A STUDY OF U.S. CONSUMER PERCEPTIONS CENTERED AROUND SOLID WASTE RECYCLING MANAGEMENT OCCURRING WITHIN A LARGE PUBLIC VENUE (AIRPORT TRANSPORTATION HUB), THE REALITIES OF CONSUMER RESPONSIVENESS, AND ACTIONABLE ABILITIES OF THE VENUE'S PERSONNEL AND TENANT STAKEHOLDERS TO INFLUENCE IMPROVEMENTS AND TO EXACT POSITIVE CHANGES IN RECYCLING BEHAVIOR - THE CASE OF THE CINCINNATI /NORTHERN KENTUCKY INTERNATIONAL AIRPORT (CVG)

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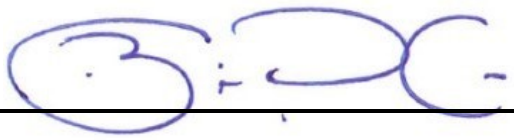

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ABSTRACT

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Title
A study of U.S. consumer perceptions centered around solid waste recycling management occurring within a large public venue (airport transportation hub), the realities of consumer responsiveness, and actionable abilities of the venue's personnel and tenant stakeholders to influence improvements and to exact positive changes in recycling behavior – the case of the Cincinnati /Northern Kentucky International Airport (CVG)

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Abstract

This Master's Thesis research addresses the general challenges of the United States national solid waste recycling system and circular economy engagement in the context of a large public venue of an airport transportation hub. Furthermore, it explores consumer stakeholders' perceptions of recycling practices, and personal characteristics and their impact on recycling behavior. Research problem is examined, and results analyzed through the theoretical framework of Stakeholder Theory and the Theory of Planned Behavior. The results of 156 (n) in-person conducted surveys of 19-question structured questionnaire reveals customers' active awareness of environmental issues, and engagement and interest towards sustainable development of organizational practices. Furthermore, this study reveals key improvement opportunities for the organizational stakeholders to develop to result with high-quality recycled material, cost-effective solid waste management practices, and enhanced customer experience. The concluded recommendations include clear guidelines of recyclable materials, list of items requiring further clarification, and operational developments to consider for further developing current solid waste management system.

Key words
Airport Sustainability, Circular Economy, Stakeholder relationship, Consumer Pro-environmental Behavior, Public Venue Recycling, Solid Waste Management

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TIIVISTELMÄ

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Tutkimus amerikkalaisten kuluttajien käsityksistä kiinteän jätteen kierrätyksestä suuren julkisen tilan kontekstissa, lentoliikenteen solmupisteessä ja operatiivisten toimijoiden vaikutusmahdollisuuksista tukea kierrätyskäyttäytymistä
– Cincinnati/Pohjois-Kentuckyn kansainvälisen lentokentän tapaustutkimus

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Tiivistelmä

Tämä Pro gradu -tutkielma käsittelee yleisesti amerikkalaisen kiinteän jätteen kierrätyksen käytännönongelmia ja kiertotalouden periaatteiden hyödyntämistä suuren julkisen tilan, lentokentän, kontekstissa, lento- ja tavaraliikenteen solmupisteessä. Lisäksi työ tarkastelee asiakassidosryhmän käsityksiä kierrätyksen käytännöntoteutukseen liittyen ja asiakkaiden ominaisuuksien vaikutuksia kierrätyskäyttäytymiseen. Tutkimusongelmaa tarkastellaan ja tulokset analysoidaan sidosryhmäteorian ja suunnitellun käyttäytymisen teorian kautta. Tulokset koostuvat 156:sta (n) vastauksesta 19-kysymyksiseen strukturoituun ja henkilökohtaisesti toteutettuun kyselytutkimukseen. Ne paljastavat asiakkaiden olevan tietoisia ympäristökysymyksistä, sekä sitoutuneita ja kiinnostuneita yksilön ja organisaation eko- ja vastuullisuuskäyttäytymistä kohtaan. Lisäksi työ kokoaa organisaation ja toimijasidosryhmien keskeisiä mahdollisuuksia kehittää toimintaa saavuttaakseen korkealaatuista kierrätysmateriaalia tuottavan, kustannustehokkaan ja asiakaskokemusta parantavan järjestelmän. Johtopäätöksissä esitettävät suositukset käsittävät kierrätysohjeistuksen selvennyksiä, listan erityistä huomiota vaativista jätetuotteista, sekä nykyisen jätehuollon käytänteisiin liittyviä toiminnallisia parannusehdotuksia.

Asiasanat
Julkisen tilan kierrätystoimet, Kiertotalous, Kiinteän jätteen kierrätys, Kuluttajien ekokäyttäytyminen, Lentokenttien vastuullisuus, Sidosryhmäjohtaminen

Säilytyspaikka
Jyväskylän Yliopiston Kirjasto

CONTENTS

ABBREVIATION LIST

ACI – Airport Council International
ACRP – Airport Co-operative Research Program
CE – Circular Economy
CO_2 – Carbon Dioxide
CSR – Corporate Social Responsibility
CVG – Cincinnati/Northern Kentucky International Airport
EPA – (U.S.) Environmental Protection Agency
ESB – Environmentally Significant Behavior
ESC – Environmentally Significant Consumption
GDPR – General Data Protection Regulation
GHG – Greenhouse Gas
HW – Hazardous Waste
KCAB – Kenton County Airport Board
MRF – Materials Recovery Facility
MSW – Municipal Solid Waste
PEB – Pro-environmental Behavior
RCRA – Resource Conservation and Recovery Act
ST – Stakeholder Theory
SWM – Solid Waste Management
TPB – Theory of Planned Behavior
U.S. – United States
UW – Universal Waste

1 INTRODUCTION

This Master's Thesis research is conducted in conjunction with the Kenton County Airport Board (KCAB), which oversees the operation of the Cincinnati/Northern Kentucky International Airport, abbreviated as CVG (henceforth CVG or CVG Airport). Inspired by the organizational, industrial, regional, national and worldwide challenges and attempts in developing efficient waste management, resource recovery, circular economy, and public engagement, means, and practices, with this work CVG is taking steps towards better understanding its operational context related to advanced sustainable performance and specifically, recycling and solid waste management together with its stakeholders, in here the traveling customers.

The aim of this research is to produce valuable information of the customers' attitudes and behavior related to recycling, and of the performance of the current recycling system. The results present customers' level of awareness of environmental issues and engagement with recycling and reflect their knowledge of how to recycle. Furthermore, items most often misplaced and misconceptioned, problems with the waste and recycling receptacles set-up, and factors impacting the customers' level of actual knowledge of recycling and waste management guidelines are explored.

Stakeholder theory and individuals' behavioral theories (Chapter 2) are applied to examine the stakeholder relationship between the organization and the customers and the factors that impact the behavioral decision-making process. Theory of planned behavior is utilized to define the factors of interest; self-evaluation of knowledge, attitude, engagement with behavior, and indirectly examined perceived behavioral control in the given situation of recycling. Furthermore, the actual knowledge and therefore a perception of the actual behavior in the given situation is examined by a waste diversion, a so-called recycling test. The methodological approach is quantitative, with in-person data collection through a survey of a structured questionnaire. Quantitative analysis were conducted, and results are presented in Chapter 4. Chapter 1 presented the relevant practical contexts and concepts of waste management and recycling related issues.

The goal of this research is to enable adequate decision-making for enhancing the organizational recycling practices. The concentration is on how to develop the waste management system to efficiently and intuitively support users of the system to divert recyclables adequately, following the instructions. The practical aims are to produce high-quality recovered materials, support efficient, low-cost local recycling services, and enable development of better waste management operations and potential cost-savings for the organization. Furthermore, the results of this research are useful for other entities evaluating their recycling systems and practices through comparing the existing issues identified, and by implementing applicable solutions presented in this research.

The identified problem items in the waste streams and recommended actions to develop existing systems can be modified and applied in many public spaces.

1.1 Sustainable materials management

Sustainability is commonly defined after Brundtland Commission's statement through development "that sustains the needs of the present without compromising the means of future generations to meet theirs" (Brundtland, 1987, p. 43). Ever-increasing human consumption of energy, food and goods drive expansion of agriculture and over-exploitation of natural resources, that have led to land, wetland and soil degradation, biodiversity loss, pollution, greenhouse gas (GHG) emissions and climate change (WWF, 2018). For long it has been known that the current level of consumption and rising demand of finite natural resources such as oil, gas, water, arable land, metals, rare earths, fertilizers, fisheries, and wood are continuously exceeding the biocapacity of the Earth (Brown, et al., 2014; Lozano, et al., 2018), and thus the first condition of the sustainability definition remains unmet. In addition to the direct ecological impacts, natural resource depletion and raw material scarcity limits development, production, consumption and thus the infinite-considered growth of the economy, and thus development of quality of life (Brown, et al., 2014). While development and innovation have been successful in some cases to develop substitute materials to replace those that have become scarce, it is likely not to be economically feasible or simply possible to create substitutes for all (Graedel, Harper, Nassar, & Reck, 2013), and therefore alternative methods to approach resource scarcity, overexploitation of natural resources, ideology of infinite growth, and consumption-based economy need to be developed (Graedel, Harper, Nassar, & Reck, 2013; WWF, 2018).

Adoption and development of resource recovery methods such offered by the circular economy (CE) model are measures for societies to cope with resource scarcity, develop new sustainable business models, increase resource efficiency, and thus sustain resources, value, and well-being for the present and the future demand. Compared to traditional linear model of 'cradle to grave' ideology of goods life-cycle, beginning from raw materials harvest to production and ending at the end-of-life to disposal, generating waste, the circular economy represents an approach of 'cradle to cradle', in which the value of harvested resources and manufactured products is maintained as long as possible through long-lasting design, maintenance, repair, reuse, remanufacturing, refurbishing, and recycling. (Ellen McArthur Foundation, 2020; Geissdoerfer, Savaget, Bocken, & Hultink, 2017) Key elements of the concept are; product engineering to minimize non-recoverable waste production, pollution and harmful environmental impacts throughout the product and service life-cycle; prolonging product lifespan; regenerating the natural systems; and, to involve all the stakeholders of a society such as policymakers, local authorities, companies, and individuals as

entrepreneurs, employees, and consumers to support the development of closed-loop systems where minimal amount of materials are lost from the cycle (Geissdoerfer, Savaget, Bocken, & Hultink, 2017).

CE has been criticized for having a narrow economic vision of resource maximization and lacking political and sociocultural aspects and value creation (Zwiers, Jaeger-Erben, & Hofmann, 2019). Yet, decision-making power, environmental burden, means of action and responsibility often do not fall equally within the chain of stakeholders of a product life cycle. (Ilic, Eriksson, Ödlund, & Åberg, 2018) Primary problems are related to decisions of product design, manufacturing and transportation efficiency, which can shift the environmental burden of pollution and GHG emissions to waste management sector and thus companies with little to no abilities to recycle the used materials, such as many plastics, and thus to end-users with even less to no means of sustainable disposal options. Therefore, CE indeed requires advanced policy instruments, system approach and collaboration to efficiently support sustainable development throughout products' whole lifecycle in the hands of all the stakeholders (Ilic et al., 2018).

Though CE and issues of sustainable societies are not all about waste, it has a big role both as a problem and as a part of the possible solutions. Waste management is a complex universal issue that affects everyone. Individual, community, and authority level decisions affect both directly and indirectly many aspects of life such as cleanliness, health, productivity, and prosperity of humans, animals and the overall natural and built environment, and the negative impacts often affect the most of those least equipped to mitigate (Kaza, Yao, Bhada-Tata, & Van Woerden, 2018).

According to the World Bank's report *What a Waste 2.0*, globally 2,01 billion tonnes of municipal solid waste (MSW) defined as residential, commercial, and institutional waste excluding industrial, medical, hazardous, electronic, construction and demolition waste, is produced annually. (Kaza et al., 2018) This translates to 1,6 billion tonnes of carbon dioxide (CO_2) equivalent GHG emissions from the solid waste treatments and disposal, still excluding the emissions of waste transportation. These quantities are expected to rise to 3,4 billion tonnes of MSW and 2,6 billion tonnes of CO_2-equivalent GHG emissions by 2050. The main contributor to the MSW-originated GHG emissions is non-adequate waste management such as open dumping and landfills without gas-recovery systems which cover 33 % of global waste, while sanitary landfills with gas-collection systems consist only 8 % and mainly exist in high-income countries, like the United States, where globally over 90 % of the MSW also gets collected. The amount of generated waste seemingly increases along urbanization and increase of income level, drastically so within lower-income segments. Globally, waste collection and management practices also become more challenging in an urban environment with high population density due to lack of space and infrastructure, while the income level of the community and cost of waste management solutions often limit the feasible treatment options. High-income countries population consists only 16 % of the world's population yet produce

over 34 % of all waste, with 19 % expected increase by 2050. Currently, composting and recycling counts for 19 % of all produced waste, yet the trend is positive worldwide. (Kaza et al., 2018) In conclusion, solutions, accurate data collection, collaboration, and thus efficient future planning and actions are desperately needed to support efforts of global sustainable waste and resource management.

1.2 Waste Management within the United States

In the United States, the Congress-authorized Resource Conservation and Recovery Act (RCRA) Program (1976) allows the Environmental Protection Agency (EPA) together with the States and local governments to regulate and enforce solid waste management. RCRA has set national goals to fulfill the aim of the program to protect communities and the environment by setting standards for hazardous and non-hazardous solid waste management practices and handling facilities, and supporting effective infrastructure, while advancing energy and natural resources conservation and generated waste reduction, implementation of sustainable materials management through life-cycle approach, innovation, and partnership building (EPA, 2014).

Solid Waste is defined as any garbage, refuse or effluent in solid, liquid or gas form, produced in the many functions of a society while Solid Waste Management (SWM) refers to "supervised handling of waste materials from their source through recovery processes to disposal". (EPA, 2020a) Hazardous Waste (HW) is defined as solid waste "with properties that make it dangerous or capable of having a harmful effect on human health or the environment". HW is regulated according to Cradle-to-Grave System which includes to ensure safe management of the waste from the time of creation over transportation to treatment and storage, and until disposal. Generators of HW must fully document, quantify and ensure identification, managing, transportation and treatment of their waste and more precise compliance regulations are defined based on the quantity of regularly generated HW (EPA, 2020a). Universal waste (UW) is a type of hazardous waste commonly generated in households and institutions such as batteries, mercury-containing equipment, pesticides, and light bulbs. (EPA, 2020b) The aim of the UW Program is to encourage UW recycling and building municipal and commercial programs for UW recycling and thus prevent these items from being disposed to landfills or ending up in nature by easing the regulatory burden of HW generators (EPA, 2020b).

Non-hazardous solid waste recycling (henceforth recycling) is an important form of solid waste treatment besides options of all forms of reuse and disposal, such as landfilling and incineration. EPA defines recycling as "collecting and reprocessing a resource so it can be used again", and thus it is also an important form of materials and resource recovery (EPA, 2013). EPA lists the benefits of recycling to include environmental aspects such as energy savings

from reduced raw material hauling and processing, natural resource conservation such as timber, water and minerals, pollution prevention, reduction of greenhouse gases, and reduced landfill and incineration burden and costs (EPA, 2020c). More economic benefits include aspects such as creation of new jobs, industries, and stimulating greener technologies, increased wages and taxes, supporting local manufacturing and raw material hauling, and thus increased economic security (EPA, 2020d).

The National Framework for Advancing the U.S. Recycling System (EPA, 2019a) lists the following as the main challenges of advancing the U.S. recycling system; confusing and non-united guidelines causing confusion of generally recyclable and in-practice recycled items and materials; outdated recycling infrastructure; reduced export markets and weak internal markets of recycled materials; varying methods of measuring recycling system performance and waste generation. Confusion of recycling guidelines often leads to unnecessary input of recyclables to trash, or contamination of non-recyclable items and materials to recycling steam. Contamination increases issues and safety hazards at the materials recovering facility (MRF) such as equipment failures, jamming the process, and endangering employees to dangerous items. Furthermore, contamination causes increased processing costs, lower quality of end-material and thus market price. These challenges lead to increased landfilling of recyclable materials, loss of revenue, higher price of recycling services and decreased recycling rates. EPA recognizes four critical action areas to be education and outreach; enhanced infrastructure for sustainable materials management; and enhanced performance measurement methods (EPA, 2019a). EPA is continuing the advancement with a National Recycling Strategy, that aims to address goals and actions needed to create a robust, resilient, and cost-effective national recycling system. (EPA, 2020e) The strategy will be finalized in January 2021.

EPA monitors waste management information and publishes a Sustainable Materials Management Facts Sheet, according to which on year 2018 (2017 values in brackets, (EPA, 2019b)), United States annual MSW creation was 292 (268) million tons[1]. Of this, 23,6 (25,1) % was recycled, 8,5 (10,1) % composted, 11,8 (12.7) % combusted with energy recovery and 50 (52,1) % landfilled. Of 63,13 (40,67) million tons of produced food and other organic municipal solid waste only 4,1 (6,3) % was composted, while other food waste management paths consisted 28,1 % of food waste in 2018, accounting 6,1 % of total MSW. Additionally, 63 (69,4) % of the 35,4 (35,18) million tons of yard waste was composted. These amounts of MSW also include construction and demolition debris as part of non-hazardous solid waste stream. It is also important to note, that for 2018 report, EPA has renewed the food waste measurement methodology which increased the amount of overall MSW and food waste amounts significantly by 22 million tons, and thus reduced the landfill recovery rate of

[1] U.S. short ton = 907,2kg, differing from the SI system "metric ton" or "tonne" = 1000kg used in the World Bank report (Kaza, Yao, Bhada-Tata, & Van Woerden, 2018)

composting. (EPA, 2020e) The 2018 report also shows other excess food and food waste recovery methods, which include animal feed; land application; codigestion/anaerobic digestion; bio-based materials/biochemical processing; food donation; and sewer/wastewater treatment. Overall, the trend of waste generation has been on the rise over the years, yet landfill input has slowly been declining with increased efforts of recycling, composting and combustion for energy recovery (EPA, 2019b, 2020e).

The COVID-19 pandemic during the year 2020 has caused many negative and positive short and long-lasting impacts in many aspects of our lives. Some first positive implications to the environment are seen in air quality improvement, cleaner beaches, and less environmental noise, while negative implications include especially increase in waste generation and reduction of recycling. (Zambrano-Monserrate, Ruano, & Sanchez-Alcalde, 2020) Introduced personal protective equipment, retrieval of plastic bag bans, increased time spend at home and thus increased residential food and packaging waste have increased overall waste production, yet the fear of potential health threat caused by the virus spreading through the MRFs have caused recycling practices being restricted and stopped in many countries severely affected by the virus (Zambrano-Monserrate et al., 2020). This unprecedented situation and its implications have impacted the recycling services and poses great challenges for the future of advancing the recycling system also in the United States.

While there are no enforced federal regulations regarding implementation of recycling, EPA is committed to advancing sustainable materials management, materials recovery, and waste management hierarchy practices, commonly known as the 3 R's of reduce, reuse and recycle, and development of life-cycle approach. (EPA, 2009) EPA collaborates with state and local governments and supports planning and implementation of local regulations and solutions, and many individual states and cities have set voluntary goals as well as binding regulations. In the case of airports, those located within cities that have set their individual goals for recycling and composting are more likely to have such advanced services also in the airport ground (SFO, 2018), and thus stakeholder collaboration is highlighted as motivational and implementation-initiating power along with the importance of regulations for environmentally sustainable practices.

1.2.1 Local Recycling Co-operation

In the Greater Cincinnati region, which CVG Airport serves and is located at, there are multiple entities engaged in finding means to advance the recycling rate, increase accepted recyclable items, and bring new solutions to the region. These instances include governmental organizations such as the EPA; states', counties', and cities' environmental and solid waste and recycling departments; waste, retail and manufacturing companies; sustainability organizations such as the Green Umbrella, a regional sustainability alliance; and initiatives such as the Beyond 34: Recycling and Recovery for a New Economy which is a national waste

hierarchy and circular economy driven public-private multi-stakeholder initiative to increase the U.S.'s average recyclables diversion rate from 34%, introduced by the U.S. Chamber of Commerce (ASU, 2019).

An assessment report *The Current State of Recycling in the Cincinnati Region* was produced within the scope of the Beyond 34 initiative in collaboration with the local stakeholders. (ASU, 2019) It compiles recycling data from city of Cincinnati located in Hamilton county which are the main identified regional stakeholders. The available data shows that landfilled MSW consist of; 30.4 % of compostable organic matter, of which 16.8 %-units is food waste, currently without a facility to comprehensively process it; 21.2 % of paper with 15.6 %-units of recyclable materials and rest is compostable; 15.2 % of plastic with only 3.8 %-units of recoverable materials, majority of currently unrecyclable plastic film products; and, other materials including mixed materials household items such as diapers, large appliances, pet waste, and so forth, with estimated 4.0 % of recoverable materials, mainly textiles (Hamilton County SWCD, 2018).

As commercial waste is not managed by the regional authorities, such data is not readily available, and facilities impacts are only estimated in categories based on their core business. (ASU, 2019) Furthermore, the report summarizes that; Cincinnati and its surrounding areas have engaged with efforts to prioritize recycling to meet the Cincinnati citywide goal of Zero Waste by 2035; The areas main landfill and recycling facility provider, Rumpke, is in a unique position to continue recycling through strong partnerships with local secondary material buyers despite the recent years issues of global recycling related to China's change of secondary material policies; Plastic waste capture rate is high while paper and compostable materials rates remain low; and, urban farming initiatives, waste collection, yard waste, and infrastructure must be considered in a holistic way to benefit the whole region (ASU, 2019).

1.2.2 CVG Airport and the Aviation Industry

CVG is a medium size airport located in Hebron, Kentucky, serving the Tri-State area (central to the U.S. states of southwest Ohio, northern Kentucky, and southeast Indiana) in what is considered and referred to as the Greater Cincinnati region. In 2019, CVG served over 9.1 million passengers traveling to and from over 50 nonstop destinations including international flights provided by 10 airlines and tour operators. (CVG, 2020) It is also North America's 7th largest cargo airport with altogether 1,2 million tons of annually handled cargo through 9 operating cargo carriers, including Amazon's Prime Air Hub and DHL Express Global Superhub located at the premises. CVG operates on 7,700 acres of airport ground, employs 14,500 badged employees through over 70 employers. It has $120 million annual operation budget and overall has over $6,8 billion economic impact on the region (CVG, 2018).

'A city within a city' is a phrase often used to describe the CVG Airport as a business and operational environment. It has a compact, highly monitored and gated private campus with high-level security measures and yet similar day-to-

day issues to manage as any municipalities do, such their own stormwater treatment plant, municipal solid waste, noise and environmental impacts, land development, and vivid neighboring communities to consider, along with security, safety and transportation of passengers and employees. (CVG, 2020) Such environment provides attractive operational opportunities to test and develop solutions that could be scaled up or down to other airports or communities. This principal idea leads the work of the innovation team and the development within the four verticals of CVG Innovation: Clean, Connect, Transportation and Secure. Their aim is to enhance customer experience and create new revenue sources while increasing efficiency through wearable technology and feedback systems; advancing security measures; developing efficient transportation systems through robotics, drones, and autonomous vehicles; reducing carbon dioxide (CO_2) emissions and increasing sustainable performance of the airport. The applications are tested and applied together with the other departments and external partners, such as universities, start-ups, and corporations (CVG, 2020).

The Federal Aviation Administration regulates and develops the Aviation related practices within the United States. (FAA, 2016) Among many regulative duties, they provide help and funding incentives for airports for example to create a Sustainability Master Plan, implement environmental programs such as organizing advanced recycling and fund research initiatives of the Airport Cooperative Research Program (ACRP) which publications are available for all airports and can be utilized as a support in applying such development into practice. (FAA, 2019) FAA and many of the airport networks use the airports' global trade organization Airport Council International's (ACI) North American division's airport-specific sustainability definition model 'EONS' which stands for Economic Viability, Operational Efficiency, Natural Resource Conservation and Social Responsibility, which incorporates operational efficiency in addition to the common dimensions of the 'Triple Bottom Line' model. It includes, for example, the airport's responsibility to provide ground support operations to enable airlines with efficient plane and runway use, minimize wait times and thus for example maximize fuel efficiency (ACI-NA, 2017). With increased worldwide public awareness of sustainability, climate change and the environmental impacts of flying (Kantenbacher, Hanna, Cohen, Miller, & Scarles, 2018; Tabuchi, 2019), sustainability has become one of the main topics of issues within the aviation industry. With the lowest and decreasing average airfare rates in the region, and thus increasing number of passengers, carriers, destinations, and investments of the cargo partners, CVG is looking for growth in both passenger and cargo business sectors in the oncoming years (CVG, 2020). Therefore, it is important to address the economic, social, and environmental impacts of the airport, and develop practices that support sustainable growth of the airport and the whole region.

After the data collection of this research, COVID-19 pandemic has impacted the aviation industry heavily due to traveling restrictions and advisory

against any unnecessary traveling. (ACI World, 2020a) While demand of cargo has even increased due increased online shopping and delivery service use, reduced numbers of passengers and changed social behavior and consumerism of face-to-face services, such as shopping and dining, have had a major impact on businesses and the ways business is conducted everywhere. Reduction of passengers through airports has presumably led to reduction in the amount of generated waste. At the same time, increased mistrust on the safety and hygiene of reusable products, such as cutlery at restaurants, and reduced dine-in have in general significantly increased the amount of generated waste, especially of single-use plastics (Vanapalli, et al., 2021). ACI has encouraged to continue reusable and recyclable materials use when appropriate and in-alignment with local health authorities' instructions, as well as reassessing waste management practices to reduce operational costs while enhancing hygiene and safety measures related to waste management operations (ACI World, 2020b).

In co-operation with the local initiatives and recycling stakeholders, CVG is also looking for ways to enhance its recycling rate and examine options to introduce new recyclable and re-use waste streams. CVG has adopted the locally common curbside pick-up system of waste collection within the public areas of the airport and most parts of the operational buildings. It includes two-receptacles, trash and recycling. Trash is transported to landfill with GHG collection system, while recycling is operated through a single-stream system, which means that all accepted recyclable items can be placed into one collection bin and are separated at the MRF. (Rumpke, 2020a) The accepted items at CVG and commonly throughout the Greater Cincinnati region are as follows; all colors of glass bottles and jars; plastic containers with a bottle-neck shape with caps attached; metal cans, containers, lids and empty aerosol cans; clean paper, cardboard and carton items. (Appendix A, Figure A1; Rumpke, 2020b) Recyclable items must be placed loose or in transparent plastic bags for the safety of the MRF employees who manually assist in the sorting process and are instructed not to open non-transparent bags.

CVG is looking into options of diverting food waste and thus options of introducing compostable tableware into its food serving concession partners' materials selection instead of unrecyclable single-use products commonly used by the fast-food industry. This development is supported by the Arizona State University report (2019, p. 24) by an estimation of food waste solutions being extremely necessary addition to the waste treatment solution in the Cincinnati region. Furthermore, reduction, re-use and redesigning of single-use and plastic packaging are the key aspects of retail industry partners efforts. As mentioned, the region has limited feasible commercial options for food waste processing through industrial scale services such as composting or anaerobic digestion at the moment of this study (ASU, 2019), though recently some composting services have begun to emerge on the market (GoZero, 2020; Kentucky Compost, 2019).

1.3 Research Questions

There is very limited amount of data available to support analyses of CVG's recycling or overall waste generation, as only parts of the landfill-trash and recyclables are stored in compressing containers which get weighed as single units while the rest are stored in open dumpsters that are hauled as a part of a service route and are weighed in the end of the route for the landfill and MRF facilities' own regulatory purposes only, and thus contain waste from multiple generators and therefore are not applicable for a single generator. A full waste auditing is time and effort consuming exercise, yet in the future very beneficial for the purpose of understanding the main issues with recycling.

This research will provide valuable information of the customers perception of waste and recyclable items, and recycling knowledge, to support development of practices. CVG will begin from exploring the traveler-customers' interest to such practices, their views about existing set-up of waste management provided in the public areas, the need of making the set-up clearer and the possibility to introduce new options for enhanced recycling. The research problem can be defined as follows:

"The organization's limited understanding of the customers interests regarding engagement to sustainable and pro-environmental practices at the CVG Airport, and furthermore of customers knowledge of recycling and how to effectively support the engagement of practice."

The aim of this research is to explore the customers' views on the sufficiency of recycling at the CVG Airport and the supportive and inhibitive factors of the waste receptacles for recycling purpose. The scope is to explore how customers view the waste management efforts and their usability, and to identify the factors that currently support engagement with recycling practice in the facility, and those requiring development.

The following research questions were formed together with the CVG Airport representatives based on the interest for the view of customers as an important stakeholder and user group of immediate sustainability service of recycling to provide information of the functionality and performance of the system. The structure of the research is based on modified theoretical model derived from the Theory of Planned Behavior, which aims to explain the factors behind engaging with pro-environmental behavior. The research questions are formed as following:

1. Do customers hold stakeholder pressure for advanced sustainability performance for the CVG Airport?
    a. Are environmental issues and recycling a concern of customers?
    b. Are customers educated and engaged with the practice of recycling?
    c. Are customers aware of sustainability aspects other than recycling?

2. How does the current recycling system perform?
    a. What is the relative diversion rate among common recyclable items?
    b. Is there potential for new recoverable waste streams, such as compostable waste?
    c. What inhibitive and supportive factors exist for customers to engage with recycling?
        i. Is the system accessible and intuitive?
        ii. What factors impact the Personal Recycling Score?

The methodological approach is a quantitative, measuring the frequencies and variance of socio-economic information, self-evaluation in relation to pro-environmental behavior, and feedback of recycling services provided. Additionally, requested suggestions and more in-depth feedback are utilized as explanatory sequence. The results shall support and guide the decision-making process when it comes to evaluating and renewing existing receptacles and their set-up, engaging with new solutions and developing infrastructure to serve enhanced waste management, cooperation with service providers, and educational approaches towards stakeholders.

2 THEORETICAL FRAMEWORK

Sustainability can be defined through the three dimensions of sustainability as "the integration of economic performance, social inclusiveness, and the environmental resilience, to the benefit of current and future generations" to stress the integration of all the three dimensions of the concept (Geissdoerfer et al., 2017), and approachability also from traditional business point of view. Supporting increased sustainable performance, steps towards more circular society, and enhanced organizational stakeholder engagement are the theoretical center and goals of this research. Therefore, the theoretical contexts of stakeholder management and corporate social responsibility (CSR) are used to explain the motivation of CVG Airport to conduct such a research in the first place and emphasize the importance to develop practices in conjunction with the stakeholders. Furthermore, the theories around customer characteristics that are expected to play a role in defining one's views and behavior emerges from behavioral science, that has been used to understand the factors and drivers behind environmental related behavior (Stern, 2011). Therefore, these theories are examined to gain an understanding of the framework around enabling and enhancing recycling. Finally, the Theory of Planned Behavior is chosen to build upon a theoretical model for the questionnaire.

2.1 Stakeholder Management

Since the concept's introduction in 1984, now commonly known as the Stakeholder Theory, it has become a backbone for the business ethics, CSR and sustainability management discussions. (Freeman, Harrison, Wicks, Parmar, & De Colle, 2010) It highlights the role of corporations to increase value in a broader concept rather than merely the economic value of shareholders in daily operations as well as strategic planning. Shareholders refer to the company owners and financiers, while Freeman has defined stakeholders as "any group or individual who can affect or is affected by the achievement of the activities of an organization'' (Freeman, 1984, p. 46, as cited in Freeman et al., 2010). For most businesses, the main stakeholders would include customers, employees, suppliers, impact-communities, and financiers, yet stakeholders come in too many forms to exhaustively list (Freeman et al., 2010).

Freeman, Martin and Parmar (2007) present the concept of *Stakeholder Capitalism* that underlines the modern-day issues of capitalism and suggest that changing the assumptions and discussion of business from safety and self-interest centered value capturing to social centered, cooperation-driven value creation, and thus states, that to be what businesses should be about (Freemanet al., 2007). Freeman et al. (2010) restate that the modern world and its issues

emerged from globalization, rapid development of information technology, liberalization of states and nations, and the ever-increasing societal awareness have created a situation where corporations can no longer ignore the ethical aspects of business. This traditional separation of business and ethics, along with the issues of value creation and trade, problems of managerial mindset, as well as concept of individual, corporate, and societal responsibility are in the core of the Stakeholder Theory to address and develop in practice (Freeman et al., 2010; Freeman, 2017).

Freeman et al. (2010) clarify that the stakeholder theory's ideology does not oppose the idea of the traditional business capitalism, or so called "stock- or shareholder theory", which claims that business' purpose is profit maximization for its owners. Instead, they argue that the real maximum of profits is only gained through engaging all stakeholders into a healthy relationship with the corporation and basing business and strategic decisions on understanding the impact of those to all the stakeholders (Freeman et al., 2010).

It is important to remark that traditionally stakeholder theory has concentrated to companies' responsibilities towards their stakeholders and stakeholders influence on the company. However, Freeman & Dmytriyev (2017) underline the multi-directionality of responsibilities, meaning that stakeholders too would have responsibilities towards the company and other stakeholders, within reasonable consideration. Sulkowski, Edwards & Freeman (2018) suggest a step further by proposing companies to initiate collaboration with stakeholders to promote pro-socio-environmental changes in the society and thus proactively leading the change and cocreation of shared sustainable values.

A review from Uribe, Ortiz-Marcos & Uruburu (2018) shows that stakeholder management is also a fundamental direction in project management today, that provides companies tools and clarity for value creation, such as increased interpersonal, social and communication skills and emotional intelligence. The authors expand the traditional project management consideration scope of cost, time and quality to include wider scale stakeholder engagement and longer time frame beyond immediate project scope to increase creation of sustainability values. According to them, doing so provides companies; instuments to promote CSR and inclusive policies; generate shared value and technological innovation; and, it functions as a key factor in the strategy and business management of a project (Uribe et al., 2018).

Stakeholder theory has been applied and exceeded in different fields of business and management as well as criticized throughout. Stieb (2009) concentrates to invalidate Freeman's arguments about readjusting the stockholder beneficiaries with larger representation of stakeholders, and of giving them deciding power in the corporate decision making by seeking answers to what and how much of benefits and power is enough for stakeholders outside of the stockholder group. He concludes that Freeman's theoretical suggestions either change the current management ideology of business too much or on the contrary does not add new value to the practices. Similar conclusions have drawn Soin (2018), who argues stakeholder theory to lack

normative evidence and to be unable to hold against the empirical issues of the stakeholder 'rights', and thus should not be considered as a practical but instead a general descriptive management theory. Barney and Harrison (2020) compile 12 themes of expert-identified "tensions", questions of the modern stakeholder theory and answers aiming to clarify those. The tensions range from questioning stakeholder theory being a true academic theory; its essential arguments; its purpose; role of creating satisfaction and value, and to whom; and the means of stakeholder decision-making to its position in align with other perspectives. While many of the questions remain open for future research and little of consensus is established among scholars, they conclude that stakeholder theory is a "genre of theories with some common themes" instead of being merely one theory nor "a theory of everything" (Freeman, Phillips, & Sisodia, 2020; Barney & Harrison, 2020).

To understand the scopes of the overlapping theories, Freeman and Dmytriyev (2017) define that CSR concentrates to address mainly social issues and responsibilities the corporation has towards the community and society, while stakeholder theory aims to define the reasoning for fundamental existence of the business and the multi-directionality of responsibilities within the firm and its interlinked stakeholders. They also clarify that creating value for one stakeholder group, in the case of CSR – the society, is not in contradiction with the stakeholder theory if not done at the expense of the other stakeholders, including shareholders. They thus emphasize the equal importance of all the stakeholders and propose the use of term "corporate responsibilities" within the concept of stakeholder theory (Freeman & Dmytriyev, 2017). Barney and Harrison (2020) mention that due to stakeholder theory's comprehensive nature it benefits of the interlinkages with other theories. Freeman and Dmytriyev (2017) clarify that the context and problem define which theory or approach is going to be most effective for the companies to address and handle the issues at hand. While stakeholder theory underlines the interlinked responsibilities within all stakeholders and CSR concentrates to the social responsibilities towards the community and society, a category that many of the customers directly or indirectly could be accounted to, Barney and Harrison (2020) claim it is the terms of marketing that customer-oriented research falls under.

2.2 Behavioral Theories

Vlek and Steg (2007) compile five (5) driving forces of environmental resource use: Population, Affluence as the average consumption, intensity of Technology used in production, and Institutions and Culture in which the impact takes place. These define the total environmental impact of human activities and thus are the key intervention areas to establish more sustainable societies, including urban environments, natural resources, wildlife, recreational areas, and the climate and weather conditions for everyone and all forms of life. They list key goals to ensure

such environmental security: conserving basic resources and sufficient living environments; protecting human health and natural areas with its wildlife from environmental risks; and promoting harmony between humans and the natural environment. As they conclude, many environmental problems occurring on Earth are in fact originated from human social and behavioral issues, and thus fundamental changes to the operational concepts of societies are required in all levels (Vlek & Steg, 2007). To understand the behavior, potential, and means of change, we must then examine the theories behind motivation and behavior.

Stern (2011) reviews the science of Psychology's achieved and potential contributions to limiting climate change, to which many aspects of resource scarcity, sustainable consumption and related human behavior are in connection with, as efforts of improving understanding of climate relevant individual, household, and organizational behaviors and personal, social, economic, institutional, policy, and socio-cultural factors that affect such behaviors. And furthermore, identifying environmentally significant behaviors and barriers to behavior change, developing, and identifying efficient intervention methods, and assisting in development of technologies and measures to be easily accepted by the public. Behavior that has a positive impact on environment is referred as pro-environmental behavior (PEB) while environmentally significant behavior (ESB) includes all actions with any environmental consequences (Stern, 2011). Consumption refers to what, how, and how much is bought, and how the products are used and disposed. (Trudel, 2019) Understanding consumerism, the decision-making process, and the determinants affecting those is imperative for governments, non-governmental organizations, and companies to influence the behavior of consumers to conserve and sustain resources for the present and future demand (Trudel, 2019).

2.2.1 Individuals' behavior

Psychological research has approached ESB and PEB from multiple directions including: individualistic motives and presumption of material welfare, subjective well-being and utility maximization; theory of planned behavior; cost-benefit relation and factors of altruistic concerns, such as environmental consciousness, normative goal frames, self-transcendent values and social value orientation; social comparison and social normative influences; stages of intentional behavior change; social network and innovation-diffusion theories; model processes of change in habits, and elaborate system theories. (Stern, 2011) Separately are considered research topics that recognize psychological determinants as ESB-specific instead of unified explanatory factors for all ESBs. These include research of the determinants of environmentally significant consumption (ESC), ESBs, and responses to interventions to change such behavior.

Stern (2011) finds the evidence of psychological or personal variables, values, beliefs, and norms, impact on engagement with ESB inexhaustive. While perceived behavioral control, attitude, and personal moral norms, as described

in the Theory of Planned Behavior, have found to be strongly predictive of pro-environmental behavior intentions, the connection to self-reported behavior is found to be weak and indirect, supportive mainly in niche situations when contextual factors are not applicable, such as recycling despite the lack of public recycling program, or carrying recyclables along to the next recycling receptacle, when only trash receptacle is available, for example. (Stern, 2011) More research is needed to examine the relationship of the psychological factors to individual ESBs to separate the role of contextual factors.

Trudel (2019) presents four major decision-making processes related research topics from the past two decades of environmental and sustainable behavior: cognitive barriers; the self; social influence and norms; and product characteristics. Cognitive barriers are related to the psychological decision-making systems and their implications. The first one being a rapid, autonomous system that relies on affection, familiarity, and associated memory, and leans towards preserving energy and effort, while the second is a cognitive system that can accept or reject the conclusion of the first one with refined and deliberate processing, relying on facts and information available. Due to the intertemporal nature of sustainably conscious behavior, it often requires deeper processing and thus more effort invested from the consumer. Present bias, cognitive myopia – 'shortsightedness', the uncertain and abstract nature of the benefits and consequences cause the human cognition to draw towards maintaining the status quo and thus often prevents one from focusing on the future, the consequences and long-term benefits of the decisions made today (Trudel, 2019).

The research of 'the self' bases on a premise that decisions are made because they are content with the consumers' beliefs and allows them to demonstrate those. (Trudel, 2019) The motives of self-signaling, self-identification, and social identification guide the decision-making of engaging or disengaging with certain behavior. Self-signaling is directed towards oneself and thus motivates commitment and standards of behavior through providing feelings of pride, and avert discrepancy and feelings of quilt, which at some cases can be counterproductive and increase the amount of consumption as the 'green' behavior supports the positive self-image. Self-identification refers to the many personal and collective identities one holds in different in-groups and for oneself. Consistent behavior accordingly with the identity of the group supports self-view while the desire to such can lead to rising of self-defenses and ignorance of evidence and the out-groups that support such behavior, as could be in the case of climate change denying, for example. Social self-defensive behavior can prevent one from placing valuable items to trash and recycling them instead. Furthermore, social identification motive places one to be influenced by the groups one belongs to and contributing with group identity supportive behavior. (Trudel, 2019). Social influence is the change in one's psychological factors resulting from the influence of others while social norms are the unwritten behavioral rules of groups and societies developed in social interaction. (Trudel, 2019) Descriptive norms represent the actual behavior of people and such

messaging can function as a supportive model of accepted behavior, similarly, as presented of self-identification. As people tend to look for guidance from the in-group, they presume them to possess more information, act accordingly and end with good results. Injunctive norms on the contrary represent the desired normative behavior of 'what should be done', and such messaging receives reluctant response if the matter holds no pre-interest for the consumer compared to suggestive normative messaging (Trudel, 2019).

As consumers are learned to value some sustainable attributes, the psychological determinants, selection size, and product quality and attribute expectations still influence the decision-making. (Trudel, 2019) Strength and endurance attributes are often viewed as the weaknesses of sustainable products compared to the superiority in gentleness attributes. Also, distortion of a material impacts the likelihood weather the product gets recycled or disposed to trash. Cut or smashed paper is valued less and placed to trash more likely than flawless piece, similarly, as seen in loss of identity with positive defenses in self-identification (Trudel, 2019).

2.2.1.1. The Theory of Planned Behavior

The Theory of Planned Behavior (TPB) is an extension from the Theory of Reasoned Action deriving from the limitations to predict behaviors with incomplete behavioral control. (Ajzen, 1991) They reconfirm the aim of TPB to understand, explain, and predict human behavior based on one's intention to perform certain behavior (Figure 1). The theory examines the impact of the determinants: attitudes towards a given behavior; the related subjective norms; and, perceived behavioral control, to the intention. Further explained, the intention refers to the motivational factors that influence behavior thus being an indication of the level of commitment to endeavor to behave in a certain way. Attitude refers to the level of positive or negative evaluation of the given behavior, subjective norm to the perceived social pressure related, and perceived behavioral control to the experienced level of possessed capability, anticipated obstacles and effort needed to invest to perform successfully (Ajzen, 1991).

The impact of each determinant is expected to vary between situations and behavior in question, and in some cases one's own attitude is found to overcome the perceived norms. Furthermore, the actual behavior is affected by the level of volitional control over the behavior as having the freedom to choose whether to act or not to act, and other non-motivational factors, for instance availability of opportunities and resources such as time, money, skills, and co-operation of others. These collectively define one's actual control over the given behavior, which self-evidently impacts the actual performance of a behavior. In conclusion, intentions with high perceived behavioral control have strong predictive correlation with the actual behavior (Ajzen, 1991).

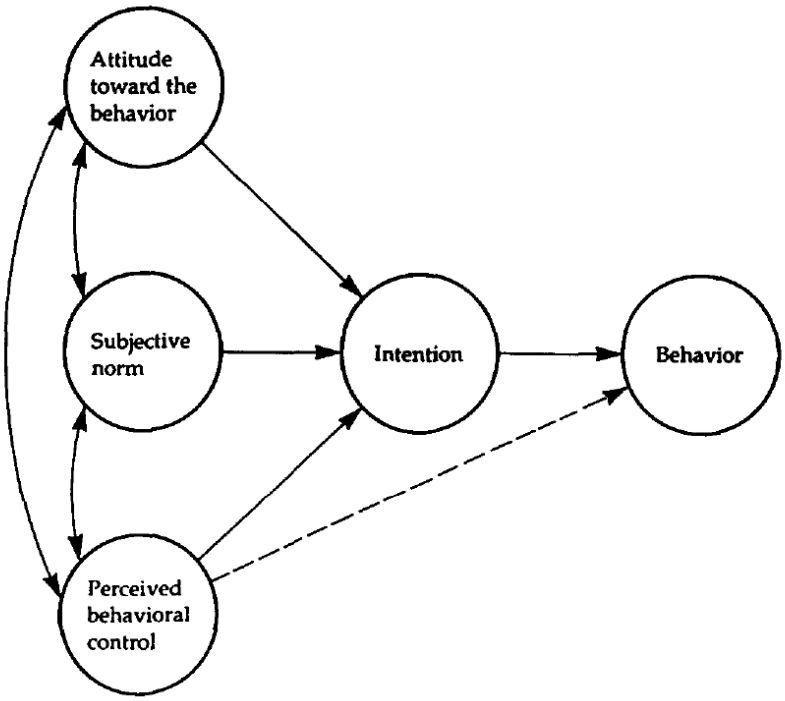

Figure 1. Theory model of the Theory of Planned Behavior (Ajzen, 1991).

TPB (Figure 1) also examines the antecedents of the determinants of intentions which are the explanatory factors of attitudes, subjective norms, and perceived behavioral control: salient information and behavioral, normative, and control beliefs. According to the expectancy-value model (Fishbein & Ajzen, 1975, as cited in Ajzen, 1991), the attitudes result from the beliefs one has of the object of the attitude and the attributes linked to it. In the case of behavior, attributes could be translated as the perceived outcomes of performing a given behavior. Therefore, the subjective value of the behavior's outcome is directly linked with the attitude one holds, and thus favors the behavior with perceived positive outcome. The attributes and evaluations can be evaluative such as cost-benefit-evaluation or affective judgements such as personal negative or positive feelings that rise from the behavior or its outcomes. The role of the different evaluation types is not clear in defining the attitude. Normative beliefs relate to the perceived likelihood of relevant social groups or individuals to approve or disapprove the behavior, and the strength of a belief is reasserted by the willingness to comply with the perceived expectations of those references. Control beliefs consist of past experiences of oneself and others, and factors that decrease and increase the believed capability of performance. In principle, higher beliefs of one's capability to perform, available opportunities, and fewer anticipated obstacles, the higher the perceived behavioral control. Ajzen (1991) concludes that while results support the existence of the connection between beliefs and the determinants of intention and presumes the connection to be vital in determining one's intention and thus behavior, the precise significance remains ambiguous. The limitations of expectancy-value model are examined in the contexts of methodological research requirements, yet the author

acknowledges that alternative models could explain the connection more sufficiently (Ajzen, 1991).

2.3 Tying the theories together

Both, the Stakeholder Theory, and the Planned Behavior Theory, have been used to describe the motivation and reasoning behind engaging with sustainable and pro-environmental behavior, such as recycling. Stakeholder theory discusses the matter from organizational perspective leaning on to the so called *human dimension*, the individuals in the different groups of stakeholders (Freeman et al, 2010), while the Theory of Planned Behavior concentrates to individuals, their motives and decision-making processes (Ajzen, 1991). Stakeholder theory was chosen as the backbone for this research to justify the customer related stakeholder research, and to evaluate the validity of the research within the context of pro-environmental behavior of individuals. Based on an overlook of literature about pro-environmental behavior, the behavioral theories concept was chosen of interest. Furthermore, examining the pro-environmental behavior and the aspects impacting it, the Theory of Planned Behavior was chosen as the leading approach, and was used to form the research concept and the questionnaire.

As some directions of Stakeholder Theory research questions the research of consumers and consumerism to completely be excluded under the research umbrella of marketing (Barney & Harrison, 2020), it seems important to justify the importance of inclusion of customers as a stakeholder group with valid rights to the dialogue of matters of responsibility with the businesses. In the case situation of this research, there are no direct motives of increasing sales, yet later in the implementation process, this could become a relevant point of view. However, customers power of decision-making and so-called voting with their feet, is present in all cases of businesses maintaining and attracting new customers. Also, the waste management related measures in question have a great potential of operational cost savings, and thus economic interest for the organization, if conducted in efficient co-operation with stakeholders. Therefore, it seems justifiable to agree, that there indeed is a vast grey line between addressing CSR and promoting marketing measures when it comes to consumerism related research.

However, as highlighted by Freeman & Dmytriyev (2017), the two-way feature of the responsibilities in the stakeholder relationship is an important viewpoint to the stakeholder pressure. This means that companies would not only have the responsibility to answer to the demands and needs presented by their stakeholder groups but have the opportunity and responsibility to act as an active promoter of applications and measures that have beneficial common or fundamental goals. In the case situation, CVG Airport has the opportunity to invest to enhanced recycling measures to support the efforts of recycling

education and advancement already happening in the surrounding communities and contribute with better quality recyclables materials to support low cost-structure of recycling services in the region. Furthermore, there is an opportunity to support accessibility for smaller facilities and residential communities to the services, and proactively lead the development of infrastructure of compostables collection options to support the larger community development progress.

Furthermore, Gallagher, Hrivnak, Valcea, Mahoney, and LaWong (2017) emphasize the importance of people as actors for organizational sustainability performance. They underline human resources and organizational education practices to support sustainable development, that were found to link to organizational identification, such as innovative culture, learning orientation, supportive and collaborative culture. While employee engagement and organizational performance measurement are outside of the research scope, it is important to note that for successful external stakeholder engagement in the context of sustainable practice development, it is reasonable to expect an efficient engagement and development to begin from within the organization. Stern (2011) reviews the psychological factors affecting organizational behavior with conclusion that profit-oriented organizations are often expected to follow the principles of economy and engage with actions and investments providing the highest economic efficiency. However, factors such as leadership, decision-making quarter, efficiency and style of communication in the organization, accounting procedures, and the accustoms of the maintenance and occupants can have a major impact on issues brought to decision-making and how projects are prioritized in the organization. Also, the receptiveness to different kind of psychological and intervention measures should be considered for different roles in the organization to enable efficient engagement with pro-environmental and responsibility matter (Stern, 2011).

Of interventions such as information, feedback, social motives, financial incentives, and combined approach, Stern (2011) concludes campaigns and dissemination of information to have traditionally been popular yet ineffective. However, framing and personalizing the information has shown positive results and potential in many fields. Furthermore, efficient feedback given frequently with a tangible reward dimension intact, providing social model behavior, and using social marketing techniques in a context of frequent behavior actions, have shown potential as feedback effects. With financial incentives the form and structure can have a major impact on the effectiveness in comparison to the monetary value, which means that program marketing, access to information of how to obtain the advantage, and the convenience of applying it play a key role in the effectiveness of the incentive. Finally, the most effective intervention is to apply a combination of the mentioned strategies as psychological manipulation may not offer major change on its own, yet it is an invaluable complement to the success of financial incentive programs. (Stern, 2011) Positive response to pro-environmental policies is found to connect with environmental worldviews and fundamental values, while opposition is linked to values and political ideology.

Beliefs, feelings and trust to the organization, technology or process can impact the acceptancy of policies, while cultural and social-structural factors, such as consumerism behavior, can require major fundamental changes of multitude of factors together (Stern, 2011).

As a base for this research, a modification of the Theory of Planned Behavior (Ajzen, 1991) that aims to reflect the different aspects of individuals, customers', perceived characteristics of themselves and the situation, and thus of the relation to the experience and behavior was chosen. The attributes of knowledge, attitude and behavior was formed. Self-evaluation variables (Table 1, presented in Chapter 3.2.2., Variables) represent the Knowledge (Q7 – 8) as perceived ability to perform the task through knowledge of recycling guidelines and the benefits of recycling, Attitude (Q9 – 10) as the self-reported level of concern of environmental issues and importance of recycling, and Behavior (Q11 – 12) as representation of subjective norms through the engagement with recycling behavior in one's day-to-day life, while Feedback data (Q14 – 16) is viewed to represent the situational Perceived Behavioral Control. Recycling Scores (extracted from Q13 results) are therefore a representation of Actual Behavior in the situation, in this case, imaginary waste disposal situation at the CVG Airport.

3 DATA AND METHODOLOGY

3.1 Research Methods

The research approach was chosen to be an empirical stakeholder survey, which is a questionnaire-based quantitative tool to provide companies or projects insights of the interest groups' knowledge, attitudes, perception, interests, and experiences (Sadashiva, 2020), otherwise easily left undiscovered and thus unconsidered. While this research concentrates only on one stakeholder group, the traveling customers, who are taking part to the research in person, the general benefits of this method include the ability to discover opinions from a wide range of individuals and organizations who can or might not be the actual users of a given service, participation is not necessarily bind to a time or space and allows differing perspectives to be presented (Sadashiva, 2020). These benefits provide a holistic view to the issues at hand. Also, in this research, the participants were not limited to the users of the recycling service which guarantees a wider range of experiences to be presented in the results. Future studies for other stakeholders, such as the internal stakeholders of employees of CVG, in-house partners and executives, and external stakeholders such as waste management providers, local waste authorities and non-governmental organizations would refine these results, the conclusions, and the practical opportunities.

Stakeholder Theory was chosen to be the backbone for this research to justify the customer related stakeholder research, and to evaluate the validity of this research within the context businesses interest to pro-environmental behavior of individuals. Based on an overlook of literature about pro-environmental behavior, the behavioral theories concept was chosen of interest. Furthermore, examining the pro-environmental behavior and the aspects impacting it, the Theory of Planned Behavior was chosen as the leading approach, and was used to form the research concept and the questionnaire.

A structured questionnaire of 19 scaled and open-end questions was constructed based on the company interests, and the factors in question were compiled based on the determinants presented in theoretical framework. The questions were refined together with the company supervisors and feedback was requested from colleagues. Finally, as a pre-test, the results were checked and evaluated after the first 30 participants for losses of participation or other immediate issues, yet nothing was changed at that stage.

As the target audience for the research are the traveling customers of CVG Airport, the data collection was conducted within the secured area of the airport. CVG has 2 concourses, referred to as A and B, with arrival and departure gates in addition to the main terminal with functions of pre-security check-in, luggage claim and the security check. Data collection was designed to capture a good representation of the traveling customers, for which data was collected in

different times of the days during a period of one week, excluding Sunday, in November 2019. Altogether, data collection took approximately 15 - 20 hours. Due to the rushed nature of the arriving traffic, only departing customers were targeted.

The surveying was conducted using a tablet computer to provide a Microsoft Forms platform survey for the participants to fill, or it was filled for them as a constructed interview if requested. The customers were approached mostly while seated by the gates to guarantee the least extra stress for the participants. A verbal or written (in case of a hearing-impaired customer) request to participate to the study and the purpose of the research were presented when approached. Proceeding to answer and completion of the questionnaire was considered as of an agreement to participate. After completion it was impossible to withdraw the consent of participation as the data is not identifiable to a single participant. Such was not requested, and overall, positive response to requesting to participate remained positive throughout the data collection period. Under 18-year-old participants were excluded from answering the survey.

3.2 Data and Analysis

3.2.1 Questionnaire

The questionnaire is presented in Appendix B in a text form. There are three (3) sections, and all questions of one are visible at a time. Questions are presented in a row, one after another, with only one possible answer to be chosen in each question. In Q13, there are 12 items to be placed in one of the 6 categories.

In the beginning of the section number two, the terminology of Recycling and Composting are explained in a high-level and thus defined as recycling referring to "separating instructed recyclable materials and items from non-recyclable trash and hazardous waste, and the following process of transforming [recycling] the material to be reused for other products" and composting referring to "biological decomposition of organic waste" (Appendix B). Furthermore, explanations of words and concepts, such as "Environmental Issues" referring to phenomenon such as environmental pollution or climate change, and "effort invested to recycling" in terms of emptying bottles and rinsing containers are provided throughout the questionnaire. Any further explanations were not provided during the survey process.

In the beginning of the section number three, there is a picture of the trash and recyclables receptacles standing side by side to provide an immediate reference for the Feedback section. Also, there is a worded instruction of the official instructions to recycling provided by the waste management company, Rumpke. It is to be noted, that the recycling test, Q13, was presented in the end of the section number two. This instruction is meant to support the evaluation of

functionality of the receptacles and the printed instructions on them, shown also in the attached picture (Appendix B).

3.2.2 Variables

This chapter describes the contextual meaning and statistical limitations of the variables. Furthermore, as in the case of Q13, multiple different examination variables are drawn from the basic results, which are presented in Appendix C, Figure C1, and all the new variables are presented in this section.

This research and the created questionnaire (Appendix B) produce quantitative data of 16 numerical variables, which are presented in Table 1, and are referred as variables Q1 - 16, and 3 open-end questions of explanatory qualitative information, Q17 - 19. The data consists of customers' socio-demographics, also referred as *Background information* (Q1-6), their *Self-evaluation* (Q7-12) as the perceived characteristics of knowledge, values and behavior related to environmental issues and recycling as described in the Theory of Planned Behavior (Chapter 2), their recycling knowledge with a scored 12-item-6-category -test referred as *Personal Recycling Scores* (Q13), and the *Feedback* (Q14-16) as evaluation of the performance of chosen aspects of the provided recycling service set-up at the CVG Airport. As examined in the Theoretical Framework (Chapter 2), the CVG performance evaluation represents the perceived behavioral control of customers, while the *Personal Recycling Scores* are considered as representation of the actual performance, the behavior.

Nominal variables are grouped to meaningful categories, provided in the questionnaire set-up, and cannot be put into any meaningful order amongst each other. (Table 1) Most of the variables are classified as ordinal, as those can be considered to include a meaningful order and are thus statistically higher quality measures. (Vehkalahti, 2019, pp. 27-30) Self-evaluation and Feedback information are measured on 5-scale Likert-scale, and thus are defined as ordinal scale variables in the statistical tests (Table 1).

Additionally, the survey provides qualitative information from three (3) open-end questions (Q17-19) to demonstrate the ideas and needs of the customers, and to provide deeper insight to the customer experience regarding recycling and sustainability performance of the CVG Airport.

Table 1. Variables' statistical classification. Classification used in statistical analysis in SPSS Statistics, and measurement scale used in the questionnaire.

Variable information			
Question #	**Variables**	**Classification**	**Scale in questionnaire**
	Participant ID	Scale	Automatically assigned
Background Information			
Q1	Gender	Nominal	4 Categories provided
Q2	Age	Ordinal	6 Categories provided
Q3	Education	Ordinal	5 Categories provided
Q4	Residency	Nominal	2 Categories provided
Q5	Purpose of Traveling	Nominal	2 Categories provided
Q6	Frequency of Traveling	Ordinal	6 Categories provided
Self-evaluation Information			
Q7	Recycling Knowledge	Ordinal	5 point Likert Scale
Q8	Recycling Benefits Knowledge	Ordinal	5 point Likert Scale
Q	Concern of Environmental Issues	Ordinal	5 point Likert Scale
Q10	Importance of Recycling	Ordinal	5 point Likert Scale
Q11	Frequency of Recycling	Ordinal	5 point Likert Scale
Q12	Effort Invested to Recycling	Ordinal	5 point Likert Scale
Q13	Recycling Score & Personal Recycling Scores	Ordinal	6 Categories provided; Variable presents the sum of correct answers
Feedback Information			
Q14	Clarity of Receptacles to Use	Ordinal	5 point Likert Scale
Q15	Clarity of Instructions	Ordinal	5 point Likert Scale
Q16	Convenience of Locations	Ordinal	5 point Likert Scale

Figure C1, Appendix C presents the data deriving from the questionnaire (Appendix B) Q13. Further analysis, the Recycling Rate of individual items, participants' Personal Score, and comparisons between the technically correct answers and the most desirable options for disposal, are compiled based on this information. *Correct Options* include the options that are correct and currently available in the region and at the CVG Airport, and the *Most Desirable Options* include the highest possible level of materials recovery value reasonably potentially available in the region, to dispose the item, even if such option is not currently commonly available. Of the given disposal options, *Composting* and *Hazardous waste* are not available in the public curbside pickup program, and thus are not commonly available in public places, also at the CVG Airport.

In addition to the 17 quantitative variables, 3 open-end survey questions were requested customers to further explain the significant factors. These questions include positive feedback items of the trash and recyclables set-up, recommendations to improve recycling, and suggestions of other sustainable development issues to be enhanced.

3.2.3 Statistical analysis

The final data consists of a sample of 156 participants (n=156) from the population of customers traveling through the CVG Airport during the data collection week. The main interest of the in-depth statistical analysis is to understand the factors impacting the Personal Recycling Scores, as those are perceived as the representation of the actual behavior of customers in the situation of waste disposal and recycling situation. Furthermore, the suggested theoretical dependency model based on the Theory of Planned Behavior as presented in Chapter 2.2.1.1 is examined as follows; the possible dependencies and correlation of *Background information* (Questions 1-6) is analyzed with the *Self-evaluation* (Questions 7-12) and *Feedback* (Questions 14-16), and further on, all variables with the *Recycling Scores* (Q13). All tables and figures are created utilizing Microsoft 365, Excel version 2010. Statistical analysis is conducted with IBM SPSS Statistics version 26.

The dependency between dichotomous background information variables (*Gender*, *Residency*, and *Purpose of Traveling*) and Personal Scores is analyzed by comparing the difference in means of two groups and the statistical significance of the possible difference utilizing the Independent Samples T-test. Levene's test's insignificant p-value ($p>0,05$) shows if two-sided test of the T-test can be utilized.

The dependency between non-dichotomous background information variables (*Age*, *Education*, *Frequency* and *Frequency of Traveling*) and Personal Scores is analyzed by comparing the means of variances within multiple groups utilizing Variance Analysis. (Vehkalahti, 2019) Its expectation requirement is the homogeneity of variances with insignificant p-value ($p>0,05$).

The possible dependency between nominal and ordinal variables can be examined utilizing Cross tabulation to present relative frequencies of groups. (Vehkalahti, 2019) To test the significance of differences between groups and thus interpret the results concerning the whole population, Chi square test (X^2 test) compares the groups' expected frequencies and observed frequencies. The expectation requirement for Chi Square is that maximum of 20% of groups have a count less than 5 observations. SPSS Statistics enables an expansion of Fischer's Exact test, which provides the exact p-value and thus is valid for all sample sizes despite of group sizes.

However, the 5-scale Likert scale is decoded to 3-scale Likert scale to reduce the number of groups and increase the calculation efficiency. The transformation of scale is conducted by uniting the far-end groups with their neighboring milder version as follows: groups 1 and 2 form recoded group 1, group 3 becomes recoded group 2, and groups number 4 and 5 form recoded group 3. The middle group is still considered as the neutral group. When applicable, Pearson's Chi square results are presented, and Fischer's Exact Test are presented when more than 20% of the cells in the contingency table, groups, have count less than 5. (Tables D3 - D8, Appendix D) With confidence level of 95%, the significant difference is presented as p-value below 0,05.

The possible dependency, in this case correlation, between Self-evaluation and Feedback information with the two differently calculated Recycling Scores is analyzed utilizing Spearman's correlation coefficient, which is suitable for examining non-normal and Likert scale variables. (Vehkalahti, 2019) The correlation coefficient 1 means complete positive correlations, -1 complete negative (opposite) correlation, and 0 means no correlation between variables.

While Likert scale measures are clearly either nominal or ordinal by nature, being presented, quantified and put in order by artificial numbering and definition, they can be taken as a continuous measure in some statistical tests due to the continuous scale nature behind the actual measurement. This exception is utilized in this research to allow correlation analysis to be conducted.

The resulting data of the open-end questions was themed according to qualitative methods in meaningful categories, and frequencies of each observation theme was quantified. Relative frequencies are not meaningful to be presented, as one answer often contains many observations that belong to different themes, and those were all captured. These results provide explanatory value and in-depth information of the given aspects. The frequency tables with examples are presented next to the relevant results in Chapter 4, in Tables 5, 8, and 9.

3.3 Research ethic and data privacy

Personal identifying information was not collected during the research. Yet, all personal safety measurements and the new General Data Protection Regulation (GDPR) are considered as this is a research and privacy matter that must be carefully considered in the rapidly changing world.

Survey data collection is a seamless part of modern facility operations and CVG has stated the organizations Data Privacy Policy concerning online data collection (CVG, Privacy Policy, 2019). The data collected in this research is considered the same way as if it were collected through the online systems, and all given privacy statements apply. The data is stored in electrical form in the secured Office365 account for the time of the research and to secured shared drive of KCAB for future use. The collected data is a possession of KCAB and all the rights for its future use belongs to CVG Airport. In the scope of this research, the raw data is processed, analyzed, and presented as a part of this Master's Thesis and published public online in the University of Jyväskylä collection. Furthermore, the data is used internally and externally for decision making, developmental, educational, and marketing purposes.

4 RESULTS AND ANALYSIS

Chapter 4 presents the statistical and qualitative findings of the survey. The chapter is structured and titled by the Research Questions main and sub-questions to provide a comprehensive understanding of the issues and potentials at hand. The exact form for each question and answer options are presented in the questionnaire (Appendix B).

4.1 Stakeholder pressure

The stakeholder pressure and the related aspects are evaluated from the customers' Self-evaluation, Feedback and Recycling Score data. Main interest is to understand customers attitudes, values, and potential adaptability to introduction of further measures. First, the Basic Information (Table 2) of the participants is presented to be utilized in the later analyses.

From four (4) gender options of 'Female', 'Male', 'Non-Binary' and 'Prefer not to say', 54 % identified as 'Male' (n=84) and the rest 46 % as 'Female' (n=72). (Table 2) Participants' age was requested on six (6) unequal-sized range groups beginning from age 18, of which '25-34' years old was the most common, representing 25 % of participants (n=38), and age of '18-24' the least represented by 9 % of participants (n=14). Men and women are relatively equally represented in each Age category (Figure 2).

Participants' level of education was requested on five (5) levels from 'No High School Diploma' to 'Bachelor's Degree or Higher' resulting the highest education level to represent 69 % of all participants (n=108) and 'No High School Diploma' 1 % (n=1). (Table 2) Participants represented 51 % of Local Residents within 150 miles (n=79) and 49 % Visitors (n=77). 58 % traveled for Leisure (n=91) and 42 % (n=65) for Business reasons. Frequency of traveling through the CVG Airport was requested on 6 categories from first time to weekly-bases traveling, resulting frequent travelers of '1-3 times a year' (28%, n=43) and 'More than 3 times a year' (24 %, n=38) frequencies as most common.

Table 2. Frequency distribution of Background information. Frequency and relative frequency distributions presented, n = 156.

Participants' background information, n=156	**f**	**f %**
Gender		
Female	72	46.15%
Male	84	53.85%
Age group		
18-24	14	8.97%
25-34	38	24.36%
35-44	26	16.67%
45-54	27	17.31%
55-64	31	19.87%
65+	20	12.82%
Education level		
No High School Diploma	1	0.64%
High School Diploma or Equivalent	12	7.69%
Some College Credit, No Diploma	20	12.82%
Associate Degree	15	9.62%
Bachelor's Degree or Higher	108	69.23%
Area status		
Visitor	77	49.36%
Local (within 150mi)	79	50.64%
Purpose of traveling		
Business Traveler	65	41.67%
Leisure Traveler	91	58.33%
Frequency of traveling through CVG Airport		
This is my first time	32	20.51%
Every few years	30	19.23%
1 - 3 times a year	43	27.56%
More than 3 times a year	38	24.36%
1 - 2 times a month	8	5.13%
Every week	5	3.21%

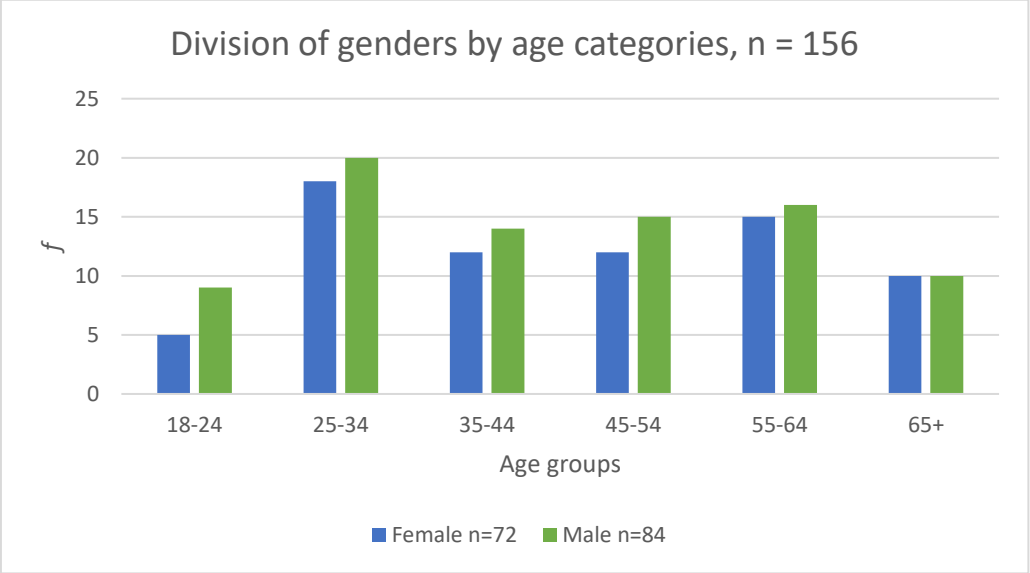

Figure 2. Frequency distribution of Gender in Age categories, n = 156.

The Self-evaluation results show that 54 % (n=84) of the participants reported to be very concerned of environmental issues, such as pollution and climate change (Figure 3), and 49 % (n=77) recycling to be very important to them (Figure 4). Overall, Figures 3 and 4 show that approximately 80 % of the participants are aware of such environmental concerns.

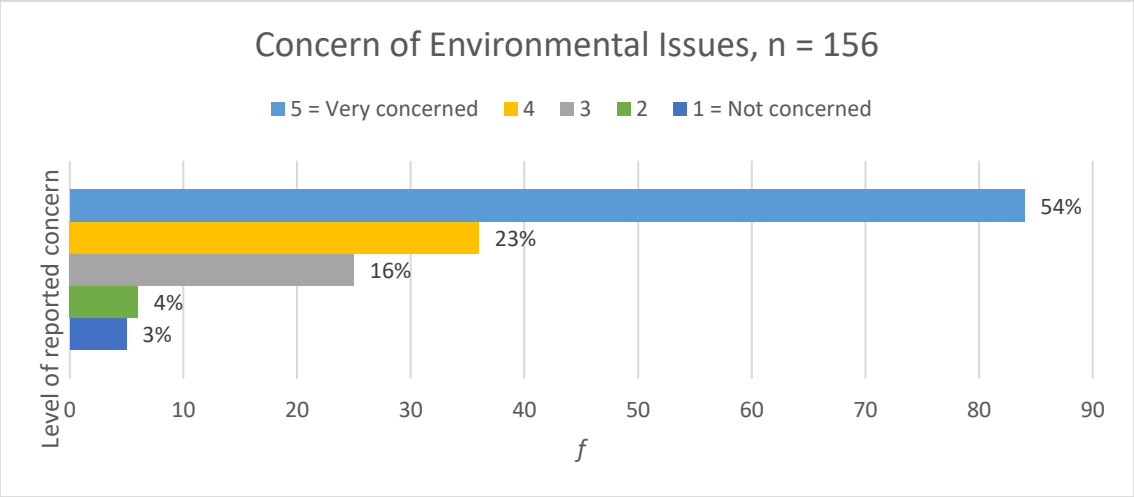

Figure 3. Frequency distribution of Concern of Environmental Issues. Frequency and relative frequency distributions presented, n = 156.

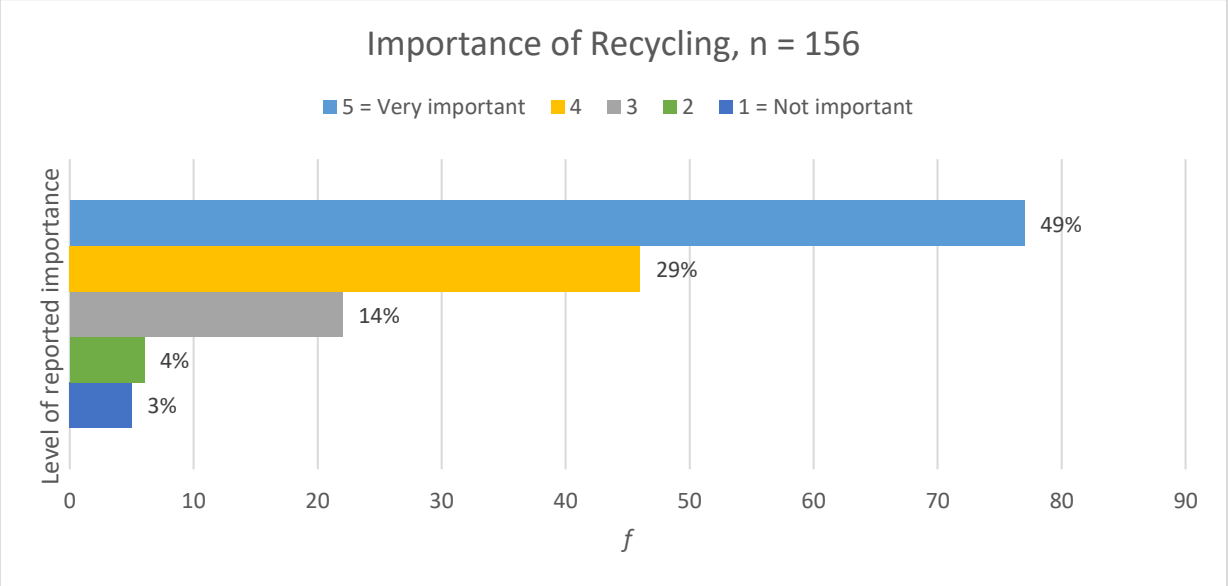

Figure 4. Frequency distribution of Importance of Recycling. Frequency and relative frequency distributions presented, n = 156.

Only 31 % (n=48) reports to know very well what items can and cannot be recycled, while more moderate knowledge level was reported by 38 % (n=60) of the participants (Figure 5). However, 50 % (n=78) evaluate themselves to know the benefits of recycling very well (Figure 6), which indicates that everyone aware of the benefits acting upon the environmental concerns and recycling, are not confident of how to conduct the behavior correctly in action.

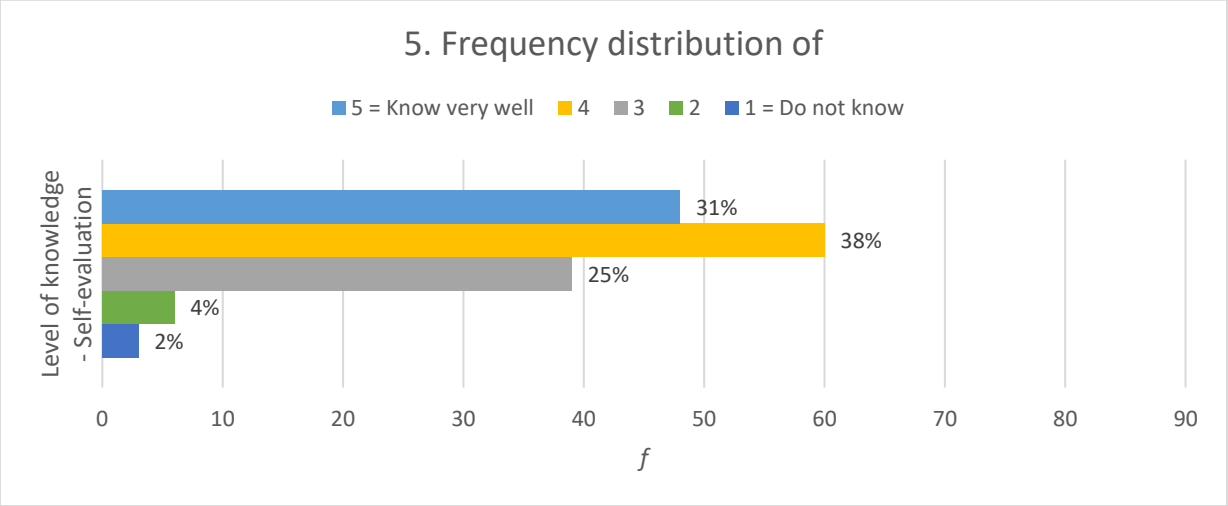

Figure 5. Frequency distribution of Recycling Knowledge. Frequency and relative frequency distributions presented, n = 156.

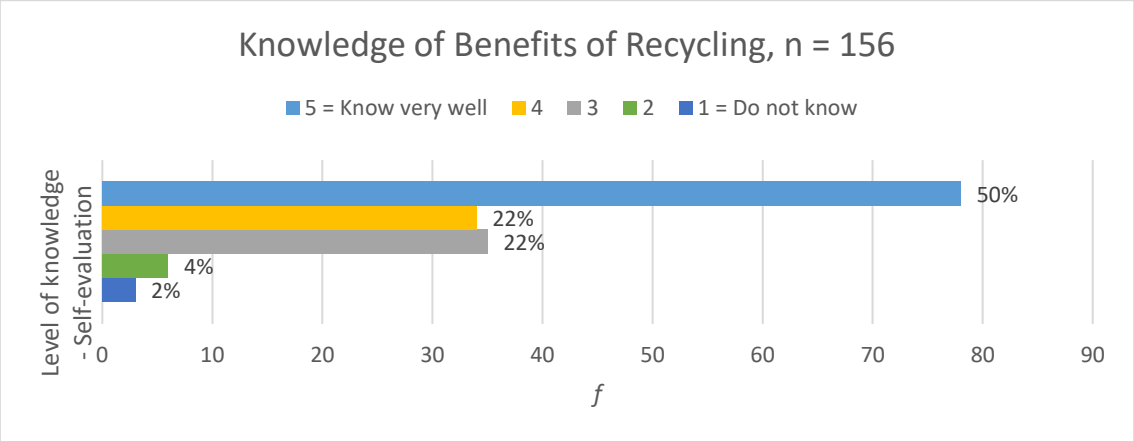

Figure 6. Frequency distribution of Knowledge of Benefits of Recycling. Frequency and relative frequency distributions presented, n = 156.

45 % (n=70) report to always recycle and 29 % (n=45) most of the time (relative translation of option number 4, (Figure 7). Also, 35 % (n=54%) report to invest very much and 38 % (n=60) 'relatively much' effort to the recycling process (Figure 8), including practices such as emptying and rinsing containers and separating materials. The results indicate that approximately over 70% of the participants do pay attention to recycling in their daily lives.

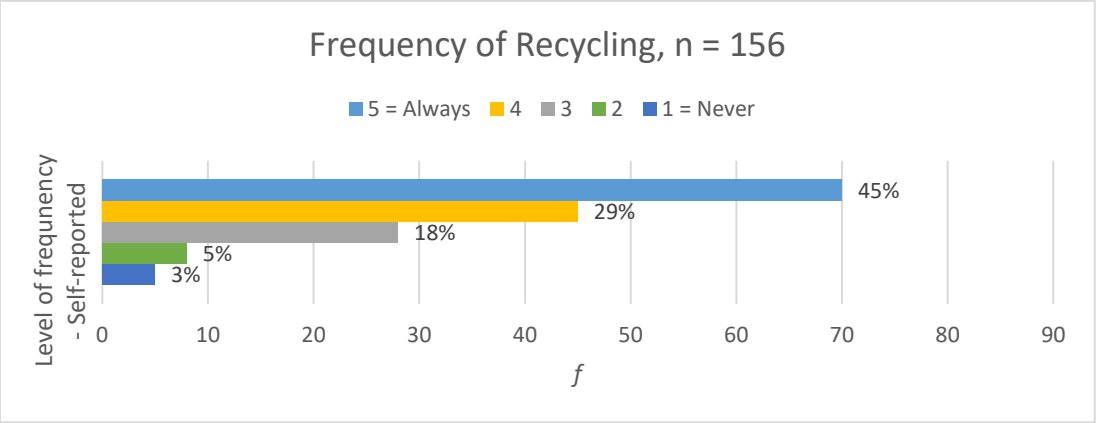

Figure 7. Frequency distribution of Frequency of Recycling. Frequency and relative frequency distributions presented, n = 156.

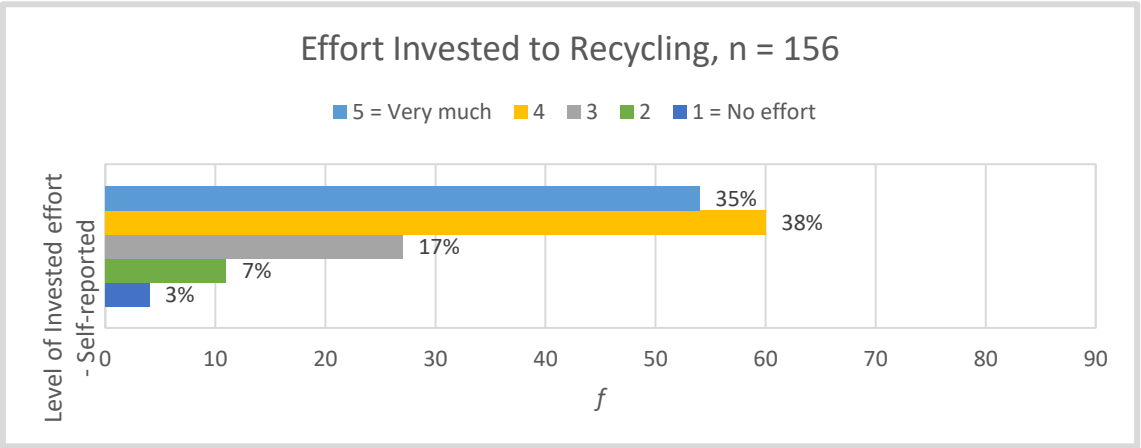

Figure 8. Frequency distribution of Effort Invested to Recycling. Frequency and relative frequency distributions presented, n = 156

Generally, it is approved that for samples larger than 30, normality of distribution can be assumed. However, as the Recycling Test information (Q13) and thus its modifications later on, are the only variable of a scale measurement and contain some of the main findings, normality is further examined statistically. Figures 9 and 10, presented in Chapter 4 attached with the relevant results, show that both variables' distributions are slightly skewed. The statistics (Table 3) show that for the *Correct Answers Personal Score*, median value (9.00) is higher than the mean (8.41), and standard deviation is 1.903. However, the difference is small, and the relation of skewness to its standard error is -1,77, which is between -2 and +2 (Karhunen, Rasi, Lepola, Muhli, & Kanniainen, 2011), and thus it can be considered as a symmetrical figure and thus normally distributed. Also, normality tests of Kolmogorov-Smirnov with Lilliefors Significance Correction and Shapiro-Wilk (Table 4) show that despite some variance, the data is close of normally distributed (p = 0,000).

For the Most Desirable Options Recycling Score, the median (6,00) is also higher than the mean (5,63), and standard deviation is 1,924. (Table 3) The relation of skewness to its standard error is -0,16, and normality tests support

normal distribution interpretation (p = 0,003) (Table 4), and thus parametric tests can be utilized for both variables.

It is important to be noted that one (1) participant had not answered to all the items in Q13, presumably out of a confusion caused by the template functionalities. Therefore, the n equals to 155 in analytics concerning the Recycling Scores, as seen in Table 3. It is also important to note, that in the questionnaire, participants were only able to choose one of the given categories for each waste item.

Table 3. Descriptive Statistics of Personal Recycling Score and Most Desirable Options Personal Recycling Score

Statistics					
Personal Recycling Score			**Most Desirable_PRS**		
N	Valid	155	N	Valid	155
	Missing	1		Missing	1
Mean		8.41	Mean		5.63
Std. Error of Mean		0.153	Std. Error of Mean		0.155
Median		9	Median		6
Mode		8	Mode		7
Std. Deviation		1.903	Std. Deviation		1.924
Variance		3.621	Variance		3.703
Skewness		-0.345	Skewness		-0.031
Std. Error of Skewness		0.195	Std. Error of Skewness		0.195
Kurtosis		-0.522	Kurtosis		-0.277
Std. Error of Kurtosis		0.387	Std. Error of Kurtosis		0.387
Range		8	Range		10
Minimum		4	Minimum		1
Maximum		12	Maximum		11
Sum		1304	Sum		872
Percentiles	25	7	Percentiles	25	4
	50	9		50	6
	75	10		75	7

Table 4. Tests of Normality for Personal Recycling Score and Most Desirable Options Personal Recycling Score

Tests of Normality						
	Kolmogorov-Smirnov, a			**Shapiro-Wilk**		
	Statistic	**df**	**p**	**Statistic**	**df**	**p**
Personal Recycling Score	0.124	155	0.000	0.955	155	0.000
Most Desirable Option_PRS	0.13	155	0.000	0.972	155	0.003
a Lilliefors Significance Correction						

Calculated based on the Recycling Test (Q13), the frequency distribution for the Correct Answers Personal Recycling Score (Figure 9) shows that 67 % of the

participants got 8 – 11 items correct out of 12 and are thus relatively well informed of the basic waste management and recycling guidelines. The results for the Most Desirable Option Personal Score (Figure 10) reveal lower values when compared to the Personal Recycling Score values; 68 % of participants scored now only 5 – 8 points out of 12.

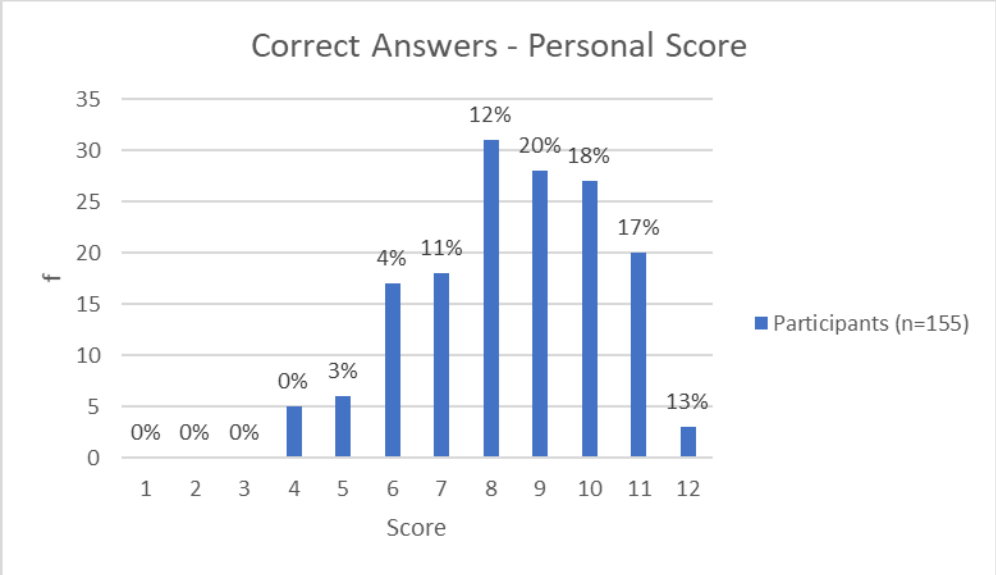

Figure 9. Frequency distribution of Correct Options Personal Recycling Score. Frequency and relative frequency distribution presented. Variable calculated from the Q13 results of 12-item-6-category recycling test, n = 155.

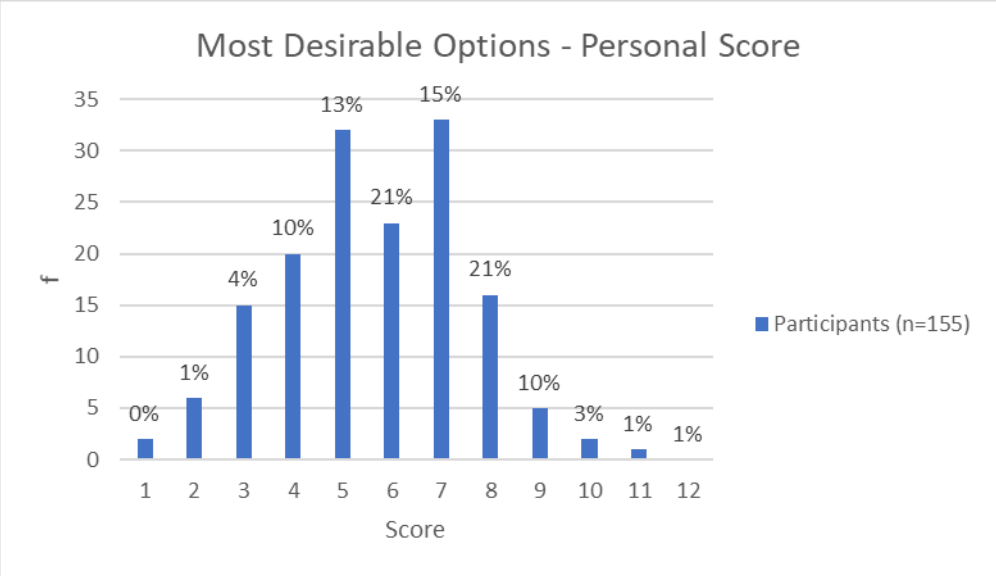

Figure 10. Frequency distribution of Most Desirable Options Personal Recycling Score. Frequency and relative frequency distributions presented. Variable calculated from the Q13 results of 12-item-6-category recycling test, n = 155.

An open-end question Q19 reveals 5 groups of sustainable development factors customers wish CVG Airport to explore. (Table 5) Energy and Consumption are the main additions to the recycling related initiatives being suggested. In general,

renewable energy sources, especially solar, are most often mentioned, along the energy and material consumption reduction and increased efficiency efforts.

It is to be noted that Composting as a practice is mentioned 8 times separate from recycling efforts. Customers do recognize the opportunity of further separate waste streams, and compostables are seen as the single most important stream to be handled separately.

Table 5. Requested sustainable development aspects. Observations themes, subthemes, frequencies, and examples for Q19, the further sustainable developmental aspects to be requested for the CVG Airport to explore. One answer can contain many different observations belonging to multiple theme groups.

What other SUSTAINABILITY developments do you wish CVG to explore?			
Factors	Subgroups	f	Examples
Energy		13	"Fuel efficiency in the ground crew equipment , Bird and wildlife control", "Pictures before and after (Ohio river cleaning etc)", "Renewable energy"
	Solar	7	"More use of solar… the opportunity to use the sun near the airport should be pretty good since there are no trees and plenty of parking garages**** perhaps add to the top of the parking garages", "Solar panels "
	Energy concervation	3	"Energy savings.", "More EV charging", "Natural lighting (tunnels)"
Consumption		7	" Reduce use of single use products", "Get vendors to sell items in recyclable packaging. Get rid of plastic packaging together. ", "Less plastic use at restaurants at the airport"
Recycling		12	"Encourage more people to recycle", "Print something on the containers to show what items are recyclable", "Composting option, more treatment containers (hazardous, batteries)"
	Composting	8	"Composting like San Francisco ", "Add composting and encourage compostable packaging at food vendor locations, replace plastic straws at vendor locations with paper ones, paper products like toilet paper from recycled paper sources, eliminate plastic bags at vendor locations. "
Social		2	"Pay foodservice workers more, better pay & training for runway workers (e.g. belt loaders), wheelchair attendants, etc"
Other		8	"Waste water treatment", "Low cost bottle water after check in.", "To make a smaller airport "
"No"		18	"No"
"Not sure"		16	"Don't know enough to say. "
No answer		82	

4.2 Performance of the recycling system

Performance of the recycling system is evaluated through the calculated Recycling Rate for each waste item and the potential of customers recognizing new separable waste streams, especially compostable waste, and the Feedback received of the functionality of the system in its current state. Besides self-reported engagement and knowledge levels reported previously, the results in Figure C1, Appendix C and further analysis show how participants placed the given items to the different disposal options. Highlighted are the most desirable disposal options for each item, according to the environmental materials recovery value of the disposal option.

Results in Figure 11 and Table 6 show that common recyclables, such as empty and full plastic bottles, aluminum can, clean pizza box (carton) are well recognized as recyclable items with 86 - 98 % of correct answers. Also, currently items that mostly end up in trash, but could also be composted, such as leftover sandwich (97 %), greasy paper plate (66 %), used paper napkin (74 %), and oily pizza box (79 %), find their way to the technically correct disposal option. However, to-go coffee cup (79 % incorrect) and plastic straw (68 % incorrect), which both are non-recyclable items in this region and rarely recyclable in general, mostly do not find their way to the trash bin. Most (57,4 %) recognize that batteries must be placed to separate Hazardous waste bins, while 42,6 % would place these hazardous waste items to a wrong place. Also, only 43,9 % knows to place biodegradable plastics to composting or trash, while 56,1 % would place these items incorrectly.

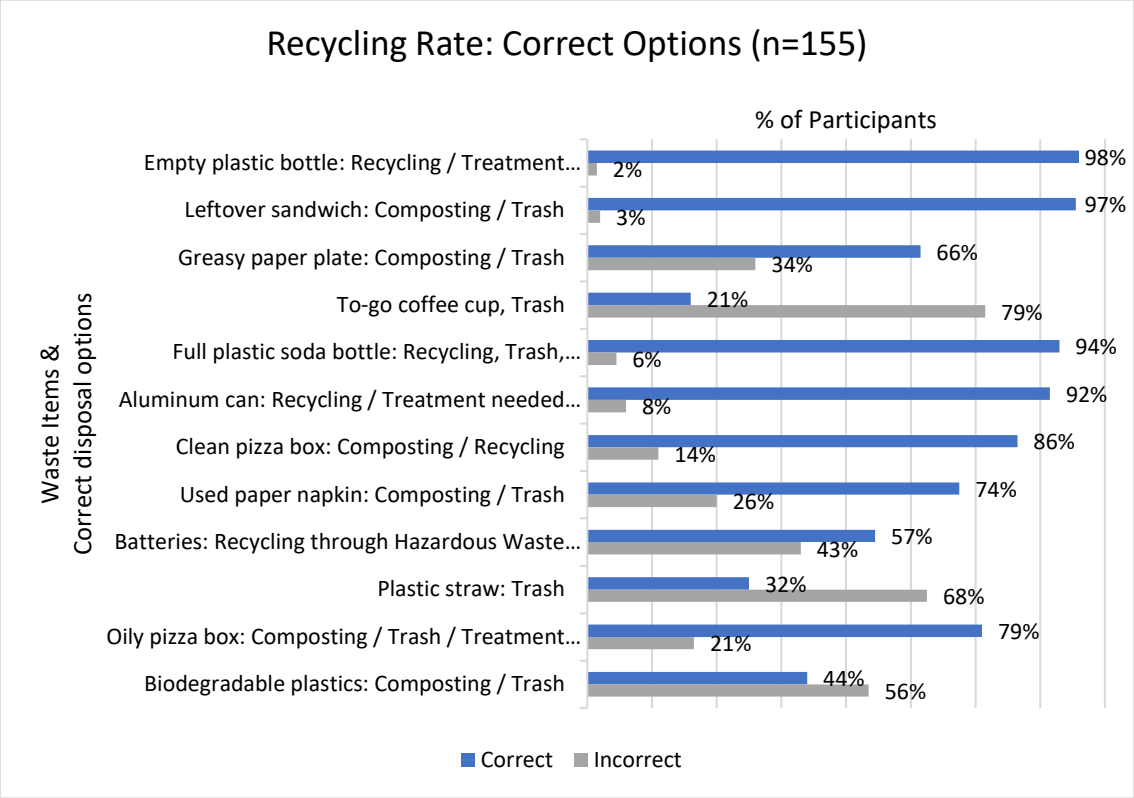

Figure 11. Frequency distribution of Correct Options Recycling Rate. Relative frequencies of waste items in categories of correct and incorrect are presented, n = 155.

Table 5. Frequency distribution of Correct Options Recycling Rate. Frequencies and relative frequencies presented, n = 155.

Recycling Rate: Correct Options (n=155)												
	Empty plastic bottle: Recycling / Treatment needed before recycling		Leftover sandwich: Composting / Trash		Greasy paper plate: Composting / Trash		To-go coffee cup: Trash		Full plastic soda bottle: Recycling, Trash, Treatment needed before recycling		Aluminum can: Recycling / Treatment needed before recycling	
	f	f%	f	f%	f	f%	f	f%	f	f%	f	f%
Correct	152	98.1%	151	97.4%	103	66.5%	32	20.6%	146	94.2%	143	92.3%
Incorrect	3	1.9%	4	2.6%	52	33.5%	123	79.4%	9	5.8%	12	7.7%
	Clean pizza box: Composting / Recycling		Used paper napkin: Composting / Trash		Batteries: Recycling through Hazardous Waste service		Plastic straw: Trash		Oily pizza box: Composting / Trash / Treatment needed before		Biodegradable plastics: Composting / Trash	
	f	f%	f	f%	f	f%	f	f%	f	f%	f	f%
Correct	133	85.8%	115	74.2%	89	57.4%	50	32.3%	122	78.7%	68	43.9%
Incorrect	22	14.2%	40	25.8%	66	42.6%	105	67.7%	33	21.3%	87	56.1%

Recovering of waste stream means that a product coming to the end of its original purpose and becoming a 'waste item' is brought up in the value chain of materials recovery, recovering it from trash which ends up in the landfill. Food waste and in general compostable waste are of interest, yet other recoverable items, such as plastic streams, are also discussed. Of the provided 12 items, the public recycling program provided by Rumpke currently accepts: preferably

clean and empty *plastic bottles* with a bottle neck shape, *aluminum cans*, and clean *carton* and *paper* products.

In comparison with the correct answers data, the recycling rates of Most Desirable Disposal Options (Figure 12, Table 7) show that, while empty plastic bottle, aluminum can and clean pizza box hold their values, full plastic soda bottle, which should ideally be emptied before recycling, and hence *Treatment needed before recycling* is the only correct answer, only 42 % of participants has chosen the option. Also, to-go coffee cups were perceived as recyclable by 55 % of the participants (Appendix C, Figure C1), though most carton or styrofoam drink cups, apart from the possible carton hot cup liner, are not recyclable due to the material itself or the thin plastic lining inside the carton cup.

However, 58 % of participants recognized that leftover sandwich is a compostable item, while the rest of the compostables; greasy paper plate (8 %), used paper napkin (17 %), oily pizza box (6 %), and biodegradable plastics (36 %), (Appendix C, Table C1) were less frequently recognized, and were often perceived as trash, or even recyclable, such as biodegradable plastics.

It seems that of compostable items, food waste and biodegradable plastics hold highest potential to be diverted for adequate composting treatment. Soiled paper and carton products would require measures to be taken to increase awareness of the composting potential of the materials. Furthermore, certain trash items such as single-use plastics, food containers, straws, and to-go coffee cups, could be replaced by alternative products, such as reusable, recyclable, or compostable options. Finally, as Hazardous waste disposal option is not available for the public at the CVG, yet 57 % of the participants recognize batteries belonging to the Hazardous waste service over public recycling, adding a collection location for Universal waste holds potential to increase recycling rate.

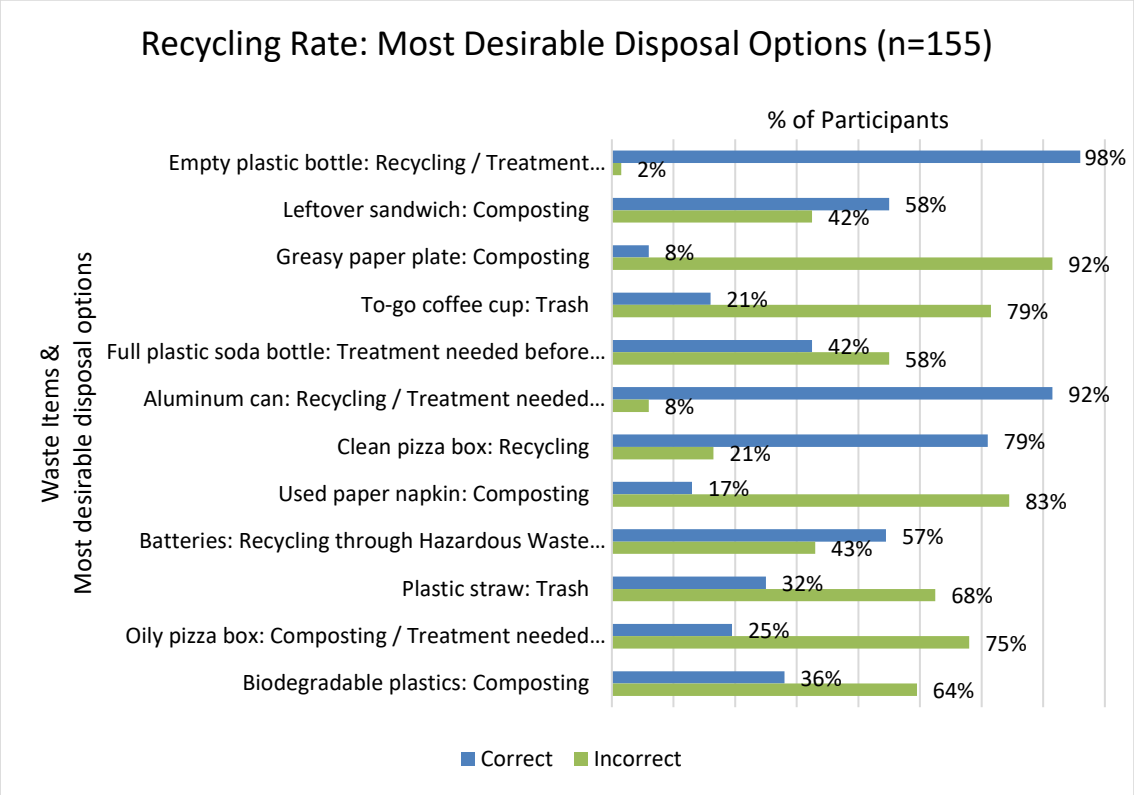

Figure 12. Frequency distribution of Most Desirable Options Recycling Rate. Relative frequencies of waste items in categories of correct and incorrect are presented, n = 155.

Table 6. Frequency distribution of Most Desirable Options Recycling Rate. Frequencies and relative frequencies presented, n = 155.

Recycling Rate: Most Desirable Disposal Option (n=155)												
	Empty plastic bottle: Recycling / Treatment needed before recycling		Leftover sandwich: Composting		Greasy paper plate: Composting		To-go coffee cup: Trash		Full plastic soda bottle: Treatment needed before recycling		Aluminum can: Recycling / Treatment needed before recycling	
	f	f%	f	f%	f	f%	f	f%	f	f%	f	f%
Correct	152	98.1%	90	58.1%	12	7.7%	32	20.6%	65	41.9%	143	92.3%
Incorrect	3	1.9%	65	41.9%	143	92.3%	123	79.4%	90	58.1%	12	7.7%
	Clean pizza box: Recycling		Used paper napkin: Composting		Batteries: Recycling through Hazardous Waste service		Plastic straw: Trash		Oily pizza box: Composting / Treatment needed before recycling		Biodegradable plastics: Composting	
	f	f%	f	f%	f	f%	f	f%	f	f%	f	f%
Correct	122	78.7%	26	16.8%	89	57.4%	50	32.3%	39	25.2%	56	36.1%
Incorrect	33	21.3%	129	83.2%	66	42.6%	105	67.7%	116	74.8%	99	63.9%

Feedback of functionality and intuitiveness of location and wrapping of the trash and recycling receptacles was requested in general level and with open-end questions to find out the aspects that are considered supportive or inhibitive for the behavior of recycling. Presented in Figure 13, 91 % of participants consider

CVG Airport's waste receptacles, trash and recycling, clear to use, with 76 % rating of very clear. 82 % (Figure 14) also consider the clarity of instructions, with intention to refer to what can be placed in the recycling receptacle, very or relatively clear. Finally, 83 % (Figure 15) think that the receptacles are located conveniently.

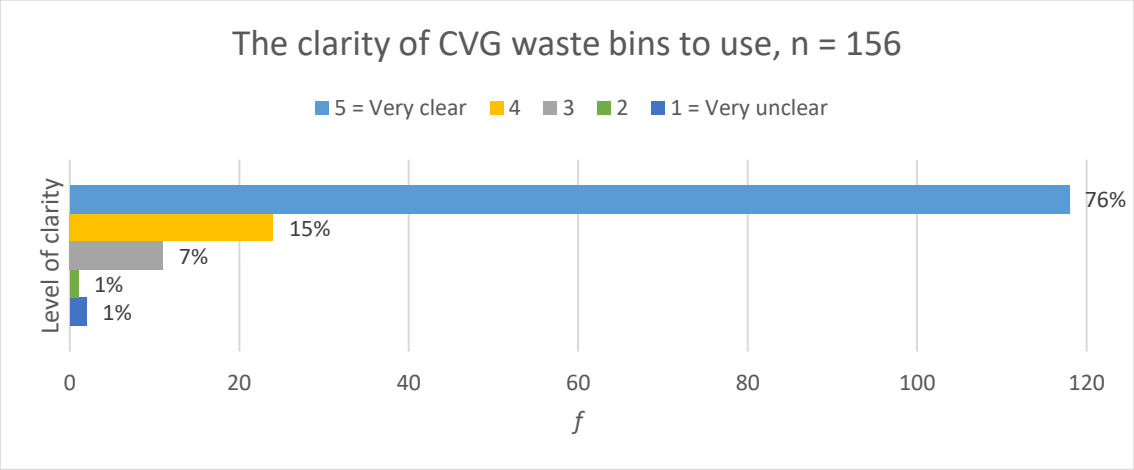

Figure 13. Frequency distribution of Clarity of Receptacles to Use. Frequency and relative frequency distributions presented, n = 156.

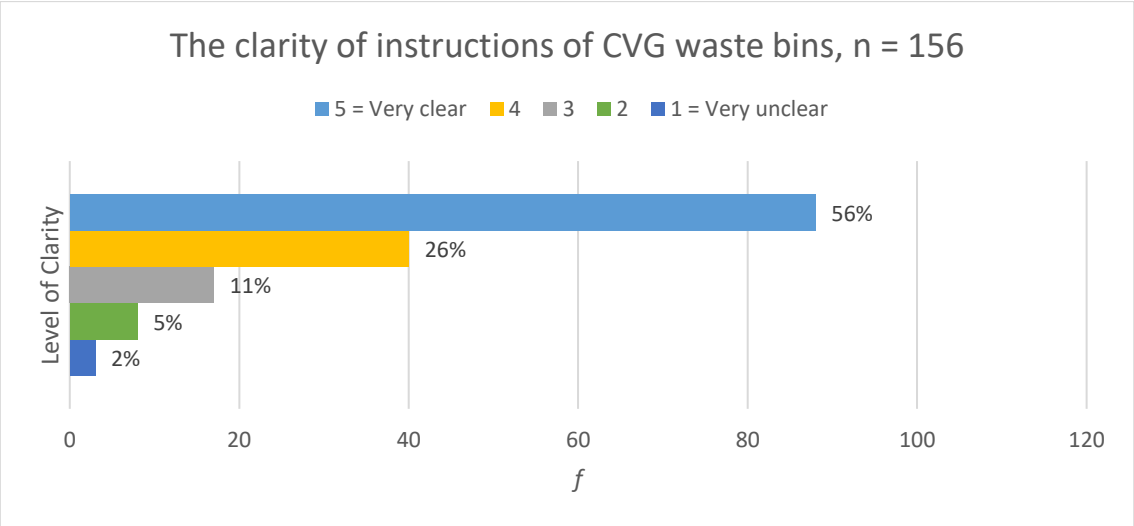

Figure 14. Frequency distribution of Clarity of Instructions of Receptacles. Frequency and relative frequency distributions presented, n = 156.

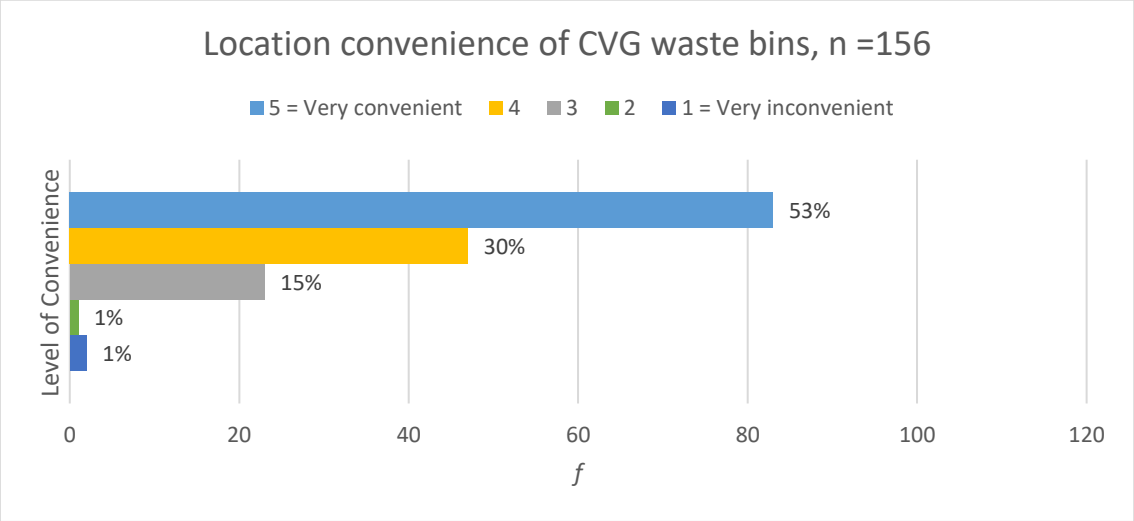

Figure 15. Frequency distribution of Convenience of Location of Receptacles. Frequency and relative frequency distributions presented, n = 156.

These results are complimented with further information requested in the open-end questions. There are 12 identified attribute groups (Table 8) of which 10 can be considered to present the positive and recycling supportive factors aimed to clarify. Majority of answers describes overall satisfaction with the setup and its usability: groups such as Overall assessment, Easy to use, Convenient. Attributes of colors and visual distinction from one another, frequent availability and locating recycling and trash receptacles side by side were mentioned most often as positive factors. Equally, participants brough up the acknowledgement of the ability to recycle in the facility, and that the availability itself supports the behavior of recycling. Instructions were mentioned only 5 times.

Table 9 presents the attribute categories for recommendations related to the recycling efforts at the CVG Airport. 9 groups were identified, of which 6 contained action items. It is to be noted that 67 chose not to answer this question, 53 did not have any recommendations and 3 had no recommendations but commented positively the current efforts. Main requests were related to the availability of receptacles throughout the airport (10) and better instructions of the recyclable items (13). Locations highlighted the food court area, outside at the entrance of the airport and some gates currently missing receptacles.

Furthermore, measures of CVG to actively encourage recycling, taking action to reduce using plastic packaging and other single-use items in the facility, and add more recycling measures such as composting were mentioned. Composting as a separately collected waste stream was mentioned 8 times in the overall sustainable development recommendations for the CVG Airport to explore (Table 5).

Table 7. Positive characteristics of the trash and recycling set-up. Observation themes, frequencies, and examples from Q17, of the positive aspects about the trash and recyclables receptacles set-up. One answer can contain many different observations thus belonging to multiple theme groups.

What do you like about the two-container trash and recyclables setup?		
Attributes	f	Examples
Colors	11	"The color contrast", "Color coded, visually obvious"
Visually easy to separate	12	"Makes it easy cuz it is clearly marked."
Side by side location	13	"Easy to recycle, don't have to find a separate container"
Availability and accessibility	12	"Can be found all across the airport"
Instructions	5	"Clear and obvious instructions", "Clear on which one to use because of directions on side. "
Convenient	13	"It makes using both highly convenient. "
Easy to use	19	"Easy to spot and easy to use properly", "Easy to find and use"
Option existing for recycling	10	"Opportunity to recycle ", "Gives more options", "I'm glad recycling is an option"
Encourages recycling	7	"Makes it easy to recycle. ", "Clarifies different treatment for trash"
Overall assessment	20	"Great", "Minimal options are helpful", "Great that they recycle with a large volume of materials"
Other	2	"Recycling causes extra trucks to pick up and haul away. Thus there are now two trucks burning fuel and emitting pollution. I think this is worse for the environment than not recycling."
No answer	40	

Table 8. Improvement characteristics of the trash and recycling set-up. Observation themes, frequencies, and examples from Q18, for recommendations to improve the provided recycling service. One answer can contain many different observations thus belonging to multiple theme groups.

Do you have recommendations for CVG to improve recycling?		
Attributes	f	Examples
No need to change	3	"No. Great job. ", "Good enough"
More containers	10	"Few more locations (some gates don't have?) especially at food, instruction on bigger print of what goes and where", "More cans available. "
Signage and Education	13	"Print something on the containers to show what items are recyclable ", "Signage above containers", "Better instructions ", "Photo examples"
Encourage recycling	2	"More signage to encourage recycling (tv, screens, crawls)"
Stop using plastic packaging	4	"Add composting, minimize food packaging that needs thrown out", "Reduce consumption"
New recycling options	4	"Add composting option", "Maybe add additional kinds of recycling like for lids and packaging ", "
Other	3	"Stop recycling Put recyclables in with the regular trash."
No recommendations	53	"No"
No answer	67	

4.3 Factors impacting recycling knowledge

The previous subchapters presented the frequencies and provided description of the overall situation, and on their own answered the research questions set in Chapter 1.3. This section studies the factors that impact the actual recycling knowledge, referred as the Personal Recycling Scores. These are examined to understand the characteristics of participants with high knowledge of the recycling guidelines. The possible dependencies between the different individual factors and factor units (background information, self-evaluation, feedback and recycling scores) are statistically analyzed according to the characteristics of the variables and expectation requirements of the statistical tests presented in the methodology (Chapter 3.2.3).

The aim is to examine factors that impact the two differently calculated recycling scores, *Personal Recycling Score* and *Most Desired Option Recycling Score*. Furthermore, the applicability of the modified theory model of the Theory of Planned Behavior for this study set-up is analyzed.

4.3.1 Background Information with Recycling Scores

Levene's test's insignificant result ($p>0,05$) means that the expectation of the equality of variances remains applicable in the case of all the dichotomous variables, *Gender*, *Residency*, and *Purpose of Traveling*. (Table D1, Appendix D) The results of the T-test show that no significant p-values ($p<0,05$) are observed, which means that there is no significant dependency between any of the independent variables and the dependent variables.

Variance analysis expectation requirement of the homogeneity of variances with insignificant p-value ($p>0,05$) is applicable with all the non-dichotomous variables, *Age*, *Education*, and *Frequency of Traveling*. (Table D2, Appendix D) Significant p-value ($p<0,05$) of the difference of means is only found within the *Education* variable with both *Personal Recycling Score* and *Most Desirable PRS*. It is likely produced due to the underrepresented frequency of observations in the *No High School Diploma* group, which only has one observation, and thus standard deviation and standard error are not measurable. Overall, no meaningful significant dependencies between the background information variables with recycling scores can be extracted.

4.3.2 Background Information with Self-evaluation and Feedback variables

Cross tabulation's relative group frequencies and results of the Pearson's Chi square test and Fischer's Exact test are presented separately for each variable combination in Tables D3 – D8, Appendix D.

Table D3, Appendix D shows that *Gender* has dependency with self-evaluation variables of *Concern of Environmental Issues* ($X^2(2) = 8.723$; $p = 0,013$), *Importance of Recycling* ($X^2(2) = 8.147$; $p = 0,017$), and *Effort Invested to Recycling* ($X^2(2) = 8.058$; $p = 0,018$). The relative frequencies reveal that higher percentage of women (87,5 %) are concerned or very concerned compared to men (67,9 %), and that there is approximately 10 %-unit difference in the groups of Neutral and Not concerned. Similar trend is present with Importance of recycling, women reporting 88,9 % of importance compared to men of 70,2 %, and similar difference in lower importance groups. However, women report 12,5 % of times to invest little or no effort to recycling, compared to men's 7,1 %, and the difference of some or much effort invested is only 10 %-units between women and men. As a conclusion, women generally seem to report higher concern levels of environmental issues and importance of recycling than men. The difference in effort invested to recycling is less, and differently distributed, yet statistically significant.

Table D5, Appendix D shows that *Education* level has significant dependency with *Recycling Knowledge* (p = 0,018) and *Frequency of Recycling* (p = 0). However, the group of highest education level (Bachelor's Degree or Higher, n = 108) is overrepresented, and lowest (No High School Diploma, n = 1) underrepresented compared to others. Despite that, the relative frequency distribution is more equally distributed in other groups, while 86,7 % of Associate Degree group and 71,3 % of Bachelor's Degree or Higher group reports to know well or very well how to recycle, and Neutral answer was given by 6,7 % and 25,9 % of these groups. Similar trend can be observed with *Frequency of Recycling*; higher levels of engagement are reported within the three highest education levels.

Table D6, Appendix D shows that being a local resident of the region within 150 miles, or a visitor from outside of the area has significant dependency with the *Concern of Environmental Issues* ($X^2(2) = 10,700$; p = 0,005), *Frequency of Recycling* ($X^2(2) = 7,5$; p = 0,024), *Effort Invested to Recycling* ($X^2(2) = 8.91$; p = 0,012), and nearly statistically significant dependency with *Convenience of Locations* (p = 0,059). Visitors have less distribution within groups in their concern with 87 % being relative to very concerned of environmental issues, compared to locals with 73,4 % reporting concern and 19 % of Neutral opinions. Visitors also report higher recycling frequencies of 83,1 % compared to 64,6 % of locals, and similar distribution in the estimation of effort invested to recycling; 83,1 % and 63,3 %. The convenience of location of receptacles is slightly less conveniently perceived among visitors with 80,5 % "Convenient" and 19,5 % "Neutral", compared to 86,1 % and 10,1 % among locals. However, this difference is not statistically significant with 95 % confidence level.

Table D7, Appendix D shows a significant dependency between *The Purpose of Traveling* and *Convenience of Locations* (p = 0,013). The distribution of Business travelers is greater with 76,9 % finding locations convenient, 18,5 % neutral and 4,6 % inconvenient. 87,9 % report convenience of location, 12,1 % neutral, and non as inconvenient.

Variables *Age* (Table D4, Appendix D) and *Frequency of Traveling* (Table D8, Appendix D) show no statistical dependency with the self-evaluation and feedback units variables.

Overall, women and visitors are reporting higher levels of awareness and engagement with environmental issues and recycling practice. Higher education level contributes to positive self-evaluation of recycling guidelines knowledge and reported frequency of recycling practice. Business travelers and visitors seem to be slightly more critical about the convenience of locations of trash and recyclables receptacles than leisure travelers and locals. Most background information characteristics have no detectable meaning in the differences in self-evaluation and feedback given to the CVG Airport related to recycling receptacles set-up.

4.3.3 Self-evaluation and feedback information with the recycling scores

Table D9, Appendix D shows that there is statistically significant ($p<0,05$) positive correlation between the *Concern of Environmental Issues* (r_s = 0,212, p = 0,008), *Importance of Recycling* (r_s = 0,271, p = 0,001), *Frequency of Recycling* (r_s = 0,291, p = 0), and *Effort Invested to Recycling* (r_s = 0,194, p = 0,016) with the *Personal Recycling Score*, which refers to the score calculated based on all accepted correct answers.

The correlating factors with the Most Desirable Option Personal Recycling Score are *Recycling Benefits Knowledge* (r_s = 0,209, p = 0,009), *Concern of Environmental Issues* (r_s = 0,219, p = 0,006), *Importance of Recycling* (r_s = 0,233, p = 0,003), and *Frequency of Recycling* (r_s = 0,291, p = 0) (Table D9, Appendix D). It is to be noted that nearly significant dependencies are also with the *Recycling Knowledge* (r_s = 0,151, p = 0,061) and *Effort Invested to Recycling* (r_s = 0,155, p = 0,055), though these correlations are not statistically significant with the confidence level of 95 %.

Overall, it can be concluded that higher self-evaluations in concern of environmental issues and recycling, and engagement with the practice does correlate with higher scores in both Correct Answers Personal Recycling Score, and Most Desirable Options Personal Recycling Score.

4.4 Summary of Results

Participants show overall high-level of awareness and concern of environmental issues, including recycling. They also report a positive self-perception of their level of recycling benefits knowledge, as well as of their engagement with recycling behavior. However, participants show more moderate confidence on their level of knowledge of the recycling guidelines.

The Correct Answers Personal Recycling Score (Figure 9) results show, that 70 % of participants got a score of 8 – 11 out of 12, which equates approximately to 70 – 90 % of the correct answers in the test. This can be considered as a relatively good result considering that the frequency distribution follows the normal distribution relatively well. However, when the Correct Answers Personal Recycling Score is compared with the Most Desirable Options Personal Recycling Score (Figure 10), the same 70 % of score range drops between scores 5 – 8 out of 12.

The relative Recycling Rates (Figures 11 and 12, Tables 6 and 7) show that common recyclables, such as plastic bottles, aluminum cans, clean pizza box (clean cardboard), have high relative rates in both Correct Options and Most Desirable Disposal Options categories. Other plastics and single-use food ware items are often confused as recyclable materials. Compostable items find their way to the trash, as they technically should, when there currently is no widely established curbside food and compostable waste collection in the region.

The trash and receptacle set-up, the visuality of receptacles, their placing and quantity at CVG Airport generally received positive feedback, which indicates that the accessibility is overall at good state. The most requests and constructive feedback concerned the instructions of what can and cannot be placed into recycling. Many suggestions included pictures, or even electronic applications for guidance to support the intention of the customers to practice the behavior and even more so, practice it correctly, and thus increase intuitiveness of the service.

Furthermore, participants are aware of sustainability matters other than mentioned in the questionnaire. Most frequently mentioned were aspects common to any property user, such as energy consumption and its origin. More specialized request included support for electronic vehicle usage, which is already a modern-day commodity for many.

Based on the high levels of positive self-perception of awareness and engagement with sustainable practices, relatively high scores of 70 % of the participants in Personal Recycling Score, and awareness of further sustainability matter, it can safely be stated that the customers are aware and in favor of sustainably responsible measures taken by the CVG Airport. Furthermore, the high rates of correct options recycling rate and positive feedback on the recycling set-up indicate that the set-up overall supports the attempts of users to practice recycling, yet more supporting efforts are required for achieving higher recycling rates and to reduce misplacing of waste items.

Furthermore, as described in the Theoretical Framework (Chapter 2.3), this research statistically analyzed the dependencies of the Background information, Self-evaluation and Feedback results with the Personal Recycling Scores. Moreover, the dependencies of Background information with the Self-evaluation and Feedback results were analyzed. Background information were not found to have any significant dependencies directly with the Recycling Scores. However, *Gender*, *Education*, *Residency* and *Purpose of Traveling* were found to have significant dependency with some Self-evaluation and Feedback aspects: Women and visitors reported higher levels of awareness of environmental issues and engagement with recycling; Higher education levels were depending with higher self-evaluation of recycling knowledge and frequency of engagement with recycling; Business travelers reported significantly lower evaluation of experienced convenience of receptacles location to leisure travelers. Finally, higher levels of reported awareness of environmental issues, recycling, and engagement with the practical behavior of recycling positively correlated with the actual knowledge of waste management guidelines and of the potential new waste stream of compostables to be separated.

5 DISCUSSION

Chapter 5 highlights the significant findings of the research, and further discusses the issues in the light of the theories of Planned Behavior and Stakeholder Management presented in the Chapter 2, Theoretical Framework. Furthermore, recommendations to advance the recycling system and enhancing stakeholder engagement to enable advanced pro-environmental engagement of the organization is provided.

Organizations stakeholder relationships and responsibilities are no one-way street, and traditional stakeholder pressure can be difficult to estimate. The results show that customers are overall aware, and positively positioned towards and engaged with pro-environmental behaviour. Furthermore, the awareness extends beyond the research matter presented. Request of development points provided a great collection of recycling, waste management, energy source and use related requests, and thus customers can be seen as active stakeholders of CVG for pro-environmental enhancements. As discussed in the theoretical framework of stakeholder relationship, the proactivity of the organizations as promoters of addressing issues and behavioral change, is equally important. It means to be an active part of the society the organization operates in. Furthermore, the advantages of taking action have great potential to result in better financial stability through operational cost savings of waste management, which role has highlighted amongst the airport industry during the COVID-19 pandemic.

The recycling system in the United States is facing many challenges for becoming a strong system and thus able to support the circular economy direction of societal development. Different practices and ununified instructions through states, counties, cities, companies, and public spaces like parks and airports, make it challenging for consumers and residents to navigate between the systems. Most published waste management performance information is from residential sources. The difference with the performance of systems within private entities or public spaces, the way individuals perceive those systems, and navigating between the different practices, seems less explored in the literature. This research showcases the perception of recycling in a public space.

The fundamental recycling guidelines are the same as the surrounding communities' guidelines (Appendix A), yet the decision of the public communication and presentation is made within the organizations. Currently, the recycling instructions at CVG Airport verbally refer to the materials that can be recycled, such as plastic, paper, glass, and metal, which fundamentally is incorrect instructions (see picture for a reference in the questionnaire, Appendix B). As described in Chapter 1.2.2, the recycling guidelines advice that most scrap metal, glass and especially plastic items are not accepted to the local recycling program, and ideally the recycled items should be clean and non-soiled to guarantee high-quality recovered materials (Rumpke, 2020b).

The results show that compostable waste items are often perceived as trash-items and some trash-belonging items as recyclable. As described in Chapter 1.2, placing trash-belonging items to recycling causes issues down at the MRF and the recovered materials supply chains, making the processes less efficient and cost-effective, the recovered materials' lower in quality and thus less attractive for reuse purposes, and furthermore, the recycling services more expensive for the users such as communities, companies, and residents. The items in the Q13 were chosen to represent average day-to-day items imagined to be sold, used, or disposed at airport facility. It could be speculated that some items are not as familiar to all participants, such as to-go coffee cups or biodegradable plastics, and thus the perceiving of such items as recyclable or not is difficult. On the other hand, single-stream recycling is not necessarily the system everywhere, and many drop-off collection points have separate containers according to the material of waste, therefore potentially causing confusion of the recycling through the single-stream system. Finally, due to non-enforced recycling, not everyone has implemented a recycling option and therefore perceiving the practice all together can seem useless or unnecessary.

The confusion of materials recyclability is also important to consider in the case of introducing new waste streams, such as compostables, to the recycling program, or if replacing products with compostable or recyclable materials. Comparing the compostable items recycling rates in the Figure 11, there is a significant gap in recognition between a leftover sandwich (58 %) and used paper napkin (17 %) as compostable. In this research, the different composting methods were not addressed for a fear of confusion and uncontrollable level of uneducated assumptions, yet composting was briefly described in principle in the questionnaire (Appendix A). It is thus important to note, that one's backyard compost is likely not be able to process a large amount of compostable and soiled cardboard and is not equipped to process biodegradable plastics. Sandwich, however, should decompose in a reasonable time in an average yard compost, although not highly recommendable if containing meat or dairy products and compost is exposed to gritters.

These findings underline the importance of education, instructions, and signage, not only in the context of what can be accepted to the recycling program or the receptacles, but especially in the context of individual products and their purchase decision, to enable and support consumers throughout the process from purchase to dispose within the facility and beyond. While added information, education, and manipulation strategies are shown weak alone to enable pro-environmental behavior, role model behavior, normative culture, and perceived behavioral ability and control factors together with other intervention approaches are shown successful. As argued below, the perceived behavioral control and especially perceived ability to execute a task, is a key element to support to enable desired behavior, and thus education and creating an intuitive system are the fundamentals of developing the recycling system.

Moreover, it is important to understand the factors that impact the materials recycling rate and customers personal score and thus the understanding and application of the knowledge of those guidelines to be able to develop practices that support customers to utilize the services correctly, and most efficiently. In this research, personal characteristics of awareness and reported engagement with recycling behavior (Attitude and Behavior in the theory model, Chapter 2.3) did positively correlate with the successful indication of behavior of recycling, the Recycling Scores. Furthermore, indirect dependencies emerged from background information as women, visitors, and high education factors had dependencies with the awareness and engagement. However, self-evaluation of one's recycling knowledge did not correlate with the actual knowledge.

According to research of TPB (Figure 1 in Chapter 2.2.1.1), the factors are learned to have weak predictive value to self-reported behavior, yet strong predictive value of intention to behave. The Recycling Score in this research is perceived as the actual behavior, the final decision after evaluation process of information available, the item and its characteristics as well as the options at hand. As this research did not explicitly examine the intention to engage, but preparedness and attitude towards engaging, it is difficult to fully evaluate the theoretical applicability. Despite the limitations, the direction and factors of influence are in accordance with the theory.

However, while the TPB highlights the impact value of the Perceived behavioral control, this connection did not present in this research. It indicates that the Feedback questions failed to represent the core of phenomenon in action. One possible explanation is that the questions' form of a request-of-feedback sifts the focus of oneself to the receiver of the information, and similar affect as self-bias in self-evaluation; giving positive feedback, takes place. Furthermore, the questionnaire contained many similar Likert-scale questions, and tiredness of focus could have occurred. However, as the perceived behavioral control represents the experienced level of possessed capability, anticipated obstacles and effort needed to invest to perform successfully, many of such aspects were shown in the overall results as aspects to be advanced in the system. The moderate-evaluated knowledge of recycling guidelines, highlighted need of better instructions, and confusion of recyclability of certain trash items do support the theory model's structure and its applicability in this research set-up.

5.1 Reliability and limitations

As presented in the Behavioral Theory (Chapter 2) the many socio-economic factors, and individuals' personal attributes and perceived characteristics have been studied in many ways in relation to the intention and actual pro-environmental behavior as predictive factors. However, the predictive value of the self-developed modification of the Theory of Planned Behavior in action have

very little reliability as a representation of the theoretical application, yet the validity of individual attributes, factors can be estimated as reasonable, supported by the sensible significant dependencies that are presented in the results chapter.

The reliability of this research is first and foremost reduced by the limitation of unknown factor of unreported refusal rate to participate to the study. The rate is estimated to be extremely low, as only the author of this research was collecting the data and thus was able to oversee the whole process. Yet, with the relatively small sample size it could be a significant loss.

As there was no data of the socio-economic information of the whole population of customers, or an equivalent sample of the population conducted with similar enough measures of capturing a well representative sample, the reliability of the results significance is reduced. However, the sample size was significantly larger than generally accepted limit of 30 ($n = 156$) and thus expectation of normal distribution in an independent sample can be safely assumed for all the variables. On the other hand, further statistical analysis revealed that certain group combinations with non-dichotomous, multi-grouped variables remained too low for certain statistical tests, and therefore limited the usability of stronger, parametric statistical tests to examine the significance of dependencies or correlation between variables.

The data collection was conducted to the best of abilities capturing morning, afternoon and evening hours and most days of a week, yet presumably not all customers had the same likelihood to participate to the study. Also, there is always a bias of the data collector, especially in this data collection method as requiring approaching and disturbing potential participants while most of them are concentrated on their matter while waiting for their boarding. No extra measures, such as always approaching every 5^{th} person, was considered, mainly a reasonable evaluation of the distribution of immediate factors, such as genotypical gender and age was actively involved to attempt to capture a good representation of the customers present in the situation in the moment. The moment here refers to one gate area at the time of data collection.

5.2 Conclusions and Recommendations

Many factors in the results highlight the need for better, more descriptive guidelines on how to recycle. The literature also highlights the overall systems scatteredness of practices. Greater Cincinnati region recycling stakeholders have a strong relationship and active efforts on enhancing the recycling performance. Local co-operation is therefore beneficial to participate. Implementing the recycling company's provided recycling guidelines supports the unified look and coherence of instructions.

However, it would be beneficial to modify the products in the instructions to also highlight the problematic items of the facility, and to provide information

of new diversion streams, such as compostables. In the case of compostables, the information of the type of composting or compost waste handling is important to be presented, and possible limitations clearly stated. For example, if the composting service were not able to accept animal-based products or accepts only certified bioplastic product, this information and its reasoning should be presented clearly. While this information should be concise, there ought to be an easy access source for more in-depth information, such as an up-to-date website behind a link and a QR-code.

This research has identified many of the problematic items and materials and is thus to be used as a direction in planning process. These items include unrecyclable single-use food containers and plastic products such as straws and bags that currently need to be placed in trash receptacle, excluding plastic bottles that are recyclable; biodegradable plastics; food waste; and other compostable materials.

As some of these items, such as plastic bags and compostables, can be recycled through companies outside of the public curb-side recycling program, it is recommended to evaluate the feasibility of such programs' implementation, preferably attached to the trash and recycling receptacles as so-called recycling stations. The benefits of implementing more diversion streams would increase the recycling rate, and in the case of compostables reduce the urgency of waste hauling and thus enable reductions on waste management costs, besides overall reduction in the amount of waste. Composting and more diversion options also presented strongly in the requests of recommendation of sustainability actions for the CVG Airport to engage with.

Creation of waste management data and ability to track performance are the key to efficient management practices. Modern technology solutions provide many tools and opportunities for innovative approach to waste management. Interactive information of recycled materials as a feedback broadcasted for a customer standing in front of a recycling station is just one way to implement personalized role-model messaging and encouraging information. Furthermore, good understanding of the waste streams content through waste audits, areas of generation, and thus quality of recycled materials allow dynamic interventions and educated decision-making processes concerning the whole waste management system, such as negotiating hauling schedules and maintenance services.

Finally, a strong commitment to organizational pro-environmental behavior begins from within. Internal culture change, establishing clear and meaningful practices, and providing education and training to support the shift towards cross-organizational innovative problem-solving, pro-environmental decision-making, and engagement with development.

Reaching the goal of circular, sustainable society requires many kinds of cultural, behavioral, and practical changes in all levels of societies. Engagement with pro-environmental decision-making and behavior in organizational and individual levels is a complex chain, influenced by many direct and indirect factors. Suggestion for the future research of supporting pro-environmental

behavior engagement is to study more in-depth the role of organizational engagement, and the influence of different types of venues, such as public spaces', efforts have for popularizing, normalizing, or familiarizing individuals with certain behaviors.

BIBLIOGRAPHY

ACI World. (2020a). *Airports Council International.* Retrieved December 31st, 2020, from Industry Information on Covid-19 - Economic impact assessment of COVID-19 on the airport business: https://aci.aero/wp-content/uploads/2020/05/200505-Third-Economic-Impact-Bulletin-FINAL.pdf?_cldee=ZHdoaXRlbHlAYWNpLmFlcm8%3d&recipientid=contact-176c3adc1118e811858c0050569c00a7-6f86c8a4ef20414080566e5f15e4a146&esid=6e11f56f-498e-ea11-a811-000d3af3a7a7

ACI World. (2020b). *Airport Council International.* Retrieved December 31st, 2020, from Industry Information on COVID-19: https://store.aci.aero/wp-content/uploads/2020/06/ACI-Airport-Operations-Business-Restart-and-Recovery-Jun-2020.pdf?_cldee=cmlpa2thX3lsaWx1b21hQGhvdG1haWwuY29t&recipientid=lead-9cd7cec1ad4beb11a812000d3af3a14a-52fe47b3d60e4ec8b2aa9bb573b8abd9&esid=026a4c6

ACI-NA. (2017). *Airport Council International - North America.* Retrieved May 5th, 2020, from Sustainability Policy Statement: https://airportscouncil.org/wp-content/uploads/2018/09/aci-na_sustainability_policy_2.10.17.pdf

Ajzen, I. (1991). The theory of Planned Behavior. *Organizational Behavior and Human Decision Process*(50), 179-211. doi: 10.1016/0749-5978(91)90020-T

ASU. (2019). *The current state of recycling in the Cincinnati region.* Arizona State University - Sustainability Solutions Service. Retrieved May 7th, 2020, from https://www.uschamberfoundation.org/sites/default/files/media-uploads/Beyond34_CurrentStateAssessment_Final.pdf

Barney, J. B., & Harrison, J. S. (2020). Stakeholder Theory at the Crossroads. *Business & Society, 59*(2), 203-212. doi:10.1177/0007650318796792

Brown, J., Burger, J., Burnside, W., Chang, M., Davidson, A., Fristoe, T., Okie, J. (2014). Macroecology meets macroeconomics: Resource scarcity and global sustainability. *Ecological Engineering, 65*, 24-32. doi:10.1016/j.ecoleng.2013.07.071

Brundtland. (1987). *Report of the World Commission on Environment and Development:.* World Commission. Retrieved April 16th, 2020, from https://sustainabledevelopment.un.org/content/documents/5987our-common-future.pdf

CVG. (2018). *Cincinnati/Northern Kentucky International Airport.* Retrieved December 20th, 2020, from Economic Impact of the Cincinnati/Northern Kentucky International Airport: https://www.cvgairport.com/docs/default-

source/leadership/cvg_economic_impact_infographic_2019_final.pdf?sfvrsn=2

CVG. (2019). *Privacy Policy*. Retrieved October 29th, 2019, from https://www.cvgairport.com/privacy

CVG. (2020). *The Business of CVG*. Retrieved April 14th, 2020, from CVG Growth and Business Diversification: https://www.cvgairport.com/cvg

Ellen McArthur Foundation. (2020). *Circular Economy*. Retrieved April 23rd, 2020, from https://www.ellenmacarthurfoundation.org/circular-economy

Ellen McArthur Foundation. (2020a). *Circular Economy - School of Thoughts*. Retrieved April 23rd, 2020, from https://www.ellenmacarthurfoundation.org/circular-economy

EPA. (2009). *Sustainable Materials Management: The Road Ahead 2009-2020*. U.S. Environmental Agency. Retrieved March 26th, 2020, from https://www.epa.gov/sites/production/files/2015-09/documents/vision2.pdf

EPA. (2013). *Vocabulary Catalog*. Retrieved March 26th, 2020, from Recycling: https://ofmpub.epa.gov/sor_internet/registry/termreg/searchandretrieve/glossariesandkeywordlists/search.do?details=&vocabName=Glossary%20Climate%20Change%20Terms&filterTerm=recycling&checkedAcronym=false&checkedTerm=false&hasDefinitions=false&filterTerm=r

EPA. (2014). *RCRA's Critical Mission & the Path Forward.* U.S. Environmental Protection Agency. Retrieved March 24th, 2020, from https://www.epa.gov/sites/production/files/2015-09/documents/rcras_critical_mission_and_the_path_forward.pdf

EPA. (2019a, November). *United States Environmental Protection Agency.* Retrieved December 30th, 2020, from National Recycling Strategy and Framework for Advancing the U.S. Recycling System: https://www.epa.gov/sites/production/files/2019-11/documents/national_framework.pdf

EPA. (2019b). *Advancing Sustainable Materials Management: 2017 Fact Sheet.* United States Environmental Protection Agency. Retrieved May 5th, 2020, from https://www.epa.gov/sites/production/files/2019-11/documents/2017_facts_and_figures_fact_sheet_final.pdf

EPA. (2020a). *U.S. Environmental Protection Agency*. Retrieved March 19th, 2020, from https://www.epa.gov/aboutepa/about-office-land-and-emergency-management#orcr

EPA. (2020b). *U.S. Environmental Protection Agency*. Retrieved March 23rd, 2020, from Hazardous Waste - Universal Waste: https://www.epa.gov/hw/universal-waste

EPA. (2020c). *United States Environmental Protection Agency*. Retrieved December 30th, 2020, from Recycling Basics: https://www.epa.gov/recycle/recycling-basics

EPA. (2020d). *United States Environmental Protection Agency.* Retrieved December 30th, 2020, from Recycling Economic Information (REI) Report:

https://www.epa.gov/sites/production/files/2020-11/documents/rei_report_508_compliant.pdf

EPA. (2020e). *United States Environmental Protection Agency.* Retrieved December 30th, 2020, from Draft of National Recycling Strategy: https://www.epa.gov/sites/production/files/2020-10/documents/draft_national_recycling_strategy_0.pdf

FAA. (2016). *Federal Aviation Administration.* Retrieved May 6th, 2020, from Mission: https://www.faa.gov/about/mission/activities/

FAA. (2019). *Federal Aviation Administration.* Retrieved May 6th, 2020, from Airport Sustainability: https://www.faa.gov/airports/environmental/sustainability/

Freeman, R. E. (2017). The New Story of Business: Towards a more responsible Capitalism. *Journal of the Center for Business Ethics, Business and Society Review, 122*(3), 449-465. doi: 10.1111/basr.12123

Freeman, R. E., & Dmytriyev, S. (2017). Corporate Social Responsibility and Stakeholder Theory: Learning from each other. *Symphonya. Emerging Issues in Management*(1), 7-15. doi:10.4468/2017.1.02freeman.dmitriyev

Freeman, R. E., Harrison, J. S., Wicks, A. C., Parmar, B. L., & De Colle, S. (2010). *Stakeholder Theory: The State of the Art.* Cambridge University Press.

Freeman, R. E., Martin, K., & Parmar, B. (2007). Stakeholder Capitalism. *Journal of Business Ethics*(74), 303-314. doi:10.1007/s10551-007-9517-y

Freeman, R. E., Phillips, R., & Sisodia, R. (2020). Tensions in Stakeholder Theory. *Business & Society, 59*(2), 213-231. doi:10.1177/0007650318773750

Gallagher, V., Hrivnak, M., Valcea, S., Mahoney, C., & LaWong, D. (2017). A comprehensive three-dimensional sustainability measure: The 'missing P' of 'people' - a vital stakeholder in sustainable development. *Corporate Social Responsibility and Environmental Management, 25*(5), 772-787. doi:10.1002/csr.1493

Geissdoerfer, M., Savaget, P., Bocken, N., & Hultink, E. (2017). The Circular Economy - A new sustainability paradigm? *Journal of Cleaner Production, 143*, 757-768. doi:10.1016/j.jclepro.2016.12.048

GoZero. (2020). *Accessible Food Waste Services*. Retrieved May 7th, 2020, from https://gozero.org/

Graedel, T., Harper, E., Nassar, N., & Reck, B. (2013). On the material basis of modern society. *Proceedings of the National Academy of Sciences of the United States of America, 112*(20), 6295-6300. doi:www.pnas.org/cgi/doi/10.1073/pnas.1312752110 PNAS

Hamilton County SWCD. (2018). *Hamilton County Waste Composition Study*. Hamilton County Recycling and Solid Waste District. Retrieved May 31st, 2020, from http://www.hamiltoncountyrecycles.org/UserFiles/Servers/Server_3788196/File/EnvironmentalServices/SolidWaste/About/Hamilton%20County%20WCS%202018%20Final%20Report.pdf

Ilic, D., Eriksson, O., Ödlund, L., & Åberg, M. (2018). No zero burden assumption in a circular economy. *Journal of Cleaner Production, 182*, 352-362. doi:10.1016/j.clepro.2018.02.031

Kantenbacher, J., Hanna, P., Cohen, S., Miller, G., & Scarles, C. (2018). Public attitudes about climate policy options for aviation. *Environmental Science & Policy, 81*, 46-53. doi:10.1016/j.envsci.2017.12.012

Karhunen, V., Rasi, I., Lepola, E., Muhli, A., & Kanniainen, A. (n.d.). IBM SPSS Statistics - Perusteet. (O. yliopisto, Ed.) Retrieved December 15, 2020

Kaza, S., Yao, L., Bhada-Tata, P., & Van Woerden, P. (2018). What a Waste 2.0: A Global Snapshot of Solid Waste Management to 2050. Overview Booklet. doi:10.1596/978-1-4648-1329-0

Kentucky Compost. (2019, October 11th). *Bizapedia - Kentucky Compost Inc.* Retrieved May 7th, 2020, from https://www.bizapedia.com/ky/kentucky-compost-inc.html

Lozano, F., Lozano, R., Freire, P., Jimenez-Gonzalez, C., Sakao, T., Ortiz, M., Viveros, T. (2018). New perspectives for green and sustainable chemistry and engineering: Approaches from sustainable resource and energy use, management, and transformation. *Journal of Cleaner Production, 172*, 227-232. doi:10.1016/j.clepro.2017.10.145

RCRA. (1976). *Resource Conservation and Recovery Act 42 U.S.C. §6901 et seq.*

Rumpke. (2020a). *Rumpke*. Retrieved May 7th, 2020, from Single Stream Recycling: https://www.rumpke.com/for-your-home/recycling

Rumpke. (2020b). *Rumpke.* Retrieved December 15th, 2020, from Recycling guidelines: https://www.rumpke.com/

Sadashiva, M. (2020). *Stakeholder Surveys.* Retrieved June 18th, 2020, from CIVICUS - Toolkits: https://www.civicus.org/documents/toolkits/PHX_H_Stakeholder%20Survey.pdf

SFO. (2018). *San Francisco International Airport.* Retrieved May 31st, 2020, from Zero Waste Plan: http://media.flysfo.com.s3.amazonaws.com/media/sfo/community-environment/13259_Zero_Waste_Roadmap.pdf

Soin, M. (2018). Philosophical difficulties of stakeholder theory. *Annales. Ethics in Economic Life, 21*(7), 75-84. doi:10.18778/1899-2226.21.7.05

Stern, P. C. (2011). Contributions of Psychology to Limiting Climate Change. *American Psychologist, 66*(4), 303-214. doi: 10.1037/a0023235

Stieb, J. A. (2009). Assessing Freeman's Stakeholder Theory. *Journal of Business Ethics*(87), 401-414. doi:10.1007/s10551-008-9928-4

Sulkowski, A. J., Edwards, M., & Freeman, R. E. (2018). Shake your stakeholder: Firms leading engagement to cocreate sustainable value. *Organization and Environment, 31*(3), 223-241. doi:10.1177/1086026617722129

Tabuchi, H. (2019). 'Worse Than Anyone Expected': Air Travel Emissions Vastly Outpace Predictions. *The New York Times*. Retrieved May 4th, 2020, from

https://www.nytimes.com/2019/09/19/climate/air-travel-emissions.html

Trudel, R. (2019). Sustainable consumer behavior. *Consumer Psychology Review, 2*, 85-96. doi:10.1002/arcp.1045

Uribe, D. F., Ortiz-Marcos, I., & Uruburu, Á. (2018). What is going on with Stakeholder Theory in Project Management literature? A symbiotic relationship for sustainability. *Sustainability*(10), 1300. doi:10.3390/su10041300

Vanapalli, K., Sharma, H., Ranjan, V., Samal, B., Bhattacharya, J., Dubey, B., & Goel, S. (2021). Challenges and strategies for effective plastic waste management during and post COVID-19 pandemic. *Science of The Total Environment, 750*(1), 1-10. doi:10.1016/j.scitotenv.2020.141514

Vehkalahti, K. (2019). Kyselytutkimuksen mittarit ja menetelmät. (H. yliopisto, Ed.) doi:10.31885/9789515149817

Vlek, C., & Steg, L. (2007). Human behavior and Environmental Sustainability: Problems, Driving Forces, and Research Topics. *Journal of Social Issues*, 1-19. doi:10.1111/j.1540-4560.2007.00493.x

WWF. (2018). *Living Planet Report - 2018: Aiming Higher.* WWF, Gland, Switzerland.: Grooten, M. and Almond, R.E.A.(Eds). Retrieved April 28th, 2020, from https://wwf.panda.org/knowledge_hub/all_publications/living_planet_report_2018/

Zambrano-Monserrate, M., Ruano, M., & Sanchez-Alcalde, L. (2020). Indirect effects of COVID-19 on the environment. *Science of the Total Environment, 728*(1), 1-4. doi:10.1016/j.scitotenv.2020.138813

Zwiers, J., Jaeger-Erben, M., & Hofmann, F. (2019). Circular literacy. A konwledge-based approch to the circular economy. *Culture and organization, 26*(2), 121-141. doi:10.1080/14759551.2019.1709065

APPENDIX A – RECYCLING GUIDELINES

Figure A1. Recycling guidelines (Rumpke, 2020b).

APPENDIX B – QUESTIONNAIRE TEMPLATE

Introduction:
This research is conducted in conjunction with University of Jyvaskyla School of Business and Economics in Finland and the CVG Airport. The purpose is to identify CVG Airport customers' interest and feedback on recycling practices at the CVG Airport. The results of this study will be analyzed and interpreted to support the enhancing efforts of recycling and waste management practices.

No personal identifiable data is being collected during the survey.

Section 1.

1. What is your gender?

— Female/ Male/ Non-Binary/ Prefer not to say

2. What age group do you belong to?

— 18 - 24 / 25 - 34/ 35 - 44/ 45 - 54/ 55 - 64/ Age 65 and older

3. What is your level of education?

— No High School Diploma/ High School Diploma or Equivalent/ Some College Credit, No Diploma/ Associate Degree/ Bachelor's Degree or Higher

4. Which best describes you?

— Visitor/ Local Resident (within 150 mi)

5. Which best describes you?

— Business Traveler/ Leisure Traveler

6. How often do you travel through CVG Airport?

— This is my first time/ Every few years/ 1 – 3 times a year/ More than 3 times a year/ 1 – 2 times a month/ Every week

Section 2. Recycling

The term recycling refers to separating instructed recyclable materials and items from non-recyclable trash and hazardous waste, and the following process of transforming (recycling) the material to be reused for other products.

Composting refers to biological decomposition of organic waste.

7. How well do you know what can and cannot be recycled?

— 1 = Do not know/2/3/4/5 = Know very well

8. How well do you know the benefits of recycling?

— 1 = Do not know/2/3/4/5 = Know very well

9. How concerned are you about environmental issues, such as environmental pollution or climate change?

— 1 = Not concerned/2/3/4/5 = Very concerned

10. How important is recycling to you?

— 1 = Not important/2/3/4/5 = Very important

11. How often do you recycle?

— 1 = Never/2/3/4/5 = Always

12. How much effort do you put towards recycling, such as empty bottles, rinse containers or separate materials?

— 1 = No effort/2/3/4/5 = Very much

13. Please choose the correct action for each item: (single option)

Items / Actions:	Composting	Recycling	Trash	Treatment needed before recycling	Recycling through Hazardous Waste service	I do not know
Empty plastic bottle						
Leftover sandwich						
Greasy paper plate						
To-go coffee cup						
Full plastic soda bottle						
Aluminum can						
Clean pizza box						
Used paper napkin						
Batteries						
Plastic straw						
Oily pizza box						
Biodegradable plastics						

Section 3. Recycling at CVG

At the moment at CVG, empty and clean plastic bottles and jugs, glass bottles and jars, aluminum cans, steel cans and lids, office paper, magazines and envelopes, cardboard and cartons are recyclable items.

14. How clear to use are the CVG blue/trash and green/recycle containers?
— 1 = Vey unclear/2/3/4/5 = Very clear
15. How clear are the instructions printed on recycling containers?
— 1 = Very unclear/2/3/4/5 = Very clear
16. How convenient located are the waste and recycling containers at CVG?
— 1 = Very inconvenient/2/3/4/5 = Very convenient
17. What do you like about the two-container trash and recyclables setup?
— Open answer
18. Do you have recommendations for CVG to improve recycling?
— Open answer
19. What other SUSTAINABILITY developments do you wish CVG to explore?
— Open answer

Do you have any questions related to the research, to the questions asked or of recycling as a practice? I am happy to help with anything I can.

APPENDIX C – RECYCLING TEST RESULTS

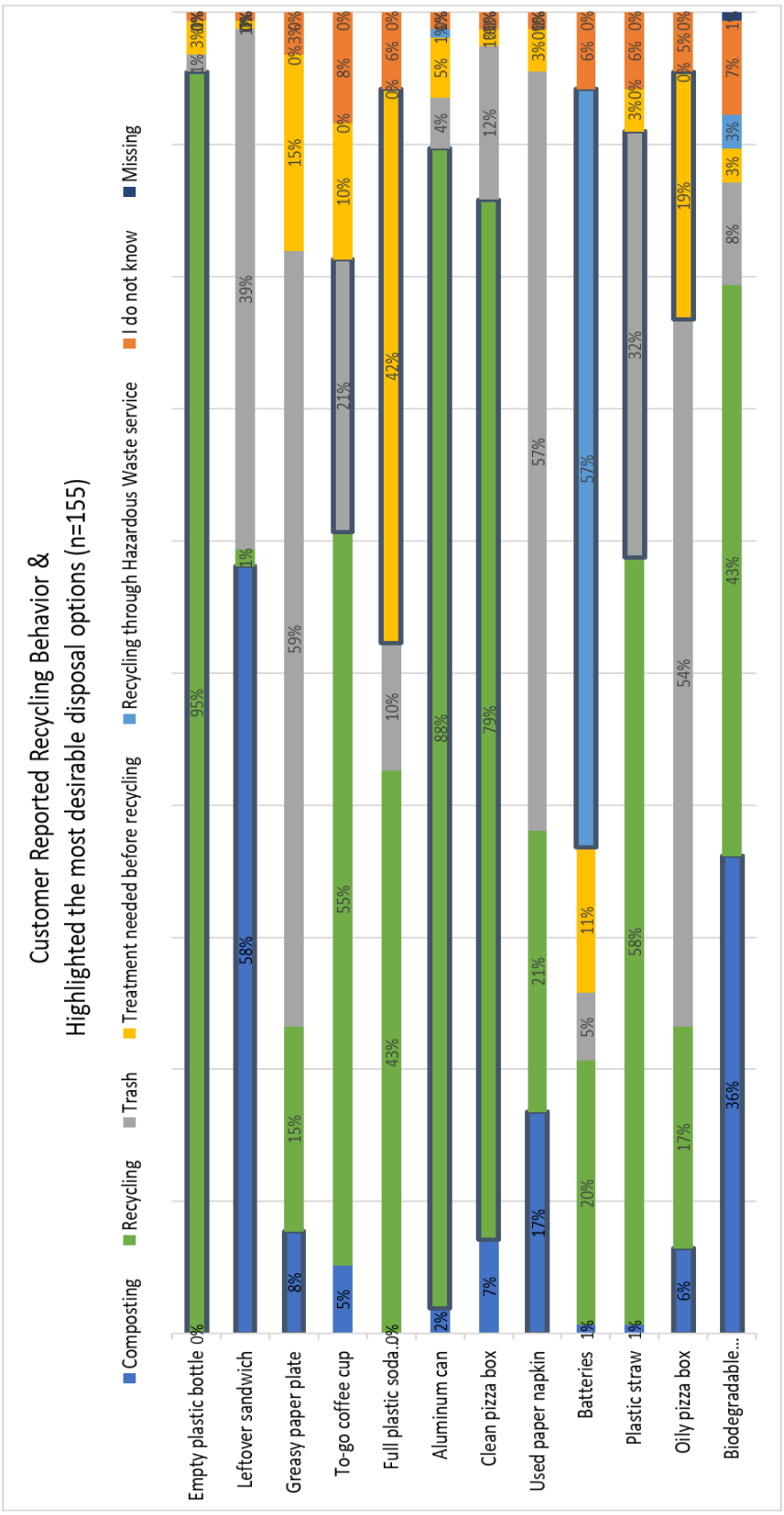

Figure C1. Frequency distribution of waste items. Table contains 12 items and 6 disposal options, n = 155.

APPENDIX D - FACTORS IMPACTING THE RECYCLING SCORES

Independent Samples T-Test: Dichotomous Background Information*Recycling Score											
Personal Recycling Score						Most Desirable Option_Personal Recycling Score					
Gender		N	Mean	Std. Deviation		Gender		N	Mean	Std. Deviation	
	Female	71	8.46	1.763			Female	71	5.85	1.786	
	Male	84	8.37	2.023			Male	84	5.44	2.026	
Levene's Test for Equality of Variances			t-test for Equality of Means			Levene's Test for Equality of Variances			t-test for Equality of Means		
Equal variances	F	p	t	df	p	Equal variances	F	p	t	df	p
assumed	1.876	0.173	0.311	153	0.756	assumed	0.577	0.449	1.307	153	0.193
Residency		N	Mean	Std. Deviation		Residency		N	Mean	Std. Deviation	
	Visitor	76	8.33	1.983			Visitor	76	5.47	1.976	
	Local	79	8.49	1.832			Local	79	5.77	1.874	
Levene's Test for Equality of Variances			t-test for Equality of Means			Levene's Test for Equality of Variances			t-test for Equality of Means		
Equal variances	F	p	t	df	p	Equal variances	F	p	t	df	p
assumed	1.472	0.227	-0.538	153	0.592	assumed	0.113	0.738	-0.965	153	0.336
Purpose of Traveling		N	Mean	Std. Deviation		Purpose of Traveling		N	Mean	Std. Deviation	
	Business	65	8.55	1.794			Business	65	5.48	1.905	
	Leisure	90	8.31	1.981			Leisure	90	5.73	1.942	
Levene's Test for Equality of Variances			t-test for Equality of Means			Levene's Test for Equality of Variances			t-test for Equality of Means		
Equal variances	F	p	t	df	p	Equal variances	F	p	t	df	p
assumed	0.458	0.5	0.783	153	0.435	assumed	0.015	0.903	-0.818	153	0.415

Table D1. Independent samples T-test for the binary variable of background information with the Personal Recycling Score and the Most Desirable Recycling Score. Confidence level of 95% and significance level (p-value) below 0,05 are used.

Variance Analysis: Non-dichotomous Background Information*Recycling Score								
	Personal Recycling Score				Most Desirable_Personal Recycling Score			
Age	**N**	**Mean**	**Std. Deviation**	**Std. Error**	**N**	**Mean**	**Std. Deviation**	**Std. Error**
18-24	14	8.36	2.023	0.541	14	5.5	2.624	0.701
25-34	38	8.39	2.15	0.349	38	5.5	2.19	0.355
35-44	26	8.12	1.883	0.369	26	5.54	1.606	0.315
45-54	27	8.37	2.022	0.389	27	5.89	1.867	0.359
55-64	31	8.74	1.692	0.304	31	5.94	1.526	0.274
65+	19	8.42	1.61	0.369	19	5.21	1.96	0.45
Total	155	8.41	1.903	0.153	155	5.63	1.924	0.155
Test of Homogeneity of Variances								
	Levene	**df1**	**df2**	**p**	**Levene**	**df1**	**df2**	**p**
Based on Mean	1.179	5	149	0.322	2.1	5	149	0.068
ANOVA								
	Sum of Sq.	**df**	**F**	**p**	**Sum of Sq.**	**df**	**F**	**p**
Between Groups	5.764	5	0.311	0.906	9.14	5	0.485	0.787
Within Groups	551.81	149			561.157	149		
Total	557.574	154			570.297	154		
Education	**N**	**Mean**	**Std. Deviation**	**Std. Error**	**N**	**Mean**	**Std. Deviation**	**Std. Error**
No High School Diploma	1	5	.	.	1	3	.	.
High School Diploma or Equivalent	12	7.08	1.564	0.452	12	3.17	1.467	0.423
Some College Credit, No Diploma	19	8.47	1.896	0.435	19	6.16	1.979	0.454
Associate Degree	15	8.13	1.846	0.477	15	5.53	1.642	0.424
Bachelor's Degree or Higher	108	8.62	1.883	0.181	108	5.84	1.804	0.174
Total	155	8.41	1.903	0.153	155	5.63	1.924	0.155
Test of Homogeneity of Variances								
	Levene	**df1**	**df2**	**p**	**Levene**	**df1**	**df2**	**p**
Based on Mean	0.504	3	150	0.68	0.499	3	150	0.683
ANOVA								
	Sum of Sq.	**df**	**F**	**p**	**Sum of Sq.**	**df**	**F**	**p**
Between Groups*	38.752	4	2.801	0.028	90.046	4	7.031	0
Within Groups	518.822	150			480.25	150		
Total	557.574	154			570.297	154		
Frequency of Traveling	**N**	**Mean**	**Std. Deviation**	**Std. Error**	**N**	**Mean**	**Std. Deviation**	**Std. Error**
This is my first time	32	8.38	2.136	0.378	32	5.72	1.938	0.343
Every few years	29	8.66	1.857	0.345	29	5.59	1.743	0.324
1-3 times a year	43	8.79	2.03	0.31	43	5.86	2.1	0.32
More than 3 times a year	38	8.11	1.673	0.271	38	5.47	1.885	0.306
1-2 times a month	8	7.5	1.604	0.567	8	5.5	1.927	0.681
Every week	5	7.8	1.095	0.49	5	4.6	2.074	0.927
Total	155	8.41	1.903	0.153	155	5.63	1.924	0.155
Test of Homogeneity of Variances								
	Levene	**df1**	**df2**	**p**	**Levene**	**df1**	**df2**	**p**
Based on Mean	1.343	5	149	0.249	0.746	5	149	0.59
ANOVA								
	Sum of Sq.	**df**	**F**	**p**	**Sum of Sq.**	**df**	**F**	**p**
Between Groups	20.027	5	1.11	0.357	8.957	5	0.476	0.794
Within Groups	537.547	149			561.34	149		
Total	557.574	154			570.297	154		
***Pair Comparison of groups with significant (p<0,05) difference in mean is invalid as the of one of the groups contains less than 2 observations.**								

Table D2. Variance analysis of non-dichotomous Background information with the Personal Recycling Score and the Most Desirable Recycling Score. Confidence level of 95% and significance level (p-value) below 0,05 are used. Significant differences (p<0,05) are marked on grey.

Cross tabulation and significance: Gender						
	Female, n=72	Male, n=84	Total	Significance Test		
Regrouped Recycling Knowledge						
Do not know	4.20%	7.10%	5.80%	**Fisher's Exact Test**		
Neutral	22.20%	27.40%	25.00%	**Value**	**p**	
Know well	73.60%	65.50%	69.20%	1.342	0.547	
Regrouped Recycling Benefits Knowledge						
Do not know	5.60%	6.00%	5.80%	**Fisher's Exact Test**		
Neutral	15.30%	28.60%	22.40%	**Value**	**p**	
Know well	79.20%	65.50%	71.80%	4.101	0.121	
Regrouped Concern of Environmental Issues						
Not concerned	2.80%	10.70%	7.10%	**Pearson Chi-Square**		
Neutral	9.70%	21.40%	16.00%	**Value**	**df**	**p**
Concerned	87.50%	67.90%	76.90%	8.723	2	0.013
Regrouped Importance of Recycling						
Not important	4.20%	9.50%	7.10%	**Pearson Chi-Square**		
Neutral	6.90%	20.20%	14.10%	**Value**	**df**	**p**
Important	88.90%	70.20%	78.80%	8.147	2	0.017
Regrouped Frequency of Recycling						
Rarely	8.30%	8.30%	8.30%	**Pearson Chi-Square**		
Neutral	16.70%	19.00%	17.90%	**Value**	**df**	**p**
Usually	75.00%	72.60%	73.70%	0.152	2	0.927
Regrouped Effort Invested to Recycling						
Little effort	12.50%	7.10%	9.60%	**Pearson Chi-Square**		
Neutral	8.30%	25.00%	17.30%	**Value**	**df**	**p**
More effort	79.20%	67.90%	73.10%	8.058	2	0.018
Regrouped Clarity of Receptacles to Use						
Unclear	4.20%	0.00%	1.90%	**Fisher's Exact Test**		
Neutral	4.20%	9.50%	7.10%	**Value**	**p**	
Clear	91.70%	90.50%	91.00%	4.591	0.069	
Regrouped Clarity of Instructions						
Unclear	8.30%	6.00%	7.10%	**Pearson Chi-Square**		
Neutral	11.10%	10.70%	10.90%	**Value**	**df**	**p**
Clear	80.60%	83.30%	82.10%	0.354	2	0.838
Regrouped Convenience of Locations						
Inconvenient	2.80%	1.20%	1.90%	**Fisher's Exact Test**		
Neutral	13.90%	15.50%	14.70%	**Value**	**p**	
Convenient	83.30%	83.30%	83.30%	0.667	0.859	

Table D3. Cross tabulation of Gender with Self-evaluation and Feedback. Self-evaluation and feedback data are decoded to 3-scale Likert scale from 5-scale to enable significance test of Chi square and its expansion of Fischer's Exact Test. Confidence level of 95% and significance level (p-value) below 0,05 are used. Significant differences (p<0,05) are marked on grey.

Cross tabulation and significance: Age									
	18-24, n=14	25-34, n=38	35-44, n=26	45-54, n=27	55-64, n=31	65+, n=20	Total	Significance Test	
Regrouped Recycling Knowledge									
Do not know	21.40%	5.30%	7.70%	3.70%	3.20%	0.00%	5.80%	**Fisher's Exact Test**	
Neutral	28.60%	26.30%	42.30%	11.10%	19.40%	25.00%	25.00%	**Value**	**p**
Know well	50.00%	68.40%	50.00%	85.20%	77.40%	75.00%	69.20%	14.637	0.092
Regrouped Recycling Benefits Knowledge									
Do not know	21.40%	5.30%	7.70%	3.70%	3.20%	0.00%	5.80%	**Fisher's Exact Test**	
Neutral	35.70%	28.90%	26.90%	18.50%	9.70%	20.00%	22.40%	**Value**	**p**
Know well	42.90%	65.80%	65.40%	77.80%	87.10%	80.00%	71.80%	13.742	0.123
Regrouped Concern of Environmental Issues									
Not concerned	7.10%	5.30%	7.70%	7.40%	6.50%	10.00%	7.10%	**Fisher's Exact Test**	
Neutral	28.60%	5.30%	19.20%	22.20%	19.40%	10.00%	16.00%	**Value**	**p**
Concerned	64.30%	89.50%	73.10%	70.40%	74.20%	80.00%	76.90%	8.555	0.547
Regrouped Importance of Recycling									
Not important	7.10%	5.30%	11.50%	3.70%	6.50%	10.00%	7.10%	**Fisher's Exact Test**	
Neutral	28.60%	13.20%	19.20%	11.10%	16.10%	0.00%	14.10%	**Value**	**p**
Important	64.30%	81.60%	69.20%	85.20%	77.40%	90.00%	78.80%	9.237	0.468
Regrouped Frequency of Recycling									
Rarely	28.60%	7.90%	11.50%	3.70%	3.20%	5.00%	8.30%	**Fisher's Exact Test**	
Neutral	7.10%	18.40%	23.10%	25.90%	12.90%	15.00%	17.90%	**Value**	**p**
Usually	64.30%	73.70%	65.40%	70.40%	83.90%	80.00%	73.70%	10.228	0.383
Regrouped Effort Invested to Recycling									
Little effort	14.30%	7.90%	15.40%	7.40%	6.50%	10.00%	9.60%	**Fisher's Exact Test**	
Neutral	21.40%	23.70%	19.20%	11.10%	19.40%	5.00%	17.30%	**Value**	**p**
More effort	64.30%	68.40%	65.40%	81.50%	74.20%	85.00%	73.10%	6.828	0.747
Regrouped Clarity of Receptacles to Use									
Unclear	0.00%	0.00%	3.80%	3.70%	3.20%	0.00%	1.90%	**Fisher's Exact Test**	
Neutral	7.10%	2.60%	15.40%	3.70%	6.50%	10.00%	7.10%	**Value**	**p**
Clear	92.90%	97.40%	80.80%	92.60%	90.30%	90.00%	91.00%	7.712	0.59
Regrouped Clarity of Instructions									
Unclear	7.10%	5.30%	7.70%	3.70%	12.90%	5.00%	7.10%	**Fisher's Exact Test**	
Neutral	7.10%	15.80%	15.40%	7.40%	6.50%	10.00%	10.90%	**Value**	**p**
Clear	85.70%	78.90%	76.90%	88.90%	80.60%	85.00%	82.10%	4.689	0.933
Regrouped Convenience of Locations									
Inconvenient	0.00%	2.60%	3.80%	3.70%	0.00%	0.00%	1.90%	**Fisher's Exact Test**	
Neutral	28.60%	21.10%	11.50%	11.10%	9.70%	10.00%	14.70%	**Value**	**p**
Convenient	71.40%	76.30%	84.60%	85.20%	90.30%	90.00%	83.30%	7.159	0.686

Table D4. Cross tabulation of Age with Self-evaluation and Feedback. Self-evaluation and feedback data are decoded to 3-scale Likert scale from 5-scale to enable significance test of Chi square and its expansion of Fischer's Exact Test. Confidence level of 95% and significance level (p-value) below 0,05 are used.

Cross tabulation and significance: Education								
	No High School Diploma, n=1	High School Diploma or Equivalent, n=12	Some College Credit, No Diploma, n=20	Associate Degree, n=15	Bachelor's Degree or Higher, n=108	Total	Significance Test	
Regrouped Recycling Knowledge								
Do not know	0.00%	25.00%	10.00%	6.70%	2.80%	5.80%	**Fisher's Exact Test**	
Neutral	100.00%	16.70%	35.00%	6.70%	25.90%	25.00%	**Value**	**p**
Know well	0.00%	58.30%	55.00%	86.70%	71.30%	69.20%	16.549	0.018
Regrouped Recycling Benefits Knowledge								
Do not know	0.00%	8.30%	5.00%	6.70%	5.60%	5.80%	**Fisher's Exact Test**	
Neutral	100.00%	33.30%	25.00%	6.70%	22.20%	22.40%	**Value**	**p**
Know well	0.00%	58.30%	70.00%	86.70%	72.20%	71.80%	8.169	0.408
Regrouped Concern of Environmental Issues								
Not concerned	0.00%	33.30%	5.00%	0.00%	5.60%	7.10%	**Fisher's Exact Test**	
Neutral	0.00%	16.70%	20.00%	13.30%	15.70%	16.00%	**Value**	**p**
Concerned	100.00%	50.00%	75.00%	86.70%	78.70%	76.90%	11.385	0.141
Regrouped Importance of Recycling								
Not important	0.00%	33.30%	5.00%	0.00%	5.60%	7.10%	**Fisher's Exact Test**	
Neutral	0.00%	16.70%	20.00%	13.30%	13.00%	14.10%	**Value**	**p**
Important	100.00%	50.00%	75.00%	86.70%	81.50%	78.80%	12.206	0.102
Regrouped Frequency of Recycling								
Rarely	0.00%	41.70%	10.00%	6.70%	4.60%	8.30%	**Fisher's Exact Test**	
Neutral	100.00%	16.70%	45.00%	0.00%	14.80%	17.90%	**Value**	**p**
Usually	0.00%	41.70%	45.00%	93.30%	80.60%	73.70%	30.825	0
Regrouped Effort Invested to Recycling								
Little effort	0.00%	25.00%	15.00%	6.70%	7.40%	9.60%	**Fisher's Exact Test**	
Neutral	0.00%	25.00%	20.00%	6.70%	17.60%	17.30%	**Value**	**p**
More effort	100.00%	50.00%	65.00%	86.70%	75.00%	73.10%	8.586	0.362
Regrouped Clarity of Receptacles to Use								
Unclear	0.00%	0.00%	5.00%	0.00%	1.90%	1.90%	**Fisher's Exact Test**	
Neutral	0.00%	8.30%	10.00%	6.70%	6.50%	7.10%	**Value**	**p**
Clear	100.00%	91.70%	85.00%	93.30%	91.70%	91.00%	6.232	0.806
Regrouped Clarity of Instructions								
Unclear	0.00%	8.30%	5.00%	6.70%	7.40%	7.10%	**Fisher's Exact Test**	
Neutral	0.00%	8.30%	10.00%	0.00%	13.00%	10.90%	**Value**	**p**
Clear	100.00%	83.30%	85.00%	93.30%	79.60%	82.10%	4.254	0.912
Regrouped Convenience of Locations								
Inconvenient	0.00%	8.30%	0.00%	0.00%	1.90%	1.90%	**Fisher's Exact Test**	
Neutral	0.00%	8.30%	10.00%	6.70%	17.60%	14.70%	**Value**	**p**
Convenient	100.00%	83.30%	90.00%	93.30%	80.60%	83.30%	7.13	0.647

Table D5. Cross tabulation of Education with Self-evaluation and Feedback. Self-evaluation and feedback data are decoded to 3-scale Likert scale from 5-scale to enable significance test of Chi square and its expansion of Fischer's Exact Test. Confidence level of 95% and significance level (p-value) below 0,05 are used. Significant differences (p<0,05) are marked on grey.

Cross tabulation and significance: Residency						
	Visitor, n=77	Local (within 150mi), n=79	Total	Significance Test		
Regrouped Recycling Knowledge						
Do not know	3.90%	7.60%	5.80%	**Fisher's Exact Test**		
Neutral	26.00%	24.10%	25.00%	**Value**	**p**	
Know well	70.10%	68.40%	69.20%	0.98	0.673	
Regrouped Recycling Benefits Knowledge						
Do not know	6.50%	5.10%	5.80%	**Fisher's Exact Test**		
Neutral	20.80%	24.10%	22.40%	**Value**	**p**	
Know well	72.70%	70.90%	71.80%	0.396	0.849	
Regrouped Concern of Environmental Issues						
Not concerned	6.50%	7.60%	7.10%	**Pearson Chi-Square**		
Neutral	6.50%	25.30%	16.00%	**Value**	**df**	**p**
Concerned	87.00%	67.10%	76.90%	10.7	2	0.005
Regrouped Importance of Recycling						
Not important	6.50%	7.60%	7.10%	**Pearson Chi-Square**		
Neutral	9.10%	19.00%	14.10%	**Value**	**df**	**p**
Important	84.40%	73.40%	78.80%	3.373	2	0.185
Regrouped Frequency of Recycling						
Rarely	3.90%	12.70%	8.30%	**Pearson Chi-Square**		
Neutral	13.00%	22.80%	17.90%	**Value**	**df**	**p**
Usually	83.10%	64.60%	73.70%	7.5	2	0.024
Regrouped Effort Invested to Recycling						
Little effort	3.90%	15.20%	9.60%	**Pearson Chi-Square**		
Neutral	13.00%	21.50%	17.30%	**Value**	**df**	**p**
More effort	83.10%	63.30%	73.10%	8.91	2	0.012
Regrouped Clarity of Receptacles to Use						
Unclear	0.00%	3.80%	1.90%	**Fisher's Exact Test**		
Neutral	6.50%	7.60%	7.10%	**Value**	**p**	
Clear	93.50%	88.60%	91.00%	2.74	0.312	
Regrouped Clarity of Instructions						
Unclear	3.90%	10.10%	7.10%	**Pearson Chi-Square**		
Neutral	11.70%	10.10%	10.90%	**Value**	**df**	**p**
Clear	84.40%	79.70%	82.10%	2.338	2	0.311
Regrouped Convenience of Locations						
Inconvenient	0.00%	3.80%	1.90%	**Fisher's Exact Test**		
Neutral	19.50%	10.10%	14.70%	**Value**	**p**	
Convenient	80.50%	86.10%	83.30%	4.951	0.059	

Table D6. Cross tabulation of Residency with Self-evaluation and Feedback. Self-evaluation and feedback data are decoded to 3-scale Likert scale from 5-scale to enable significance test of Chi square and its expansion of Fischer's Exact Test. Confidence level of 95% and significance level (p-value) below 0,05 are used. Significant differences (p<0,05) are marked on grey.

Cross tabulation and significance: Purpose of Traveling						
	Business Traveler, n=65	Leisure Traveler, n=91	Total	Significance Test		
Regrouped Recycling Knowledge						
Do not know	7.70%	4.40%	5.80%	**Pearson Chi-Square**		
Neutral	26.20%	24.20%	25.00%	**Value**	**df**	**p**
Know well	66.20%	71.40%	69.20%	0.926	2	0.629
Regrouped Recycling Benefits Knowledge						
Do not know	7.70%	4.40%	5.80%	**Pearson Chi-Square**		
Neutral	26.20%	19.80%	22.40%	**Value**	**df**	**p**
Know well	66.20%	75.80%	71.80%	1.895	2	0.388
Regrouped Concern of Environmental Issues						
Not concerned	9.20%	5.50%	7.10%	**Pearson Chi-Square**		
Neutral	20.00%	13.20%	16.00%	**Value**	**df**	**p**
Concerned	70.80%	81.30%	76.90%	2.398	2	0.302
Regrouped Importance of Recycling						
Not important	6.20%	7.70%	7.10%	**Pearson Chi-Square**		
Neutral	21.50%	8.80%	14.10%	**Value**	**df**	**p**
Important	72.30%	83.50%	78.80%	5.1	2	0.078
Regrouped Frequency of Recycling						
Rarely	7.70%	8.80%	8.30%	**Pearson Chi-Square**		
Neutral	20.00%	16.50%	17.90%	**Value**	**df**	**p**
Usually	72.30%	74.70%	73.70%	0.346	2	0.841
Regrouped Effort Invested to Recycling						
Little effort	7.70%	11.00%	9.60%	**Pearson Chi-Square**		
Neutral	21.50%	14.30%	17.30%	**Value**	**df**	**p**
More effort	70.80%	74.70%	73.10%	1.662	2	0.436
Regrouped Clarity of Receptacles to Use						
Unclear	3.10%	1.10%	1.90%	**Fisher's Exact Test**		
Neutral	7.70%	6.60%	7.10%	**Value**	**p**	
Clear	89.20%	92.30%	91.00%	1.025	0.725	
Regrouped Clarity of Instructions						
Unclear	10.80%	4.40%	7.10%	**Pearson Chi-Square**		
Neutral	10.80%	11.00%	10.90%	**Value**	**df**	**p**
Clear	78.50%	84.60%	82.10%	2.361	2	0.307
Regrouped Convenience of Locations						
Inconvenient	4.60%	0.00%	1.90%	**Fisher's Exact Test**		
Neutral	18.50%	12.10%	14.70%	**Value**	**p**	
Convenient	76.90%	87.90%	83.30%	5.335	0.046	

Table D7. Cross tabulation of Purpose of Traveling with Self-evaluation and Feedback. Self-evaluation and feedback data are decoded to 3-scale Likert scale from 5-scale to enable significance test of Chi square and its expansion of Fischer's Exact Test. Confidence level of 95% and significance level (p-value) below 0,05 are used. Significant differences ($p<0,05$) are marked on grey.

Cross tabulation and significance: Frequency of Traveling									
	This is my first time	Every few years	1-3 times a year	More than 3 times a year	1-2 times a month	Every week	Total	Significance Test	
Regrouped Recycling Knowledge									
Do not know	6.30%	10.00%	4.70%	5.30%	0.00%	0.00%	5.80%	**Fisher's Exact Test**	
Neutral	18.80%	26.70%	30.20%	21.10%	25.00%	40.00%	25.00%	**Value**	**p**
Know well	75.00%	63.30%	65.10%	73.70%	75.00%	60.00%	69.20%	4.087	0.952
Regrouped Recycling Benefits Knowledge									
Do not know	6.30%	3.30%	7.00%	7.90%	0.00%	0.00%	5.80%	**Fisher's Exact Test**	
Neutral	21.90%	16.70%	30.20%	15.80%	12.50%	60.00%	22.40%	**Value**	**p**
Know well	71.90%	80.00%	62.80%	76.30%	87.50%	40.00%	71.80%	7.925	0.595
Regrouped Concern of Environmental Issues									
Not concerned	3.10%	13.30%	9.30%	5.30%	0.00%	0.00%	7.10%	**Fisher's Exact Test**	
Neutral	15.60%	16.70%	11.60%	18.40%	12.50%	40.00%	16.00%	**Value**	**p**
Concerned	81.30%	70.00%	79.10%	76.30%	87.50%	60.00%	76.90%	5.98	0.799
Regrouped Importance of Recycling									
Not important	6.30%	10.00%	9.30%	5.30%	0.00%	0.00%	7.10%	**Fisher's Exact Test**	
Neutral	9.40%	10.00%	14.00%	15.80%	12.50%	60.00%	14.10%	**Value**	**p**
Important	84.40%	80.00%	76.70%	78.90%	87.50%	40.00%	78.80%	8.209	0.543
Regrouped Frequency of Recycling									
Rarely	6.30%	13.30%	9.30%	7.90%	0.00%	0.00%	8.30%	**Fisher's Exact Test**	
Neutral	6.30%	10.00%	20.90%	21.10%	25.00%	80.00%	17.90%	**Value**	**p**
Usually	87.50%	76.70%	69.80%	71.10%	75.00%	20.00%	73.70%	15.561	0.068
Regrouped Effort Invested to Recycling									
Little effort	3.10%	10.00%	11.60%	13.20%	12.50%	0.00%	9.60%	**Fisher's Exact Test**	
Neutral	12.50%	13.30%	16.30%	18.40%	25.00%	60.00%	17.30%	**Value**	**p**
More effort	84.40%	76.70%	72.10%	68.40%	62.50%	40.00%	73.10%	9.255	0.444
Regrouped Clarity of Receptacles to Use									
Unclear	0.00%	3.30%	0.00%	2.60%	12.50%	0.00%	1.90%	**Fisher's Exact Test**	
Neutral	0.00%	13.30%	11.60%	2.60%	12.50%	0.00%	7.10%	**Value**	**p**
Clear	100.00%	83.30%	88.40%	94.70%	75.00%	100.00%	91.00%	13.848	0.078
Regrouped Clarity of Instructions									
Unclear	6.30%	10.00%	4.70%	7.90%	12.50%	0.00%	7.10%	**Fisher's Exact Test**	
Neutral	12.50%	16.70%	7.00%	5.30%	25.00%	20.00%	10.90%	**Value**	**p**
Clear	81.30%	73.30%	88.40%	86.80%	62.50%	80.00%	82.10%	8.212	0.534
Regrouped Convenience of Locations									
Inconvenient	0.00%	6.70%	0.00%	2.60%	0.00%	0.00%	1.90%	**Fisher's Exact Test**	
Neutral	15.60%	10.00%	11.60%	21.10%	12.50%	20.00%	14.70%	**Value**	**p**
Convenient	84.40%	83.30%	88.40%	76.30%	87.50%	80.00%	83.30%	7.522	0.68

Table D8. Cross tabulation of Frequency of Traveling (Q6) with Self-evaluation and Feedback. Self-evaluation and feedback data are decoded to 3-scale Likert scale from 5-scale to enable significance test of Chi square and its expansion of Fischer's Exact Test. Confidence level of 95% and significance level (p-value) below 0,05 are used.

Correlations - Spearman's rho: Self-evaluation & feedback * Recycling Score			
	Spearman's rho	Personal Recycling Score	Most Desirable_ Personal Recycling Score
Recycling Knowledge	Correlation Coefficient	0.091	0.151
	p	0.26	0.061
	N	155	155
Recycling Benefits Knowledge	Correlation Coefficient	0.1	.209**
	p	0.216	0.009
	N	155	155
Concern of Environmental Issues	Correlation Coefficient	.212**	.219**
	p	0.008	0.006
	N	155	155
Importance of Recycling	Correlation Coefficient	.271**	.233**
	p	0.001	0.003
	N	155	155
Frequency of Recycling	Correlation Coefficient	.291**	.291**
	p	0	0
	N	155	155
Effort Invested to Recycling	Correlation Coefficient	.194*	0.155
	p	0.016	0.055
	N	155	155
Clarity of Receptacles to Use	Correlation Coefficient	0.018	0.043
	p	0.826	0.596
	N	155	155
Clarity of Instructions	Correlation Coefficient	-0.081	-0.05
	p	0.319	0.541
	N	155	155
Convenience of Locations	Correlation Coefficient	0.016	0.039
	p	0.846	0.634
	N	155	155
** Correlation is significant at the 0.01 level (2-tailed).			
* Correlation is significant at the 0.05 level (2-tailed).			

Table D9. Spearman's correlation of Self-evaluation and Feedback with Personal Recycling Score and Most Desirable Options Personal Recycling Score. Original 5-scale Likert scale is utilized with Spearman's correlation. Confidence level of 95% and significance level (p-value) below 0,05 are used. Significant differences ($p<0,05$) are marked on grey.