

Customer Perceptions of Sustainable Airports

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<p>The purpose of the study was to find how customers perceive airports and their sustainability. The aim was to find good practices from airports and other industries to find out what practices are most likely to be perceived well among customers.</p> <p>The study was conducted with a primary qualitative research and was done by a survey and analysing secondary data. Survey consisted of questions about sustainability in buying process and how the respondent's see the sustainability of air travel. Secondary data was used to analyse and benchmark airports and other industries to find out which practices were perceived well and those that any airport is able to implement.</p> <p>Airports are businesses and make money by charging airlines from various fees. As there are many controlling parties, any changes in strategy are hard and time consuming to implement. To achieve complete sustainability, it needs to be implemented to company strategy. For airports, it's very complex and all stakeholders need to work together to achieve a sustainable strategy. The advancement of technology is very important for airports, as many of their operational tasks rely on it.</p> <p>The results show that the sustainability of an airport is not important to the customer. Most customers think about the sustainability of the aircraft and its emissions rather than the airport. The respondents answered that they are not likely willing to pay extra for a more sustainable airport, if given the chance.</p> <p>In conclusion, airports are already focusing on creating a more sustainable environment, but customers are not willing to pay for it yet. Sustainability has power in air travel buying process but not enough to have an effect on the outcome.</p>	
Keywords Airport, sustainability, customer perceptions	

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1 Introduction

The aviation industry is one of the largest growing industries in the world, as the industry is expected to quadruple in passenger amounts in 2050. As the industry remains to grow, the airports that handle the passenger flow need to adapt to the growing number of passengers but also balance passenger amounts while keeping sustainability trends in mind.

The industry has made a lot of efforts to being more sustainable, partly due to a lot of pressure from the outside – customers and governmental parties. Sustainability is a growing trend, which means that customers are more aware of their environmental impact as a consumer. Airports are often overlooked in the aviation industry context, as aircraft produce massive emissions and because it is easier to pinpoint the issues. Airports are massive ecosystems, and often operate like small scale cities, while also providing all aircraft ground activities.

The aim of this study is to find out the following:

1. How customers perceive airports, and if they believe that airports are, or can be sustainable?
2. Whether customers understand the massive scale of airports and if they are aware of how they operate?
3. How and if customer behavior changes according to their knowledge of sustainability and sustainable travel?

This will be done by conducting a survey. The key aspects of the study will include a benchmark of airports' overall sustainability as well as building a futuristic sustainable airport model. The primary focus for the thesis will be the Finnish airports due to geographical location and the information available. The paper will also include nearby airports, or other airports that are interesting for the sake of this study.

The main topic of the thesis is environmental sustainability issues. The thesis is structured so that the first part covers theory about airports and sustainability, as well as how the customers perceive the airports. After those chapters, the thesis then moves on to conducting the study and benchmarking airports and different industries with secondary data. The thesis proceeds to finish with sustainable airport model and lastly, a discussion chapter, where the outcome and processes of the thesis are discussed.

The key concepts for the study include airport, sustainability, customer, customer behavior and sustainable travel. Airport means the area where aircraft land and take-off and serve

as a link between aircraft and public. By sustainability we mean the concept of businesses improving their practices to trying to not produce harmful emissions to the air. Sustainable travel means the travel that is not harmful for the environment. By customer and customer behavior we mean the customer – the user and buyer of products and their behavior and buying process.

2 Airports

An airport is a facility that includes buildings, terminals, and at least one runway. Airports are complex enterprises, and are often owned by governments, at least partially. Airports are designated areas for aircraft to take off and land. Airports are also used for aircraft maintenance, usually having a maintenance hangar, where repairs can be made. Civil airports are smaller scaled and are not usually used by commercial airlines in a non-emergency situation. (Merriam-Webster)

Airports are businesses and meant to make money just like any other business. Contrary to popular belief, airport revenue comes from paying customers and not through public funding, at least in the case of Finavia. Finavia is the controlling and managing authority of airports and the airport network in Finland. Finavia is a fully state-owned company. The company oversees 21 airports, of which 15 are civil and 6 civil and/or military airports. In 2019, the airports saw about 25 million passengers. (Finavia. 2020.) Although the consumer does not pay for the airport revenue directly, they pay the airlines who then pay for the airport usage. Airlines pay fees for landing and take-off according to weight & passengers as well as parking fees and for maintenance operations. (Finavia. 2017.)

Additional revenue to airport usage fees is commercial services provided inside in the airport such as concession stands, shops and restaurants. According to Finavia, the airport doesn't usually charge actual rent, but the partner company shares part of its income with the airport. With this business model, it is in the airports best interest to have the partner companies to do well. As seen from the figure below, 28% of all Finavia airport revenue comes from commercial activities. (Finavia. 2017)

How do airports generate revenue?

Sources: Finavia, 2015 ACI Airport Economics Report



Image 1. Airport revenue simple breakdown (Finavia. 2017.)

Modern commercial airports are business hubs, connecting people and valuable goods. Commercial airports are used by airlines for transferring customers to different locations and cargo operators that transfer valuable goods, consumer goods and other items. Airports have a complex business model, as airlines can rent slots, but also have to pay fees according to landings and takeoffs as well. (The airport business)

All European airports are regulated by the European Aviation Safety Agency (EASA. 2020.). EASA is an EU commissioned agency, which develops common safety and environmental rules at the European level. EASA is also responsible for monitoring implementation and training national authorities. The agency develops smart environmental standards to ensure noise and emission reduction technologies are integrated to airport and aircraft designs.

For airports, it is not very easy to make new changes and implement new policies. Airports have to abide first to national laws and then also comply with EASA's policies. This creates a very challenging situation for the airport, as it will take months, or possible years to go through national & EASA's systems. Implementations are hard also due to the fact that EASA's has developed standards and they are monitoring that all airports follow the standards. If an airport wishes to make any changes, they will need to make sure that the changes comply with the EASA standards. (EASA. 2020.)

3 Sustainability

This section will provide theoretical understanding about sustainability, sustainability in the airport and the airport and airline co-operation. Sustainability itself is a broad term to use. It began to come to public life in the mid-1980 and from there on it has developed quite far from the starting point. The most used definition of this term was published in 1987 by the Commission on Environment and Development and was stated like this:

“Sustainability is economic-development activity that meets the needs of the present without compromising the ability of future generations to meet their own needs” (WCED 1987:39). In a nutshell sustainability is about finding balance so that Earth or some part of it can support the human population and economic growth without ultimately threatening the health of humans, animals and plants.

As stated, before in the text, in 1987 United Nations’ Commission on Environment and Development published a report where was the three pillars of sustainability or also known as the three E’s of sustainability. These three E’s comes from words environment, economy and equity. The main idea of these pillars (fig. 1.) are that sustainability cannot and should not be achieved by skipping one of these pillars, only when you at the same time protect the environment, preserve economic growth and development and promote equity, you can achieve sustainability. (Portney. 2015.)

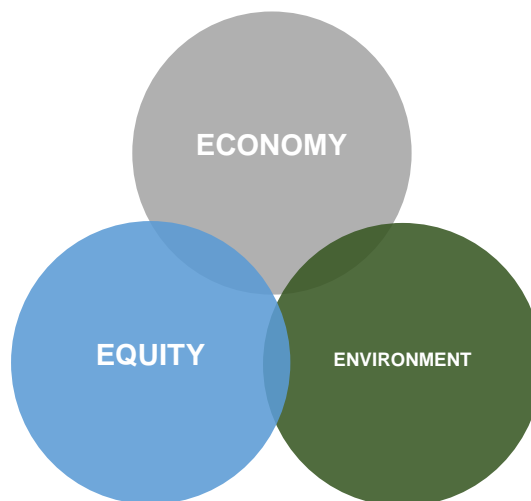


Figure 1. The three overlapping elements of sustainability (Adapted from Portney. 2015.)

The definition of sustainability has changed only a little from 1987 definition to this day. Now it has defined in most of the sectors as a triple bottom line so, financial goals, social goals and to environmental goals. Still it is still hard sometimes to understand what sustainability really means. There is no one answer, because every organization and country have their own unique mix of sustainability. It depends on many things, for example services and in what part of the world it is located. (Portney. 2015.)

3.1 Sustainability in the airport

As the demand rises in every single sector we are consuming more and more of the resources of our planet. Airports aren't exceptions in this point, they are under the magnifying glass, because of their noisy and air polluting aircraft, but without aircraft there wouldn't be airports. Fortunately, organisations and even whole countries have adopted the sustainability to be part of the business and everyday life. At this point where we take environment seriously, people are developing more sustainable airports which we can then enjoy. According to Federal Aviation Administration, sustainable airports have three goals: reducing environmental impact, prioritising economic growth and generating social progress. How can then airports achieve this? There is not only a single simple answer, airports need to manage many things to achieve this important goal. These things could be for example, decrease noise pollution, protect wildlife and lower consumption of resources like water and electricity. (Stark. Huffpost.)



Figure 2. Efficiency in airport – reduce wastefulness (Adapted from Airport World)

As stated earlier, airports are under high pressure to be sustainable in today's world when they need to reduce greenhouse gasses, but at the same time demand is increasing, passengers demand more, and the passenger growth has been continuously throughout many years now. Answer to this high pressure to be sustainable is to start solid sustainability plan, that is how airport can meet the triple bottom line – environmental, social and economic goals. All the parts of the airport should be part of this plan, so all the airport development and operations can put to account from the sustainability. So, this means airside, landside, occupied and unoccupied buildings need to be considered when thinking the sustainability plan. The plan is unique for each airport, but at the same time there are few common steps which airport should follow when starting the plan: establish the environmental context, understand current positions on sustainability, develop sustainability goals and targets to achieve aims and develop sustainability planning guidance. As stated, every airport is unique, but every one of them are aiming to get maximum efficiency and when getting that maximum efficiency, airport reduces wastefulness in its processes. When speaking about efficiency and reducing wastefulness, it means that airport has an opportunity for cost savings as well as better

utilisation of available resources, or the time and energy of the airport labour force.

(Airport World)

In today's world where climate change is an everyday topic, the sustainability plan goes easily to resilience plan. This is an important topic for the airport and the airlines, because aviation business rolls always safety-first thinking. The resilience means: "Planning for resilience empowers diverse stakeholders to evaluate plans, set strategic policies, and implement projects that will enable communities to adapt and thrive when faced with challenges. Natural and human-caused hazards constitute some of the acute "shocks" to which a community can be vulnerable. Other disruptive threats include longer-term societal "stresses," such as unemployment, poor access or barriers to education, crime, or homelessness. Resiliency planning can include updating land use codes, zoning, development standards, incentive programs, and other plans or policies to better prepare for likely shocks and stresses while also developing measures that allow for action in the face of uncertainty or unexpected events." (Planning for Hazards)

This is the future but also today's world, because Earth needs us now. There is a huge opportunity when thinking sustainability and resilience plan together. Both plans should be adopted to airport planning at the early stage of it and they should be continuously in everyday operation and maintenance tasks. As stated, before resiliency planning can ensure airports operations run efficiently and safely while every part is prepared for changing conditions. In the end everything is done to reduce waste and increase efficiency, these two things benefit to triple bottom line: financial, social and environmental and ultimately benefitting us customers, local community and other stakeholders.

(Planning for Hazards)



Figure 3. Sustainability plan elements for airport. (Adapted from Airport World)

As said all the operations in airport need to be in symbiosis and most of all understand the meaning of sustainability in airport, to really create the value for them but most of all to passengers. Without collaboration between airport operator, suppliers, airlines and tenants, there would not be a chance to tackle all the challenges these changes will brought. New technologies will open new doors to increase efficiency and at the same time save the environment. These new technologies could be for example security check automation or airports own desalination plant where they can gather water from example

rainwater or from the sea and there to use this water in airport toilets. When all the players in the airport are team players, sometimes they are also suppliers or customers to each other. This co-operation leads to increased passengers' satisfaction and from there the attractiveness of the airport. Sustainability planning and operating with it, creates new opportunities to all who are committed to it and leads also to regional and national growth. (Swedavia. 2018.)

3.2 Airport and airline co-operation

Airports itself are looked to be the greenest part of the aviation business, but inside the airports are the biggest polluting sector, aircraft and other vehicular transportation. Airlines are every year renewing their fleet to get the latest models of the new aircraft. Aircraft engines produce the same emissions that any other vehicles that run with fossil fuel so, carbon dioxide, nitrogen oxide, hydrocarbons, soot and other particles. Aircraft are nowadays 80 per cent more efficient than the aircraft in 1960s and aviation is one of the less polluting transportation modes with only 12 per cent responsible of all transportation emissions, compared to 74 per cent road transport sector. The whole aviation industry is only two per cent from all human-induced CO₂ emissions. (ATAG. 2020.)

Airports and airlines need to do co-operation to keep these emissions in control. Some of the practice's airports are using is encouraging airlines to use newer aircraft. With using the newest possible model of aircraft, airlines can influence their costs, because landing charges are lower the lower emissions the aircraft has. Other practice that airport is offering for airline is the possibility to fuel new kind of jet fuels, sustainable biofuel. Finnair and Neste just agreed on March 2020, that Finnair will increase their usage of sustainable aviation fuel. Finnair did this because their long-term target of carbon neutrality. While using the sustainable aviation fuels, Finnair will reduce their CO₂ emissions by up to 80% compared to fossil fuels. Finnish airport operator Finavia is co-operating with these two Finnish flagships. This means that the sustainable jet fuel will be more available in Finnish airports. This could mean lower landing and takeoff charges for airlines and more sustainable name for Finnish airports. (Neste. 2020)

4 Customer perception of airport

This section will cover customer perceptions of airport, how the airports are seen in the eyes of the customer now – and in the future. According to ICAO, there were more than 4 billion passengers on scheduled services. It is therefore understandable that there are a wide variety of perceptions, depending on nationality, reason of airport usage, economic situation etc. The aviation industry has set goals for reducing and offsetting its carbon emissions for the future. IATA has estimated that airplanes will carry up to 16 billion passengers in 2050. The trend during the last few years has been for companies to market themselves as a greener choice, which will bode well with the airport's customers with the growing number of passengers. (ICAO. 2018.)

A study found out that the most influential factor to customer satisfactory comes from a reliable security check. Customers are most patient during the security check and expect quality. The more the customers were satisfied with the security check, the more they valued the airport. This is due to the nature of air travel, where customers are very aware of the consequences of a possible accident and therefore respect security. Second most influential factor of customer satisfactory comes from airport accessibility. Commercial services or terminal facilities did not have a lot of influence in customer satisfaction which tells that the customers want foremost seamless and secure travel. Other services are seen as secondary. However, the study suggested that the more the customers use the airport, the more value they start to see in the commercial services as well. (Chen & al.)

The huge growth of air travel and therefore increased capacity of airports and aircraft affects the environment massively. The operations releases greenhouse gases and generates significant solid and water waste, as well as increases air and noise pollution. (Airport Corporate Sustainability) Sustainability awareness has risen massively among consumers and many are also pressuring airports to be more sustainable and founded on eco-friendly grounds. (Kim, J-H & al. 2019)

As a lot of the focus is on aircraft, and the emissions that they produce, many customers of airports may not think about the sustainability of the airports when traveling. Airports are huge eco-systems and often operate like smaller scale cities which operate flights in and out. In colder areas, also de-icing procedures have to be thought out, as the de-icing fluid contains glycol, which is harmful for the environment. (Lyster, C. 2013.)

4.1 Consumer behaviour

Consumer behaviour is a study of consumers, individuals or groups and the activities that are included in the buying process and the use of the product, goods or services. The study follows the consumer's emotional, mental and behavioural response that comes at some point, before or after the purchase. The purpose is to study how emotions and attitudes have an effect in the consumer's buying behaviour. The study takes into consideration the individual consumer's demographics, personality and the usage of the product as well as if the buying decision was a direct or an indirect influence. (Foxall, G. 2001.)

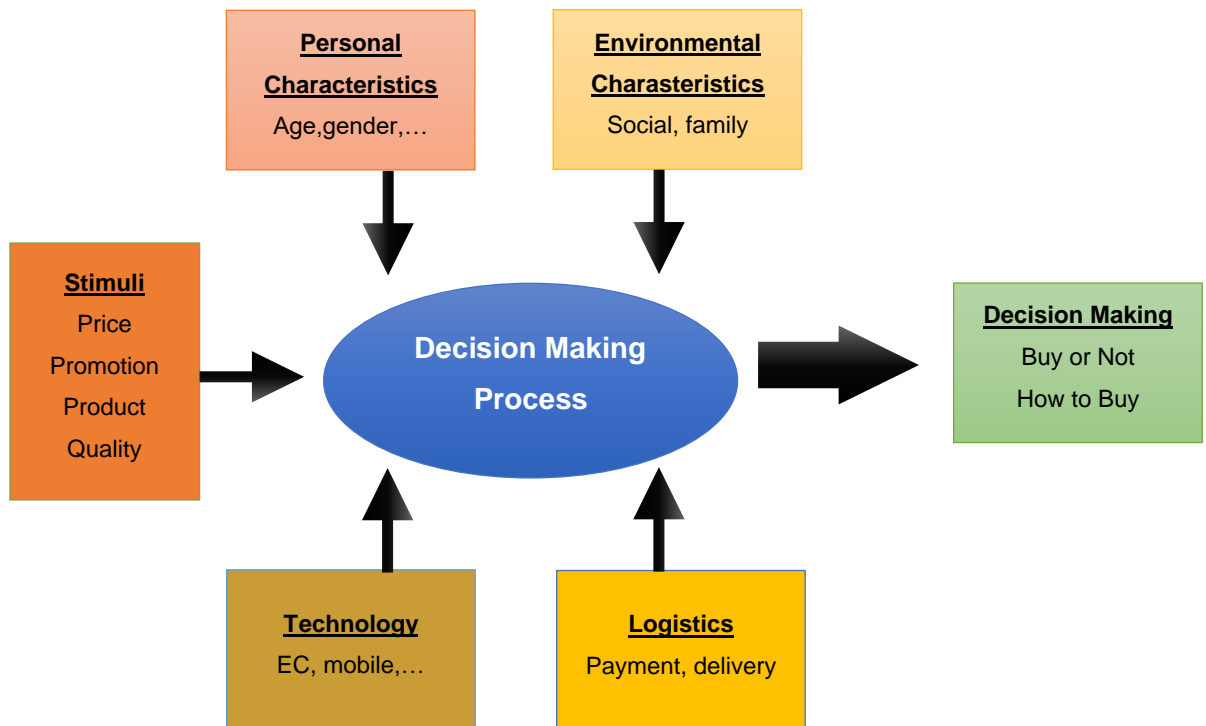


Figure 4. Consumer behaviour model during the decision-making process (Adapted from Chan. 2005.)

It is unclear, if sustainability plays a role in a consumer's decision-making process when selecting which airport to use. It is impossible to determine, as there is a scarce number of airports. Most often the biggest reasoning for airport selection is proximity of the airport

along with connectivity to other airports. As aviation becomes more sustainable and new aircraft emerge, the consumers have more options and therefore the decision-making process gets more difficult.

4.2 Consumer awareness

Consumer awareness is the awareness of the purchasing activities and product. As people's living standards continue to increase and incomes continue to increase, people's purchasing decisions are constantly changing. Consumers are also more aware about environmental issues than ever before. People are active on social media and also in the streets, demanding action from governments and businesses on environmental issues. Many businesses are noticing the customers concerns and have already created sustainability and are planning on implementing sustainability in their core values. (Sustainable Benefits. 2020.)

Market competition is a huge motivator for changes in consumer awareness. Many companies launch their own branded products, to increase their brand awareness among consumers. This especially applies to eco-products that require more branding and more marketing to customers. (Foxall, G. 2001.)

4.3 Travel as a luxury product

Luxury can't be defined as a one thing, luxury to someone could mean totally different to somebody else. Luxury can mean, according to Cambridge Dictionary," great comfort, especially as provided by expensive and beautiful things; something expensive that is pleasant to have but is not necessary; something that gives you lot of pleasure but cannot be done often." (Cambridge Dictionary, Luxury) Luxury has been here already a long time, already when human beings were purchasing goods and services, but luxury tourism haven't been that long. It has developed from a small social sector to every people who are living in modern developed countries and it all started from Europe. (Swarbrooke. 2018)

As stated, luxury tourism has grown to that size that majority of people could travel and from there buy their luxurious vacations. Camping in the middle of the forest could be luxurious to someone and to someone it could be weekly routine. How we could define the

luxury tourism then? Here are some definitions from the people's perspective whom works in this industry. (Swarbrooke. 2018)

"There has been dramatic change in how we define the concept of luxury travel over the past few years, largely due to the current economic climate. The current climate has deepened the definition, making it more multi-layered than it once was. It has pushed consumers away from conspicuous consumption towards more authentic, simple and genuine experience that incorporate elements of environmental awareness and social responsibility" Engi Bally, SilverDoor.

"Luxury travel does not just mean opulence, comfort and a range of amazing amenities on offer at the destination; it is the full journey of the traveller from the point they make the first phone call to discuss their needs". Roy Pilkington, Bailey Robinson.

Is it then sustainable to have luxurious trips? When you think for example a luxurious safari where you sleep in a tent, you will be definitely enjoying a five-star meal and sleeping in white sheets, that is not the most sustainable way to enjoy the safari. This is why luxury tourists need to be somehow modified their expectations and behaviours towards the luxury travel. The environmental impacts of luxury tourists are most likely to be bigger than the other tourists. This is because luxury tourists carbon footprint will be more likely to be bigger than the other tourist and the water consumption also due to their journeys are usually long haul and their places where they stay are usually using lot of water to their pools and gardens and also those all-inclusive hotels usually don't use locally produced products. (Swarbrooke. 2018)

Nowadays consumers and customers seek more of locally produced and authentic products and services. This can be seen for example in restaurant business, more and more restaurants are marketing their food to be authentic and all the ingredients come from local producers. This is anyhow hard to adopt to the travel business, because when someone is spending three or five thousand euros for a vacation, they are waiting the best service and commodities. What should be done to get peoples head turned to more sustainable thinking, is to promote these things right. Celebrities and luxury consumers are the influencers in today's world. People are spending more and more time in social media and that is the channel where these influencers could make the change happen. So, we need to promote and support more responsible forms of tourism, not just to educate what is responsible way to travel. Maybe someday luxury tourism will be sustainable, but for now on we are in the middle of the change of the behaviours and expectations of luxurious tourism. (Swarbrooke. 2018.)

5 Conducting the study

Research is to be done systematically to collect information on a subject or establish new facts and information. Furthermore, research is divided into qualitative and quantitative methods. Qualitative research methods tell us more about underlying reasons for a subject and are rather exploratory. Quantitative research methods give us more numerical data about a topic researched. In our research, we used both of these methods in order to gain in-depth understanding (van Hamersveld. & de Bont. 2007.). This thesis is done to get deep understanding what are the customers perceptions about sustainable airport. We used literature, benchmarking and online publications as a method to collect qualitative data, but to achieve our goal, to understand the perceptions of airports customers, we conducted a survey for the customers.

When deciding which practices would be beneficial for this project, we kept in mind our location in Finland and what would be beneficial for Finnish airports. We picked up also the most innovational practices but also what our neighbours are doing, then we would get the best practices to here.

5.1 Quantitative method

Everything in today's world works around the numbers, whether it is your life, your business or civil society, everything is measured, counted and calculated. (Payne. & Williams. 2011.) As we created a survey, we used quantitative research. Quantitative research is all about numerical data and definition of it is:” Quantitative research is defined as a systematic investigation of phenomena by gathering quantifiable data and performing statistical, mathematical, or computational techniques. Quantitative research collects information from existing and potential customers using sampling methods and sending out online surveys, online polls, questionnaires, etc., the results of which can be depicted in the form of numerical data. After careful understanding of these numbers to predict the future of a product or service and make changes accordingly.” (QuestionPro)

We chose the quantitative research method, because it is an efficient way to get data directly from the customers. “Primary research is defined as a methodology used by researchers to collect data directly, rather than depending on data collected from previously done research. Technically, they own the data. Primary research is solely carried out to address a certain problem, which requires in-depth analysis.” (QuestionPro)

The tools used for collecting the primary research data were surveys. The survey was the easiest way to reach the maximum number of customers. As survey can be done in many ways, by pencil and paper, interview, web questionnaire, we decided to use Google form to conduct this survey. This type of survey gave us both advantages and disadvantages, we can reach high number of people, but usually these surveys has low response rates. When building up the survey, we wanted that the survey was easy to access and doing it does not take long. We avoided the open-ended questions, because then the survey would be more easily analysed. (Trochim. 2020.)

As we chose primary quantitative research method as our research method, we started to brainstorm questions what we want to know and ask. We decided that all the questions except one extra question would be close-ended questions, because then the data would be easier collected and analysed. After the survey was ready, we distributed it to group we targeted, travellers. After we got answers, we started to open them and started to analyse. Advantages in this kind of research are that this is quick to make, the data that we gathered are reliable and accurate, it is quick to collect the data and it eliminates the bias. (QuestionPro)

5.2 Qualitative method

We used qualitative research method to get knowledge about sustainability and sustainability in airports and in other industries. We also wanted to have best practices what other businesses are doing and what would be the best practices to our sustainable future airport model. Qualitative research is usually described as an opposite to the quantitative research, where researchers uses more numbers, qualitative research tries to seek data which can help researchers to have new knowledge of their business sector, why does organisations work the way they work and how the researchers could benefit and learn from different sectors or same kind of businesses. (Eriksson & Kovalainen. 2008)

There is no one line which you could follow in qualitative research, because every research differs from each other, but there are still some basics you should follow when starting to plan qualitative research. Every research starts with a topic and after that you can start a draft to draw the work plan. In a work plan the idea is what are the things to do, how and in what order. You need to also choose methods what are you going to use in this research. It is also crucial to write questions to yourself to help you to find the right data to your research. These questions could be example: In what question I need an

answer or where to look up best practices. The flexibility is key in qualitative research. If you are not sticking in your method and how you use it, it will bring you success. Refining theoretical and methodological frameworks and formulating and the sensitivity to your research questions throughout the research process could guarantee good ending to your research. There are no right or best ways to do it, you are yourself part of the research and you can make the difference. (Eriksson & Kovalainen. 2008)

5.3 Survey as a data collection method

Survey is a questionnaire that is sent to individuals to seek out their opinions on selected topics. A data collection survey is to collect as much data as possible to get a reliable sample size so that answers from respondents can be used and analysed. The data usually consists of opinions or behaviour of respondents. (ASQ)

Survey as a data collection method is reliable. The purpose of the survey is to collect the opinions of respondents in an effective way, so that the results can be analysed and common trends among respondents can be found. We found that a quantitative survey is the best fit as a data collection method, as the results can be seen instantly and can be benchmarked and analysed against each other, to give us a clear idea of the common trends (ASQ)

We used a survey as the survey is very easy to send out to respondents via social medias or messages to many people effectively. As our purpose of the survey was to seek out the opinions of as many people as possible, we thought that a quantitative survey will perform the best. The questions on the survey were mostly linear non-written answer questions so that the respondent will keep their interest in the survey and not get discouraged from a long survey with many write down answers.

5.4 Survey results

As stated before, this thesis is done to get deeper understanding what are the customers perceptions about sustainable airport, and it is also our topic in our survey. When we started to create the survey, we asked to ourselves what we want to really know? We started from the basics, gender and age and how many times they have travelled in aircraft. The crucial part was ahead of us, creating the questions where we could get the answers, what are the perceptions of the sustainable airport. Aviation and airports are easily considered to be not the most sustainable places, so this was also interesting to see if there was someone who have thought that airports are doing something right. The number of answers gathered from the surveys was 47. We gathered the data and analysed the results.

In this chapter you will find the results and the analytics of the survey. We have gathered different kind of graphics to show how the respondents has answered. After each graphic you will find an explanation of what does the graphic mean. Total answers we gathered was 47. There were nine questions and one "extra" open-ended question which was not mandatory to answer.

What is your age?
47 vastausta

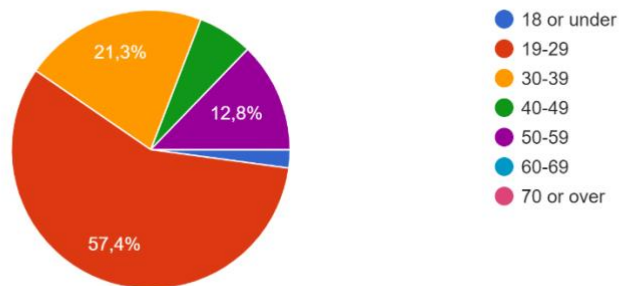


Image 2. Survey question #1 and answers. What is your age? N = 47

The majority of the survey takers are in the 19-29 age category. This is due to the majority of the survey takers are our friends or close relatives. What was positive is that almost all the age groups were present in the answers of the survey.

What is your gender?

47 vastausta

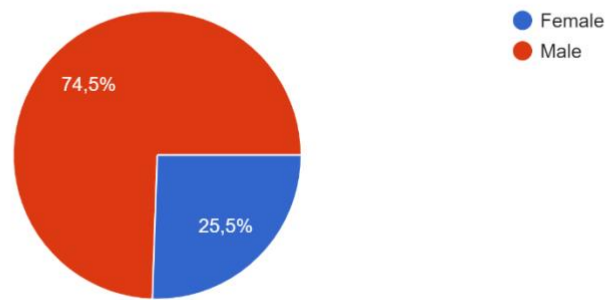


Image 3. Survey question #2 and answers. What is your gender? N = 47

We tried to get as equally answers from both genders. As you can see 74,5% 35 out of 47 were male and 25,5% 12 out of 47 were female.

How many times have you flown in an airplane?

47 vastausta

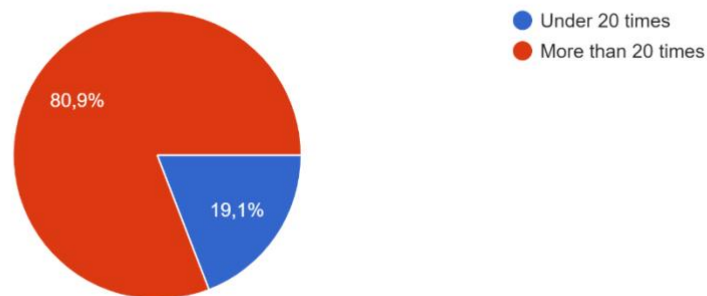


Image 4. Survey question #3 and answers. How many times have you flown in an airplane? N = 47

From this figure you can see, our respondents have flown decent amount of times. This is good for our research, because it means that they have some kind of view how the

airports look like around the world and what means sustainability in airport.

In terms of aviation sustainability, do you think more about it in terms of airport or aircraft?
47 vastausta

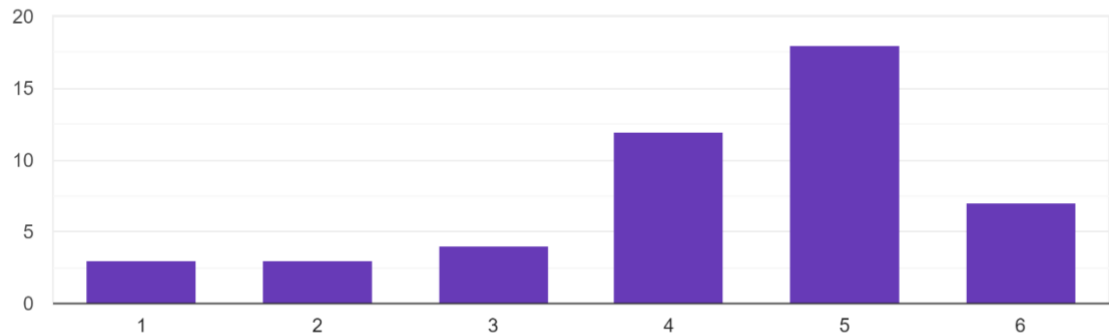


Image 5. Survey question #4 and answers. In terms of aviation sustainability, do you think more about in terms of airport or aircraft? N = 47

1 = Airport

6 = Aircraft

The figure above shows that most respondents do not think about the sustainability factor of aviation in terms of airport (1 6,4% 3 out of 47 and 2 6,4% 3 out of 47). Most people think aviation only in terms of the aircraft (5 38,3% 18 out of 47 and 6 14,9% 7 out of 47), as the actual flying happens with the vehicle.

What makes an airport sustainable in your eyes?

47 vastausta

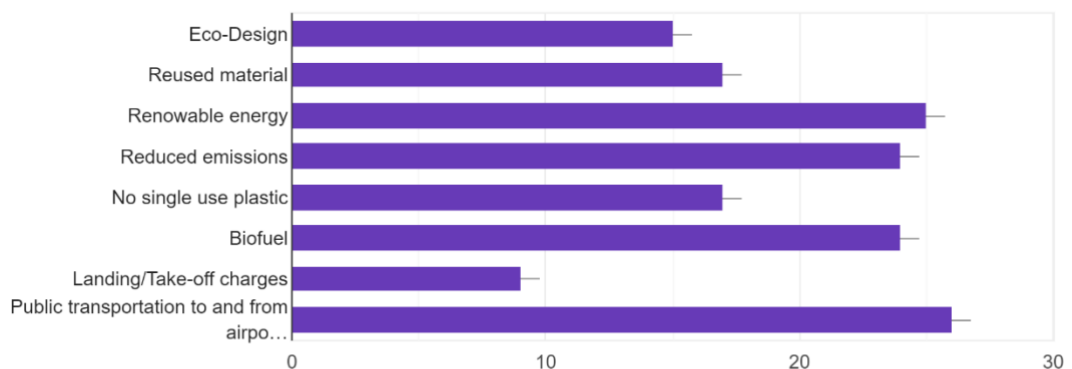


Image 6. Survey question #5 and answers. What makes an airport sustainable in your eyes? N = 47

This figure shows how the attendees of this survey sees the sustainability in airport. These all answers were "correct" ones, but what this clearly shows is customers think public transportation to and from the airport (55,3% 26 out of 47) and renewable energy (53,2% 25 out of 47) were the things that ensures to airport the sustainability. In reality public transportation to and from airport is the one which is polluting the nature and the air most.

Do you think about sustainability as a factor when buying?
47 vastausta

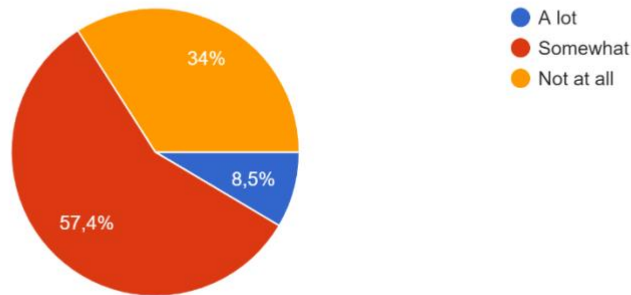


Image 7. Survey question #6 and answers. Do you think about sustainability as a factor when buying? N = 47

This was more a general question about when shopping, do these customers think about sustainability when purchasing something. As you can see the majority (57,4% 27 out of 47) answered that they think only sometimes of the sustainability of some product. What is alarming that 34% and 16 out of 47 answers says that they do not think sustainability at all and only 8,5% or 4 out of 47 thinks a lot sustainability when purchasing.

Would you choose a more sustainable airport, even if it were more expensive?
47 vastausta

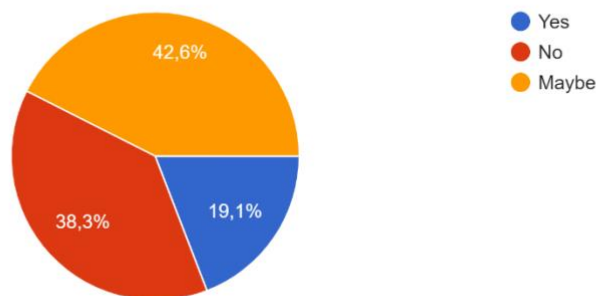


Image 8. Survey question #7 and answers. Would you choose a more sustainable airport, even if it were more expensive? N=47

18 out of 47 respondents, 38,3% wouldn't choose a more expensive airport, even if it was sustainable. This shows that customers want the best price for their money, and not follow the trend. 42,6% 20 out of 47 answered "Maybe", this tells us that given the opportunity, customers could be willing to choose sustainability over money.

Do you think that air travel is sustainable?

47 vastausta

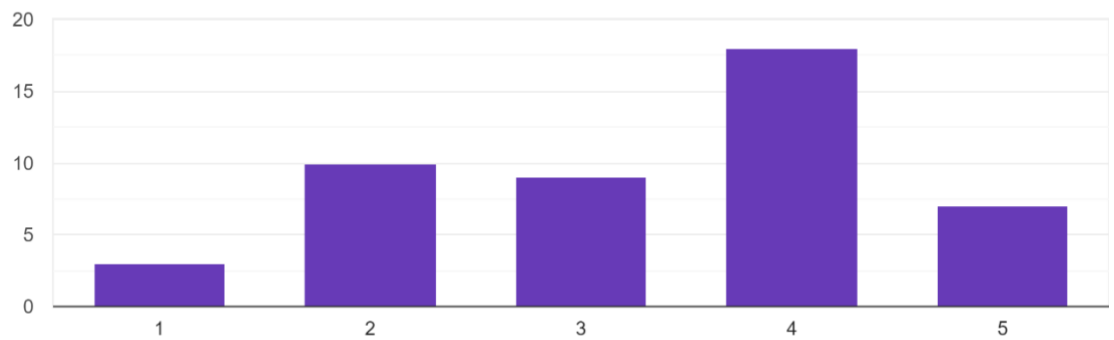


Image 9. Survey question #8 and answers. Do you think that air travel is sustainable?

N=47

1 = Sustainable

5 = Not sustainable

This question shows that the majority of respondents do not think that air travel sustainable at the moment. A lot of answers came to the 2-3 columns, which means that respondents think that air travel is at least somewhat sustainable.

Do you think that air travel is sustainable in the future?

47 vastausta

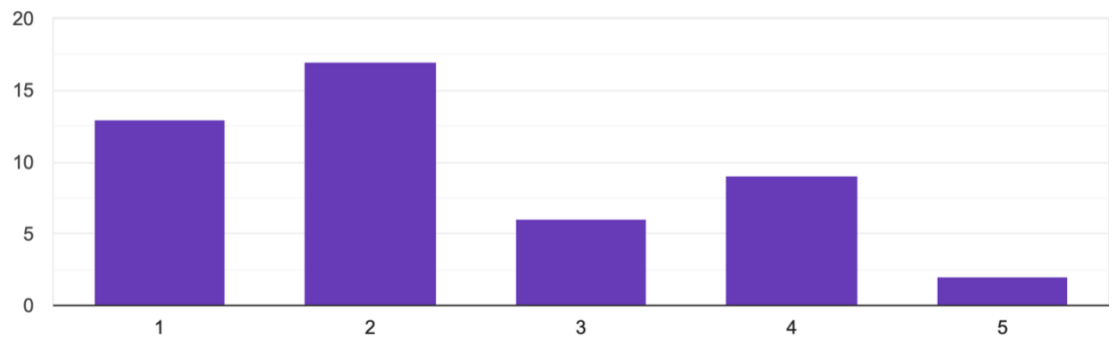


Image 10. Survey question #9 and answers. Do you think that air travel is sustainable in the future? N=47

1 = Sustainable

5 = Not Sustainable

This question shows that the vast majority of the respondents believe that air travel is will be sustainable or at least somewhat sustainable in the future. Many respondents that thought that air travel is not sustainable at the moment, believe that it will be in the future.

Our sort of extra question in the survey was: **How do you think the future airport will look like?** We got 10 answers out of 47 to it, which is considerably decent number, because it was not marked as a mandatory to answer. Here are the answers we got:

- I think in future there are a lot of automation and robotics at the airport. All the plastics are gone, and food and beverages are served from recycled plates and cups. No more paper, everything electronic.
- Sustainable
- Lots of ramp agents in cargoholes packing 300pcs bags by their selfer with help of snake loadee
- Won't differ much from what they are now
- in future airports you don't have to walk to gates. No queues either. Future airports will look more sustainable
- The electric planes, plastic free airport, public transportation and reusing materials.
- Comfortable
- Increasingly large airports that can be reached quickly from the city
- Efficient

To conclude the survey findings:

The main idea for the survey was for us to find out, if people think that air travel is sustainable now, or if it is sustainable in the future and also what makes it sustainable. The survey was distributed to various WhatsApp groups which totals around 150 persons. The survey was distributed freely and there were no certain criteria for selecting the group chats that they were sent to; the main objective was to get as many people as possible to respond to the survey. As the sample consists of friends and close relatives, the respondents are likely to have a similar mindset and thus affecting the results of the survey. The sample size is likely not very reliable, but it still provides enough insight for us to trust in the answers and proceed with the findings.

Most of the respondents only think about the sustainability of aviation in terms of aircraft and flying. This is likely due to the fact that aircraft produce massive emissions and also likely due to the fact that most people will focus on the big picture – flying, and not the small details such as airport that surrounds their travel. However, respondents were hopeful for the future and many answers indicated that the survey takers believe that air travel will be sustainable in the future. Most of the respondents were not willing or weren't sure if they would pay extra for more sustainable travel. This is worrisome for sustainability advocates as it means that the companies in the aviation industry will need to produce more sustainable products that the customers want, in their own expense.

From the answers, it seems that the number of times that a person travels, does not matter how they think about sustainability inside the airport. However, the metric used in this survey might not be reliable, as a person that travels 200 times a year could have a different view about the airport, than a person who has flown under 20 times in their lifetime.

5.5 Results of benchmarking

You can also find from this part of the thesis the insides what other airports are doing in the sustainability aspect, what other travel industries are doing and what are the trends

which are predicted to be on top of the sustainability in 2020 and in future. In other words, this part is dedicated for the benchmark. Benchmark definition as word itself is: "Standard, or a set of standards, used as a point of reference for evaluating performance or level of quality. Benchmarks may be drawn from a firm's own experience, from the experience of other firms in the industry, or legal requirements such as environmental regulations." (Business Dictionary. Benchmark.) The reason why we or somebody else is benchmarking something, is to get deeper understanding from the specific markets, products, strategies or just measure how well we or somebody else is doing. This is how we could get fresh ideas how to improve something. (Business Dictionary)

There are a lot of going on already in sustainability, but now new technologies are arriving, and consumers are more and more aware what they are buying and using. Now that we would get agriculture, companies and governments with us to make the change, we would say that next generations would also have a chance to live in safe and sustainable world.

We made a sustainability comparison between Finnish Helsinki airport operated by Finavia and Swedish Stockholm-Arlanda Airport operated by Swedavia. We also used benchmarking while looking for other airports, other travel industries and other trends.

	Helsinki Airport (Finavia)	Stockholm – Arlanda Airport (Swedavia)
Zero emissions of fossil CO2	2030	2020
by:		
Renewable Jet Fuel	Yes	Yes
Led Lightning	Yes	Yes
Renewable Energy	Yes	Yes

Vehicle Fleet To Run With Renewable Fuels	Entire diesel-powered vehicle fleet switched to use renewable biofuels	Under work to convert all the possible vehicles
Aircraft Noise Protection	Working with ANS Finland to develop solutions. CO-operating with neighbours, municipalities, environmental authorities and air traffic organisations.	Closed at nights. Insulation for homes, take-off charges, curved and green approaches by aircraft.
Limitations In Using of Chemicals	Yes, working to develop more environmental safety chemicals, for example de-icing.	Replacing chemicals to minimize the impact to people and environment
Water Treatment Center	Yes	Yes
BREEAM Certification	N/A	Yes, office one
CEEQUAL Certification	N/A	Yes, P1 Long-term car park
Investments For More Sustainable Airport	New de-icing locations, solar power, electric vehicles, recharging points, underground wetlands, biofiltration area.	New maintenance area, more aircraft parking stands, improved baggage systems.

Figure 5. Sustainability comparison between Helsinki and Stockholm-Arlanda airport. (Swedavia. 2018. & Finavia. 2019.)

As you can see both of these airports are quite sustainable airports already when looking at this comparison between these two. There is continuous work to get the airports even more sustainable, for example the vehicles operating in airport to turn more them eco-friendlier. You can also see that both of the airports do a co-operation with the neighbours and other stakeholders, this enables the airport to be as sustainable as possible and it is the most crucial point when working in these strategies. One of the differences which pops into eyes in this comparison is the certificates. Stockholm-Arlanda has two different kind of sustainability certificates, BREEAM and CEEQUAL. Finavia should definitely apply either one of these or then more worldwide certificate called LEED.

5.5.1 Airports

Airports has changed their thinking what comes in sustainability. Airports has developed different kind of sustainability plans to reduce waste and increase efficiency. There is many airports to benchmark, but we are going to focus one of the most extreme make overs when thinking sustainability and of course when we are living in Finland, we are

going to benchmark our closest neighbours to get the idea, what Finnish airport could do in the kind of nature and climate we have.

One of the most extreme sustainability make overs is done in Latin America, Galapagos. Galapagos is Natural Heritage of Humanity by UNESCO and is also that's why interesting location to build a noisy airport to this island with rich nature. Seymour airport in Baltra, also known as Galapagos Ecological Airport, is the first airport which is completely ecological. It received highest certification what currently exists to recognise sustainable constructions in 2014, LEED GOLD certification. Galapagos Ecological Airport has also received an achievement in 2017 from Airports Council International (ACI), the level 4" neutrality" accreditation, which was first in Latin America and the Caribbean. Airport is constructed from 80% of reused materials, example the big supporting steel pipes are from Ecuador oil fields. Air ventilation and lighting are implemented by huge window-shades, which can be opened and closed. Water and energy are highly consumed resources in airports and Galapagos Ecological Airport has taken initiative also in these sectors. Energy comes from solar panels (35%) and from windmills (65%). The airport has its own desalination plant, which can produce all the needed fresh water in toilets by using seawater. (Galapagos Ecological Airport)

Our neighbour country with their main airport has put their name to the list of the most sustainable airports in the world, Stockholm Arlanda Airport. Commercial flights started already early 1960 and it is largest airport in Sweden and third busiest among the Nordic countries. The airport is owned and operated by Swedavia, who is Swedish aviation authority. Sustainability has been long part of the Swedavia structure and culture, since 1994 Swedavia has taken measurements regarding air pollution. (Swedavia. 2018.)

Stockholm Arlanda Airport has cut their emissions by half for the past seven years. The airport uses biofuel for heating and all the electricity which is consumed are produced from renewable sources. The airport is the only airport in the world who has cap on carbon dioxide emissions in its environmental permit. This condition means that all the emissions from traffic to and from the airport and the heating of buildings may not exceed the level produced in 1990. This is not made easier to the airport by the 35 per cent increase from 1990 in passengers neither the fact that vehicular traffic to, and from the airport has increased carbon dioxide emissions. Anyhow heating and internal vehicular traffic emissions has decreased by 75 per cent from 1990. The fact that vehicular traffic accounts more than half of the emissions under the emissions cap, shows that airport has done something right in their internal sustainability plan, goals and by achieving those goals. It is now important goal to reduce the emissions from ground transport to and from

the airport. One of the good acts that airport has to lower its emissions is to work together with the airlines and encouraging them to use modern fleet, the lower the emissions is in an aircraft the lower the take-off charges are for airline. (Swedavia. 2018)

5.5.2 Rail and sea industry

It is not only the aviation business which demand is increasing, but also the transportation industry globally. Rail industry is not an exception, the prediction according the present trends is that rail industries passenger and freight will increase twice as much by 2050. This means in today's world situation that rail industry needs to also think about decreasing their emissions and to become sustainable. Rail industry is in a sense better position than aviation, because three-quarters off the trains now a days are electric powered. This gives rail industry benefits when thinking about options to become more sustainable. Travellers are choosing more often high-speed rail than flight in short-distance travel and the world is even more urbanised which suites for rail industry perfectly. Rail industry serves 8% of the world's passengers and carries 7% of the global freights, but still it represents only 2% of total transport energy demand. To match the demand of need for speed, flexibility and rapid delivery, rail sector needs to invest in their rail infrastructure and to technological innovations. By the 2050 the demand of total energy will increase 42%, but still it would be only 4% of total global transportation industry demand. Rail industry will be all electrified and therefore ways to produce energy will be in significant role to be sustainable. (Iea. 2019.)

One of the train stations who has been awarded by BREEAM (Building Research Establishment Environmental Assessment Method) rating of excellent in 2010 is Accrington's train station in norther United Kingdom. The station is funded by European Union and is one of 24 partaking stations in United Kingdom. The station itself has built up from recycled stones and photovoltaic cells which can be used to building's heating and other electricity requirements. Station has thirty photovoltaic solar panels which reduces stations carbon emissions by 2 tonnes each year. Accrington's station also has their own wind turbines, solar water heating and they are harvesting rainwater for toilets water usage. (Railway Technology. 2011)

As said all the transportation industry is tackling this same problem, how to lower all the emissions, to be more efficient and to be sustainable. Good example of what sea industry is doing finds close to us, Port of Helsinki. The Port of Helsinki has already done all new West Terminal to Jätkäsaari and they have many other plans, example West Terminal 2 and refreshing the Terminal of Katajanokka, to reach that goal to be more sustainable.

The Port has already made a project which aims that the Port of Helsinki is totally carbon neutral by 2035. CEO of the Port of Helsinki states that they have been investing in sustainable development more than ever before and that this sustainability and reducing emissions is their priority number one. The Port itself is considered to be already sustainable, because they only account for 5% emissions of the harbour, the biggest polluters comes from the outside of the harbour. The Port of Helsinki is heavily investing on new technologies and automation. (Port of Helsinki Magazine)

One good what the Port of Helsinki is doing, or it is outsourced, is using special ships scrubber which do not allow the wastewater to go to the sea. The waste that scrubber creates will be cleaned and the waste mass separated at the port itself and Port of Helsinki is actually promoting their "no special fee" system, which encourages the ships leave all their waste to the port. The fee covers almost every kind of waste generated in ships. (Port of Helsinki Magazine)

Next steps as mentioned what Port of Helsinki is creating is to create the West Terminal 2. It will have many sustainable aspects, same as in Terminal 1 but also something totally new in Port of Helsinki. It will have the possibility to discharge wastewater to municipal sewer system directly and it will have the same auto mooring system as Terminal 1, it will decrease the emissions and fuel consumptions of the ships. What new they will bring to this new Terminal is 156 solar panels, which can provide the electricity to the lights of the Terminal. As mentioned, automation will be in a big part also in this Terminal 2, this will help for example vehicle traffic and decrease congestion and idling. (Port of Helsinki)

5.5.3 Sustainability trends

Professionals from around the world and from all industries has said that we have now 5 to 10 years to make the difference to our world Earth and give the possibility to the younger generations to live in a safe and sustainable world. United Nations secretary-general's declaration has stated that this decade shall be known as the Decade of Action. (Schneider Electric. 2020.) We have gathered sustainability trends from around different industries:

1. Setting ambitious goals to invest clean energy and also driving business operations and supply chains towards those sustainable solutions. (Schneider Electric. 2020.)

2. Companies need to understand their water consumption and wastage. They need to create solutions that ensures our seas and waters won't pollute. (Schneider Electric. 2020.)
3. Sustainability is demanded to be in the center of organisations strategy, business practices and operations. – No more greenwashing. (Hospitalityinsights. 2020.)
4. Data gathering is not solely enough – Take actions (Hospitalityinsights. 2020.)
5. Sustainable resource management – decreasing wastage and reuse all available resources. (Hospitalityinsights. 2020.)
6. Getting rid of dependence on fossil fuels – Energy production changes, renewable energy, solar and wind energy. (Sustainablebenefits. 2020.)
7. Change in a way we consume energy – LEED certified buildings to be vanguards. (Sustainablebenefits. 2020.)
8. Regenerative agriculture – It has been a trend to change meat-based diet to plant-based diet, but regenerative agriculture means that it supports both livestock and plants. (Sustainablebenefits. 2020.)
9. Change from people's actions to governmental regulations and policies – To make the real change. (Sustainablebenefits. 2020.)
10. Consumer awareness – To push governments to do the changes, to educate and share the awareness. (Sustainablebenefits. 2020.)

5.6 Validity and reliability of this study

Reliability and validity in research are related to each other. To get the understanding of their relationship we can use a metaphor. Imagine a target which you are taking a shot by each person. If the research is done correctly you are hitting center of the target. The more you are off the center, the more non-reliable or non-valid the research is. So, to put this in other words, your research has to be constructed so that it gives you consistent results around the certain topic. (Trochim, 2020.)

We asked from the respondents how did they feel about the survey and was it about sustainable airport. This was possible because we have respondents contact information. The feedback was positive, it was fast to do, and it was relevant to the topic we said it was about. So, according to the feedback and the answers we can say our survey is valid. The reliability of this survey would be higher if there would be higher number of respondents. Now we had total of 47 respondents, and it is decent amount of responses, since these

times (COVID-19) we could not go outside and ask people to do this survey or even see people. Another thing what would bring to the survey more reliability, would have been to make more questions, but we felt that this was enough questions to get the answers we wanted to get and we wanted to keep the survey as short and quick to do as possible. This is how we ensured also the reliability and validity of the answers, so respondents do not frustrate from this survey. So, all in all the survey and the results are as reliable and valid as they could be in these difficult times.

The survey did give us a lot of valuable insights. However, now analysing the answers it seems that we perhaps did not take full advantage and potential of the survey, as there could have been more and better fitting questions that could have given us even more insight to the mind of the customer. Some of the questions could have perhaps been worded slightly differently. Overall, the results of the survey are insightful and provide meaningful context to the mind of the customer.

6 Conclusion and recommendations

In this part of the thesis we present our goal, sustainable future airport model. We wanted to gather all the information and all the research we have done in one model. The imagination is also with us when creating this, but all of the practices presented are real and doable. We wanted to have the best possible scenario, so we thought the best place that would benefit the most of this kind of sustainable airport. Every airport and city would benefit from this kind of an airport, but we came to a conclusion and we decided to target Finnish Lapland. The Lapland is a one of a kind places in the world, the nature is rich, and they have even their own language and indigenous people. As other places in the world, Lapland's tourism has been increased year after year and social influencers are promoting this beautiful place. For example, tourists from USA has increased in Lapland from 2018 to 2019 by 66.5%. (YLE. 2019.) The agriculture and the nature of Lapland are sensitive and are under a big pressure now when a mass of people has founded the area. This is why we wanted to target this area and by this time, the airports need changes to ensure that we have beautiful and rich Lapland also in the future. In this model we have spliced the airport are in different sections: Airside, Landside and Other. We wanted to do this because then you would get a better picture of all the practices which are in the airport and which are also affecting modelling this model. You will find also conclusion from the end of this part of the thesis. The tools used for collecting primary data were a survey and benchmarking.

6.1 Airside

Airside in an airport means the area after the security checks in the terminal and the area reaches all the way to runways. (Dictionary) So, airside includes many things which enables the airport to run. Let's start from the very first what we see after security checks, shops. Airports and their terminals are like shopping malls nowadays, they have all the same shops as malls except tax free shop. When keeping in mind that this airport will be located in the northern part of Finland, Lapland, we would highly recommend that there is some shops and restaurants that people know, so international brands, but also the airport need to promote also the local brands. This guarantees the local workers that their work will continue and if those brands are selected well, maybe these brands could be in future also in other countries. Energy and water consumption play a big role in this scale buildings and areas. Terminal would use only LED-lightening and those LED lights would be powered by solar panels which could be located on the roof of the terminal. In the

summer times airport could sell their leftover energy to the city or to somebody else, because summers are off-season in Lapland.

This airport also could have their own "melting room", where the staff could melt all the snow gathered from the runways and airport area. This water could be run through the own desalination plant from where the water is brought to consumers in toilets. Wind energy could be done together with Lapland region or some city, to get the maximum power out of those turbines. This could be beneficial both for the city/region but also to the airport.

What brings the consumers and money to the airport is aircraft and airlines. Airport should encourage the airlines to use the latest aircraft by lowering the fees for the airline by how their emissions are. This is how airport would get the "greener" airport stamp from the residents in the nearby area, because newer aircraft – lower emissions – less noise. When located up in the north, de-icing comes in a play, de-icing need to be also sustainable, to not to harm the surrounded nature. Those vehicles which are spraying the de-icing, need to be thought sustainability in mind. All the vehicular action in airside should be done by electric vehicles and the vehicles should be reloaded by the energy which are produced by the airport. Last thing but not least is airport should promote their sustainable values, bring exhibits to the airport, tell what has been done to save the nature and use local work force to ensure their life in this rural area.

6.2 Landside

Landside refers to the area of the airport that a person first enters, when they reach the airport. The area is a public area and any person has unrestricted access. The landside area is not controlled, and it does not have any security checks, unlike the airside, to get access. The landside of the airport is mainly used to get inside the airport to go through security checks, or to wait for a person arriving from the airside. The area usually has some commercial services, such as shops or restaurants, but not nearly as many as inside the airside. The landside area includes check-in counters and baggage drop areas. In a way, the whole idea of the landside of the airport is to be a support system for the airside between the controlled area and the public world.

Automation is a huge part of airport efficiency, especially in the landside of the airport. For example, many airports have automated baggage drops and check-in counters. The

automation helps the passenger to do things at their own schedule, such as dropping the bags and checking themselves in. The airport also hugely benefits from automation, as they need less employees working the counters. The passenger flow increases and becomes more efficient and avoids bottlenecking in landside, as the passengers can drop their baggage or check-in to their flight anytime, instead of the counter having a fixed schedule of open hours.

Many airports have put a lot of focus on the public transportation to give their customer easier access to the airport. This is good for the airport for two reasons: it avoids bottlenecking, as the customers are coming and going from multiple channels, and not only just one or two. The other reason is that the airport gets more expanding space, as they can have less allocated for parking spaces. From the customer perspective, it is also convenient, as public transportation is usually more convenient, as well as cost efficient. In Helsinki airport's case, the train comes right under the airport and is connected to the nationwide railway, which allows a more sustainable transportation to the Helsinki airport. People have flown to Helsinki from cities such as Tampere, Turku and perhaps even Oulu, but with the train, customers can support a more sustainable way, if they wish to do so.

6.3 Other

This airport should consider the sustainable certificates before they are constructing anything. These would be beneficial for the airport to get the recognition worldwide from their achievements in sustainable buildings. There are many certificates around the world, some of them are more international and some of them only are awarded only in the country where the building is. Here is a list from Green Building Council Finland from the certificates which are awarded to the Finnish buildings:

	New Building	Buildings in Use
LEED	109	37
BREEAM	73	76
Joutsenmerkki	3	0
RT-Classification	0	0
WELL	0	1

All the certified building in Finland 2018. (Green Building Council Finland.)

As you can see from the chart LEED and BREEAM certificates are the most popular in Finland. These are the most popular also worldwide. LEED certificates has origins from USA, and it has been developed by US Green Building Council back in the 1993. Most popular these certificates in Europe are in Germany, Sweden, Finland, Spain and Italy. (European Commission. Energy. LEED.) LEED stands for Leadership in Energy and Environmental Design and is an international certification system. To get this certificate buildings need to fulfil some criteria: reduced energy consumption, the efficient use of water, reduced carbon dioxide emissions, improved indoor air quality, the location of the building and the list goes on, with sustainable criteria. (STT info)

The other certificate which is most popular in Finland is BREEAM certificate. It stands for Building Research Establishment Environmental Assessment Method. The difference between LEED and BREEAM is that the BREEAM concentrates to Europe and has built around the norms of Europe and that is why it is the most popular in Europe. In BREEAM certificate you can apply indicators which takes in the consideration the best practices of the country, this helps each country to apply these certificates. (Green Building Council Finland)

6.4 Sustainable future airport model wrap-up

In today's hectic and technology driven world, it is hard to predict what the future would bring to us. We tried to conduct this sustainable future airport model according to the facts what we have researched and gathered to this thesis. We chose as a location Finland and more precisely Lapland. This was an easy decision, because the demand in Finnish Lapland's airports has been rising for years now and the capacity of the old airports are put to the test. Also, the nature and culture in Lapland is unique, so sustainability up in there is a must. We came to a conclusion that there is not only one practice that would do this future airport a sustainable, all the segments of the airport need to run in symbiosis. We divided the model in to three different sections to be clearer to follow, airside, landside and other. When creating this kind of project to design sustainable future airport model, the designers should keep in mind sustainable certificates for example LEED and BREEAM certificates. These certificates would ensure the construction a much-needed visibility in a bright light. To make airport or just a building sustainable, it needs to have certain elements and it has strict criteria how to get these certificates. Here is a list of what this airport would have:

- Sustainable de-icing, gathering the de-icing and processing it in a right way
- Encouraging the airlines to use latest equipment and aircraft, to ensure the lowest levels of noise and emissions.
- Working vehicles need to be also low in emissions, changing petrol engines to hybrid or fully electric example.
- Rainwater gathering or melting the snow from runways, this water could be used in toilets
- Solar panels, to ensure most sustainable way to have energy
- Wind energy, this could be done together with region or city to maximise the efficiency and to have renewable energy source even to residents.
- Desalination plant, to recycle the water or take water from lakes or sea to have fresh water in airport.
- Automation, there could be lot of automation but for example security checks could be automated to avoid long queues and ensure efficiency.
- Led lighting, lighting in Lapland is a must, because there is no sun at the winters, so the lighting needs to be long lasting and energy efficient.
- Build from re-used materials, this is a must because it is a criteria to get the certificate.
- Heating energy from own energy sources, from for example wind energy producing this heat.
- Better option to public transportation, we have seen the figures that airports struggle in this one. Public transportation creates the biggest emissions in airports and Lapland should have more and better options to and from airport.

To conclude this model, we need to think outside of the box and use what we have. It would be more that possible to create this kind of airport to the Lapland, because if we already have the technology and knowledge, it would be easier even in the future with new kind of technologies. The future will be even more sustainable than it is now, but the governments need to take initiative first and then people will have the change.

7 Discussion

The aviation industry is a fast-growing industry. The industry is expected to quadruple in passenger amounts in 2050. This raises a difficult task for the companies, as sustainability is a growing trend among customers. Customers are more aware of their environmental impact as a consumer than ever before. For the aviation industry, it's not easy to balance growth and sustainability as the operations produce a lot of emissions with current technology. The purpose of the study was to find how customers perceive airports and their sustainability. The aim was to find good practices from airports and other industries to find out what practices are most likely to be perceived well among customers.

The results of the study suggest that even though customers are mostly aware of sustainability and are interested on the subject, the customers are not willing to buy a more expensive product in trade of a more sustainable product. The survey conducted showed that while many respondents say that sustainability factor has an effect in their buying process, they most likely wouldn't fly out of a more sustainable airport, if it were more expensive if given the choice. This shows that customers are willing to pay more for sustainability in "everyday" products, such as groceries to get a more sustainable product, but not in "luxury" items such as air travel.

We ensured the ethicality of the study by using trusted and credible sources. These sources were gathered before and during writing this thesis. We also ensured that the survey was conducted in a way that the respondents anonymity stays confidential when collecting, analyzing and reporting the data. This is so that we couldn't see who answered and what they answered so the reporting is neutral. However, due to the survey respondents being mostly friends and close relatives, the sample size is not very diverse and therefore impacts the liability of this study. If given a more diverse sample size, the survey could have different results with people from different backgrounds. The idea of the study was to get a general idea of the mindset of an individual concerning air travel and sustainability. Given this context, the survey can be determined as a success, even with a slightly narrow and smaller sample size.

For future research, we recommend studying this topic once again in a few years. The subject of sustainability is a relatively modern topic and the many changes are only now beginning to happen. As the sustainability trend is still growing, companies are starting to implement sustainability into their company strategy more and more. The study of

customer perceptions of sustainability would be an interesting study to read in the near and also far future.

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Appendices

Appendix 1. Survey

Airport sustainability survey

Airport Sustainability Survey



What is your age? *

- 18 or under
- 19-29
- 30-39
- 40-49
- 50-59
- 60-69
- 70 or over

What is your gender?

- Female
- Male

How many times have you flown in an airplane? *

- Under 20 times
- More than 20 times

In terms of aviation sustainability, do you think more about it in terms of airport or aircraft? *

	1	2	3	4	5	6	
Airport	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Aircraft

What makes an airport sustainable in your eyes? *

- Eco-Design
- Reused material
- Renewable energy
- Reduced emissions
- No single use plastic
- Biofuel
- Landing/Take-off charges
- Public transportation to and from airport

Do you think about sustainability as a factor when buying?

- A lot
- Somewhat
- Not at all

Would you choose a more sustainable airport, even if it were more expensive?

- Yes
- No
- Maybe

Do you think that air travel is sustainable? *

	1	2	3	4	5	
Sustainable	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Not sustainable

Do you think that air travel is sustainable in the future? *

	1	2	3	4	5	
Sustainable	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Not sustainable

How do you think the future airport will look like?

Pitkä vastaukset

Appendix 2. Glossary of Terms

Sustainability

The act of not being harmful to the environment or drain natural resources. The act of supporting long-term ecological balance.

Airport

A place for aircraft to land, take-off, and repair aircraft.

Benchmark

A standard by which others can be measured or judged.

Survey

A questioning of person or persons to collect data for the analysis of an aspect of a group or area

ICAO

The International Civil Aviation Organization, is a United Nations controlled agency, established in 1944. They are the managing and governing authority on civil aviation

EASA

European Aviation Safety Agency. It is a European Union controlled agency who is responsible for regulate and maintain the aviation safety in the European area

Finavia

Finavia is a Finnish state-owned company that owns, maintains and develops all 21 airports and the network that it owns in Finland.

Swedavia

Swedavia is Swedish state-owned company that owns, maintains and develops 10 airports in Sweden.

LEED

LEED stands for Leadership in Energy and Environmental Design, is a green building certification used worldwide. It helps building owners and operators be environmentally responsible and use resources efficiently.

BREEAM

BREEAM stands for Building Research Establishment Environmental Assessment Method. It is the world's longest established method of assessing and rating the sustainability of buildings.