of distributive justice.

Passengers

Passengers are treated as individual units for this thesis and influence things like aircraft sizes, timings, and baggage limits (Wojahn, 2002, p. 144). Broome (2012) highlights that just one extra seat could also push the boundary and lead to transition to big aircrafts that consequently emit more. Moreover, for individuals, Broome (2012) argues that miniscule actions also add up to serious harm. Since passengers benefit from the flight, they are morally obligated to neutralize the emissions they create each time. As long as the actions of an individual add to the global emission levels that lead to climate change thus endangering the lives of others, they must neutralize their emissions.

The principles of distributive justice can distribute responsibility to neutralize emissions to passengers in different contexts. Firstly, passengers benefit materialistically from the flight by covering large distances over short periods of time and adding to the emission levels. While different people travel for different reasons, eventually all passengers benefit from it by reducing travel time and increasing efficiency. The purpose behind traveling could vary however gauging the morality and permissibility around traveling for different reasons is beyond the debate of this thesis. Next, while it may be obvious that passengers add to existing carbon emission levels as a result of emissions released by aircraft engines, factors like luggage weight, personal transport to

and from the airport also add to it. Finally, in terms of financial ability, some passengers are more economically and financially able than others. An indication of this could be the ticket they purchase i.e., first class, business class, or economy class. While this may be used as a financial indicator, the type of ticket purchased can also indicate the level of emissions they have contributed. For instance, some airlines offer higher luggage allowances to passengers traveling business class as compared to those flying economy which affects the amount of fuel that is required to fly (Hyun and Kim, 2021, p. 1084). This in turn influences the number of emissions that are created as a direct result of flying. Moreover, on flight services received by passengers also depend on the ticket they have bought and based on that, some benefit more than others (Wojahn, 2002, p. 156).

Although several other factors like the nature of one's travel (business, vacation, visit family, migration) could be introduced in these contexts, given the scope of this thesis, only the aforementioned factors will be considered. However, in the case of passengers, the responsibility to offset emissions should be distributed to passengers based on the tickets they have purchased.

Airports

Ringham and Miles (2018) highlight the influence of airports on noise pollution in neighbouring areas (p. 1044). This can be extended to how airports contribute towards global carbon emission levels. Ground handling services, such as parking airplanes, air cargo, and fuelling, all happen within the premises of the airport and the responsibility to offset can thus be assigned to airports.

Since there are several models based on which airports function, airports are also treated as financial legal entities. The difference between profits and salaries applies here as well given the several components that constitute airport organizations. While airports pollute as a result of ground handling services, they benefit financially from user fees associated with aircraft parking and storage, rent, landing fees, fuel flowage fees. The financial abilities of airports can be gauged by looking at the number of airlines they house and are associated with since airlines contribute to a huge proportion of an airport’s revenue in the form of maintenance and storage (Airport-Generated Revenue or Operating Revenue, n.d.). This not only explains their financial abilities, but also explains how much they pollute and benefit respectively.

Thus, airports should be assigned the responsibility offset based on the number of airlines they are associated with. The more airlines they have relations with, the higher their responsibility to offset should be.

Airlines

While airlines are also further composed of several individual units, for the purpose of this thesis, airlines are treated as legal and financial legal entities. Cui et al (2022) highlight that given the most recent consequences of COVID19, 2027 will be the peak of carbon emissions. They argue that this gives airlines time to achieve capacity optimizations, such as fleet renewal and fuel efficiency improvements (p. 11). As airlines work towards reducing emissions, the responsibility to neutralize emissions should also be distributed simultaneously.

The principles of distributive justice distribute the responsibility to neutralize emissions that can be applied to airlines in different contexts. Given their financial legal entities, airlines benefit as a result of revenue from airline alliances and frequent flier miles (Genter, 2020). While airlines consist of components such as on ground staff, pilots, and crew who directly perform specific activities that create carbon emissions, they are employed by airlines and contracted to fulfil those responsibilities. In this context it is important to distinguish between profits and salaries. I find that salaries can be described as attaching value to labour as legitimate benefits or morally permissible benefits. However, for the purpose of this thesis, financial benefits received on top of salaries will be understood as profits. The profit earned by airlines as financial legal entities also makes them more financially able to offset the emissions they create. However, there is a lot of variation in the financial capabilities of airlines which should be accounted/adjust for while assigning the responsibility to offset.

In addition to this, airlines are responsible for emissions such as carbon dioxide, water vapor, nitrogen oxides, sulphur dioxide, and aerosols that are released into the atmosphere as a result of the aircraft's engine (Borella et al, 2021, p. 1). For instance, while pilots fly the airplane when it releases emissions, as concluded earlier, a pilot is contracted to perform this task which protects them from direct responsibility assignment.

Thus, the emissions created by airplanes largely depend on the number of flights scheduled per year. Airlines should be assigned responsibility based on the number of flights they schedule per year since that is not only how they add to the emission levels directly but also how they benefit financially whilst becoming more able.

Responsibility distribution

Given the diversity within the agents of the aviation industry, it is not possible to distribute responsibility to offset emissions based on only one principle of distributive justice. While different principles can be applied for different components within the agents, this thesis looked at passengers as social entities and airlines and airports legal financial legal entities which resulted in looking at specific criteria's that represent all three principles of distributive justice. Heyward (2021) also elaborates upon the debate that encourages using the principles of distributive justice as a combination of one or more principles. Furthermore, she argues in favour of applying the Beneficiary Pays Principle to the combination of the Ability to Pay Principle and Polluter Pays Principle (p. 126).

Furthermore, airlines, airports, and passengers overlap with each other in some contexts such as transportation of luggage, on board services, and on ground service. Based on this, one can assume that airlines and airports are already offsetting for the emissions created by passengers who have died since the emissions by passengers made airports and airports financially better off, made them more able, and also made contributed to them polluting in the first place.

CONCLUSION

The thesis aimed at answering the question about the applicability of the principles of distributive justice within the aviation industry to distribute the responsibility to offset. Since the principles of distributive justice have not been applied to the aviation industry, this thesis was initially an attempt to understand its applicability within the industry. The research found that the principles of distributive justice can be applied to airlines and airports as financial legal entities and passengers as social entities. While the three principles can be used to assign the responsibility to offset to these agents as a whole, assigning the responsibility offset to sub agents within these agents was beyond the scope of this thesis and may produce different results.

After establishing that there is a gap in literature in terms of applying the principles of distributive justice to aviation industry, I look at the different ways in which the principles can be applied to certain agents within the aviation industry. Finally, the criteria which decides how the responsibility to offset emissions should be distributed in determined based on the principles of distributive justice. The thesis concludes that all three principles of distributive justice should be satisfied when assigning the responsibility to offset to financial legal entities.

First, passengers should be assigned the responsibility to offset in terms of the ticket they buy. While those who travel first class should be assigned higher offsetting fees, those who travel on flex tickets without checked in and cabin bags should be assigned the lowest offsetting fee. However, the exact amount is beyond the scope of this thesis and should be looked into more. Next, for airlines, keeping all three principles in mind, the responsibility to offset should be distributed based on the number of flights they schedule and successfully fly every fiscal year. This is because airlines benefit financially from the successful flights. This also highlights their financial abilities and contributions to the emissions results as a direct result of the emissions realised by airplane engines. Finally, since airports contribute to the emission levels as a direct result of maintenance and functional activities, keeping the three principles in mind, airports should be assigned the responsibility to offset based on the number of airlines they are associated with. Airports contribute to the emission levels while benefit from the maintenance financially. This also given an insight into the financial abilities of airports.

Limitations

First, the thesis looks at airports and airlines as financial legal entities as a whole. Moreover, it does not consider the various individual components that compose airports and airlines. In order to assign responsibility to individual agents within the aviation industry on a micro level, airlines and airports need to be researched more and further divided into more specific units. In addition to this, airports and airlines also follow several models of functioning and owner, all of which do not fall within the scope of this thesis. More research is required to assign the responsibility to offset to these agents based on the specific model they use. Finally, specifically in terms of passengers, it is not possible to adjust the amount of responsibility assigned to passengers based on the purpose of their flight. Classifying a certain category of travel as more morally permissible than another is unjust and beyond the philosophical scope of this thesis.

Next, waste (e.g., Food waste) created on the flight are overlooked in this thesis. This is because the question around the morality of who is responsible for the food waste this is created in the aircraft is too complex to fit into the current debate. To better understand this, airlines will have to be divided into subagents to further narrow down who is responsible for the food served during the flight and how they add to the emission levels. However, this doesn't fall within the scope of this thesis.

Contributions

The thesis contributes by highlighting the importance and relevance of the aviation industry. The thesis introduces the application of principles of distributive justice in the aviation industry specially to assign the responsibility to offset to agents within the industry. During the course of the thesis, I also summarise the difference between carbon neutralization and emission reduction and how they should not be used to substitute each other. Finally, I also differentiate between profits and salaries in the context of airlines and airports specifically which helps understand benefits and the beneficiary pays principle better. I introduce a debate around how salaries can be seen as morally permissible legal compensations while profits are benefits received on top of salaries.

Recommendations

From this thesis, I recommend setting up a new global commission that looks over offsetting projects undertaken by airlines, passengers, and airports. For passengers, they have to be led to offsetting projects via online links. This can be done by collaborating with airlines and travel agency platforms for instance to provide passengers with a mandatory option to pay an offsetting fee while paying for the ticket. While this requires a collaboration with airlines, this does not include the offsetting responsibilities that are assigned to airlines. To oversee that the airlines and airports are fulfilling their offsetting obligations, I recommend eventually setting up a global commission by the IPCC. However, since this is a long-term, a more viable short-term solution is to reduce global carbon emission levels by introducing emission reduction methods and tools in the aviation industry.

I also recommend extending the principles of distributive justice to other transportation methods such as trains and bus services such as BlaBlaCar and FlixBus for instance. Eventually, the principles of distributive justice can be applied to cars as a means of transportation, requiring car owners to offset the emissions they create by investing in offsetting projects per month based on the distance they cover for instance.

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