

Designing Educative Passenger Journey by Utilizing Queueing and Waiting Times

Yuki Abe

Thesis Supervisor: Miquel Alimbau Comas

Author Yuki Abe	
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<p>Airports are the locations where complicated networks of various queuing systems are tangled, and thus there are always queues irrespective to the length of waiting time. The recent research about queueing theory has been focused on reducing queueing times as much as possible by using, for example, Wi-Fi tracking to ease passenger's stress. Yet, the research about how to utilize inevitable queueing times is lacking. In this research, therefore, the futuristic idea of bringing an educative aspect into passenger journey in order to take advantage of inevitable queueing time was introduced in the research scope, and sustainability was chosen as a topic to educate passengers to ultimately prove a possibility of improving the level of service while waiting.</p> <p>The Psychology of Waiting Lines was used as the theoretical framework, which was originally presented by Maister (2005) who insisted that experiences during waiting can be a key element to decide the quality of provided services. A few of the propositions of the Psychology of Waiting Lines were then also used to form the hypotheses. Through the literature reviews, some essential findings were discovered in order to design the questionnaires such as the most stressful activities during passenger journey, the characteristics of queueing at airports, the relationship between the length of waiting and satisfaction, the possible education methods while waiting and sustainability education.</p> <p>Survey was implemented to generalize various passengers' opinions as a methodology of quantitative research. 72 respondents participated at Helsinki airport railway station, which falls into the margin of error at 10% and confidence interval at 94% based on the calculated average arrival passengers at HEL for three flights (329 people). To analyse the data, correlation research was used to observe the strength of the relationships of variables.</p> <p>The result demonstrated that nearly 48 respondents were interested in learning while waiting at the baggage claim, and 32 out of 48 respondents mentioned that topics to be educated matters to their willingness to learn. When sustainability was introduced as a topic, the respondents showed their positive interests in it at the correlation coefficient (r) 0.78. The respondents even showed their higher interests ($r=0.85$) in sustainability as a topic if it was presented in a way that passengers can learn about what they can do to improve the environmental issues when flying. The most selected education method was video, while the millennials who are going to be key players in sustainability in the upcoming future preferred to be educated by gamification.</p> <p>Although this research successfully proved the potential to introduce an educative passenger journey to utilize queueing times, a few questions emerged for further research: 1. What is the certain time for passengers to be willing to learn while queueing (if there is any), 2. How would different points of passenger journey affect outcomes (including preferred education types), and 3. How can gamified education exactly contribute to queueing time learning.</p>	
Keywords Passenger Flow Management, Passenger Journey, Queueing, Psychology of Waiting Lines, Sustainability, Sustainability Communication, Sustainability Education, Education While Waiting, Quantitative Research, Correlation Research	

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1 Introduction

Passengers are forced to queue at airports before getting on planes and even after getting off planes, and often queuing time is seen as boredom since passengers are literally waiting to be served, or sometimes it feels like forever even though it is a few minutes of queuing time. Highly likely, the majority of passengers can empathize it. This research, therefore initially began with a wish to make inevitable queuing time be enjoyable. As an idea to design enjoyable queuing times, an educative aspect was proposed as a chance to educate passengers about sustainability in the aviation industry because it is a hot topic that all the aviation sectors have been seriously working on, but their efforts to public has not yet promoted successfully. (IATA, 24 June 2019.)

1.1 Problem Statement

Queueing theory is a keystone in airport designing and planning as all airports are operated with complicated networks of various queuing systems. Yet, the research regarding queuing theory has been mainly emphasizing on exploring the relationship between demand on a service system and the delays suffered by the users of that system to improve level of services (LoS). (Neufville & Odoni 2013, 683-684.) Hence, it seems that a part of the utilization of queuing time is lacking from the previous researches when queuing systems reveal that there is inevitable waiting time existed. Airports are the places where passengers are forced to queue and wait irrespective of its lengths, and thus here is a promising possibility to take advantage of queuing time to improve LoS by educating passengers entertainingly during passenger journey.

1.2 Purpose Statement

Overall, this research could contribute to the future aviation industry by utilizing queuing and waiting times for passenger education about sustainability, and will deliver a brand-new approach in queuing time, passenger journey and sustainability in the aviation industry. More importantly, however, this research will bring competitive advantages to airports and airlines by creating a differentiator, and this will eventually generate more revenue to them. From the point of corporate social responsibility (CSR), which is often related to sustainability or sustainable development in the aviation industry, this research would also benefit to aviation business sectors since CSR has a significant impact on business, such as attracting business partners and customers.

1.3 Research Scope

In this research, therefore, the scope is set to proof a potentiality of an educative passenger journey based on passenger flow management and the psychology of waiting lines, and to verify that sustainability can be one of suitable and entertaining topics to educate passengers during the journey.

Passenger journey is one of very valuable means to correspond passenger flows. (Papiomytis, 23 April 2018.) It is the timelines of the passenger's experiences at airports, which enables to analyse passenger activities from the beginning of when passengers arrive at airports to the end of when passengers leave airports. This research will utilize passenger journey to demonstrate that passengers are under stress at certain waiting time during their journeys and to narrow down the stressful time to be improved for better experiences.

The psychology of waiting lines explains major eight feelings while people are waiting. As waiting time experience is a principal element to affect overall the quality of service provided (Maister 2005, 1.), understanding how people feel whilst waiting is theoretically of great importance in this research. By understanding it, people's expectations during waiting time are identified, and thus improvements can be found accordingly.

1.4 Research Limitation

Since this research did not cooperate with any commissioners, conducting survey at any spots of Helsinki Airport (HEL) was not permitted. Hence, the survey was alternatively conducted to collect data at HEL railway station to identify whether queuing passengers are eager to learn while waiting, and if so, whether they are willing to be educated in aviation sustainability. Although this fact allowed this research to get broader sample profiles (e.g. regardless of specific airline passengers), this became surely limitations in two ways; 1. Time pressure to answer the questionnaires (5 to 10 minutes) since the respondents were those who waiting the next trans at HEL railway station after their flights, and 2. Having no other choices than asking arrival passengers to recall their baggage claim experience for its freshness and actuality of memories. These limitations will be discussed more in the section of 5. Discussion as they brought some necessities of further research.

2 Literature Review

2.1 Introduction

This research has set its scope at to proof a potentiality of an educative passenger journey by utilizing inevitable queueing times that often happen at airports. One approach to shorten inevitable queueing times is to shorten perceived waiting times as the psychology of waiting lines immensely effects how people see their waiting times. It is of great importance to comprehend what and how affects people while queueing and waiting. The psychology of queueing will be therefore presented as the key theory in this research, in the next chapter. The theory identifies in which situations people feel waiting times longer or shorter.

After the theory is illustrated, passenger flow management (PFM) will demonstrate how the latest technologies have helped to improve recent queueing times. The literature review regarding PFM will also emphasize on passenger journey which is one of the useful tools to understand PFM. The reasons why passenger journey is important in PFM will be explained by the comment from Airport Council International (ACI). The next chapter: 2.4. Queueing at Airports explores the characteristics of queueing and queueing trend at airports with its reasons. The tight relation with the level of service and the appropriate waiting times will be simultaneously demonstrated through the International Air Transport Association (IATA) research.

Since this research attempts to find a possibility to use waiting times as opportunities to educate passengers, the chapter: 2.5. investigates the three actual cases in the field of healthcare in order to identify such particular possibilities. Interestingly, the healthcare field has been willingly working on designing educative waiting times. Once such possibilities are discovered, a potentiality of sustainability as a topic for passengers to learn will be examined by applying sustainability communications and sustainability education. With the available but very limited literature, the last chapter: 2.6. overall tries to verify that delivering sustainable messages as a tool of communications could bring competitive advantages to the companies, and what kind of educational approaches could help to gain competitive advantages, as well as to add values to customers.

2.2 Theoretical Framework

2.2.1 Psychology of Waiting Lines

Maister (2005, 1.) insisted that experiences during waiting can be a key element to decide the quality of provided services, and thus it is a great importance of paying attention to how customers have experienced their waiting times. Focusing on the three critical points; 1. What was actually done to or for the customer, 2. What was perceived by the customer, and 3. What the customer expected, Maister (2005, 2.) also proposed the simple formula as follow;

Satisfaction = Perception – Expectation.

Norman (2009, 23.) stated that the goal should be an optimization of both customers' and employees' experiences when waiting is inevitable, which eventually results in increasing customer satisfactions and decreasing employees stress and turnover. To optimize the inevitable waiting-time experiences, understanding the psychology of waiting lines helps. The eight propositions illustrated by Maister are;

- 1) Occupied time feels shorter than unoccupied time,
- 2) People want to get started,
- 3) Anxiety makes waits seem longer,
- 4) Uncertain waits are longer than known, finite waits,
- 5) Unexplained waits are longer than explained waits,
- 6) Unfair waits are longer than equitable waits,
- 7) The more valuable the service, the longer the customer will wait,
- 8) Solo waits feel longer than group waits.

As examples to occupy times (1), Maister recommended poster, reading material, shifting lights and even rolling balls. The offers to occupy times should be something that is valuable for both providers and receivers, and related to the provided services. However, Maister also emphasized on a potential of service-unrelated time fillers. One of the best examples of (2) is that customers are handed out menus at restaurant in advance. This small action lets customers understand that the service has already begun and servers has recognized the customers. This brings customers reassurance, and thus customers can spend their waiting times meaningfully. (Maister 2005, 3-4.)

People feel waiting times are long when having concerns (3). An example of concern can be choosing the right queue that is moving faster than others. As everyone has experienced, the other line always moves faster. The most profound concern is, however how long the wait will be (4). People are patient when the expected waiting times are informed, but people start to easily get irritated after the expected times are ran past. In addition, people also feel longer when the reasons that keep customers waiting are unexplained (5). Serving personnel who is not actually serving customers (e.g. a bank teller who is not serving customers but catching up on paperwork) is also an unexplained element for those who are waiting. People feel that they have been kept waiting more than necessary by judging such personnel as idle. (Maister 2005, 4-6.)

Fairness is obviously essential in the psychology of waiting lines. (6). At the most of services, the policy is first-come, first-serve (FCFS) as well as at airports. The snake queue is therefore adapted widely to maintain its fairness. (See 2.2.1.) Furthermore, at airports, it became apparent that passengers who are waiting to be served with simple services such as seat allocation are more impatient than passengers who are waiting to be served with more complex issues such as ticketing (7). Stated another way, waiting for something of little value can be intolerable. Last but not least, waiting with others feels more comfortable than waiting alone (8). It often happens that strangers start to talk each other once a delay is announced. (Maister 2005, 6-8.)

From the above-mentioned eight points of psychology, Maister demonstrated waiting times can be psychologically perceived long or short. At this time, airports are the places where people queue and wait, and thus taking advantage of inevitable waiting times by occupying passengers' minds (1) with something that is enjoyable as groups (8) will bring a new value. Norman (2009, 24.) is also one of those who promote the utilization of inevitable waiting times to make customers engage during their wait. As examples, he mentioned about introducing a back story of provided service and explaining of the event that is going to happen. When people are occupied properly, the customers think of these as the beginning of service. (Norman 2009, 28.)

2.3 Passenger Flow Management

Passenger flow management (PFM) is vital for airports and other aviation sectors in terms of enhancing passenger experiences. Nowadays, passenger flow is monitored on a real-time basis thanks to the development of technology. A typical example is a Wi-Fi tracking sensor, which takes advantage of the fact that 94% of leisure passengers and 97% of

business trip passengers carry at least one mobile device during their trips. (Spellman, 15 October 2014.) By a Wi-Fi tracking sensor, airports and other related sectors are able to comprehend a holistic passenger experience picture, including how long and at where passengers are queueing. A thermal image counting and a facial recognition tracking are also other examples. (Leidos 2018, 5.) At New York's JFK International airport, terminal 4, the waiting time has been already measured by sensors which detect passengers' mobile devices and displayed the calculated waiting time in order to ease their stress. (Carstens, 5 May 2016.)

The real-time information allows airports and other sectors to react unfolding events as quickly as possible, for instance, by rerouting passengers to other areas and deploying extra staff and enables passengers to keep updated with the personal up-to-the-minute information through their devices. (SITA, 2015.) The purpose of PFM is, therefore to make passenger flow as smooth as possible by understanding actual passenger behaviours and flows and pinpointing improvements with all these latest tools such as Wi-Fi sensors.

2.3.1 Passenger Journey

The passenger journey is one of very valuable means to correspond passenger flows. (Papiomytis, 23 April 2018.) The passenger journey is the timelines of the passengers' experiences at airports, which enables to analyse passenger activities from the beginning of when passengers arrive at airports to the end of when passengers leave airports. Passenger journey is handful to identify authentic problems of passengers by understanding passenger sequential actions, and thus where their stresses are during their journeys. Elbers (24 January 2018.) insisted that this approach is to improve overall passenger satisfaction by narrowing down problems, and "more effective way to ensure a more pleasant experience and better efficiency."

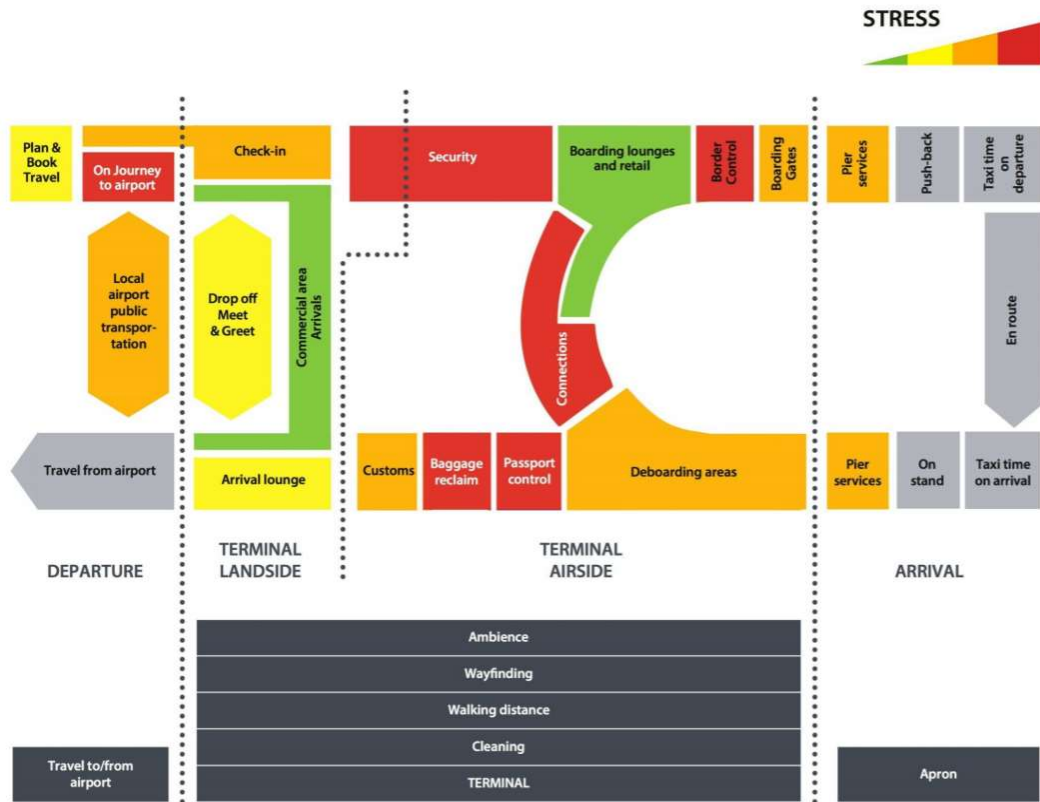


Figure 1. The Passenger Journey Stress Chart. (ACI 2014, 32.)

Figure 1 explains how passengers experience their journeys at London Heathrow Airport with the colour coordination. The red marked sections are the most stressful activities for passengers, and grey marked ones are the least stressful experiences. Needless to say, but most stressful journeys passengers go through are often at security, passport control and baggage reclaim where passengers are forced to queue and/or anxious about uncertain things. It is therefore essential to empathize on the red ones to improve the passenger journey. ACI (2014, 31.) commented that successful initiatives addressing the most stressful situations will have the highest positive impact on passengers.

2.4 Queuing at Airports

2.4.1 The Characteristics of Queueing at Airports

Queueing is happening to not only passengers, but also aeroplanes that are waiting their turns to take off at taxiways, and often the fundamental policy is first-come, first-serve (FCFS). Basically, passenger A who starts queueing at a line earlier than passenger B will get served first, or aeroplane C who declares to push back for take-off faster than aero-

plane D will get a first priority to take off. However, some airports or services are implemented by service in random order (SIRO). For instance, at baggage claims, the order of checked-in luggage to be delivered is nearly SIRO. Passenger who embarks aeroplane first, or who has checked in his/her luggage first, does not always get his/her luggage first. (Neufville & Odoni 2013, 689.)

Another distinguishing part of queueing at airports is that the most full-service carriers provide different queueing services based on the passengers' boarding classes; namely First, Business, and Economy classes. Each class has phased priorities, and this allows First and Business class passengers to skip long queues. For example, First and Business class passengers are prioritized to get onboard faster than economy passengers at gates, and some check-in counters are even reserved for First and Business class passengers for their priorities. (Neufville & Odoni 2013, 690.)

At airports, two typical queueing styles can be observed: parallel queues and a single queue (a snake queue). (Figure 2.) While parallel queues are the style which queues are formed at in front of each service point, a single queue is the style which only one queue is formed irrespective of the number of service points and the first person at a queue gets served at an available point. This single queue is sometimes called a snake queue because of its shape when it gets longer. Recently, many airports have introduced a single queue system for its fairness of service turns, because people feel stress about choosing the right line that moves faster than any other lines in parallel queues. The negative points of a single queue are, however, a very long single queue gives passengers anxiety when queueing at the end of a queue, and also make employees feel demotivated to see such a long queue. In addition, it happens quite often that the person at the head of a queue does not realize that there is a spot open for him/her, which eventually takes longer time to reach a service point. (Neufville & Odoni 2013, 690.)

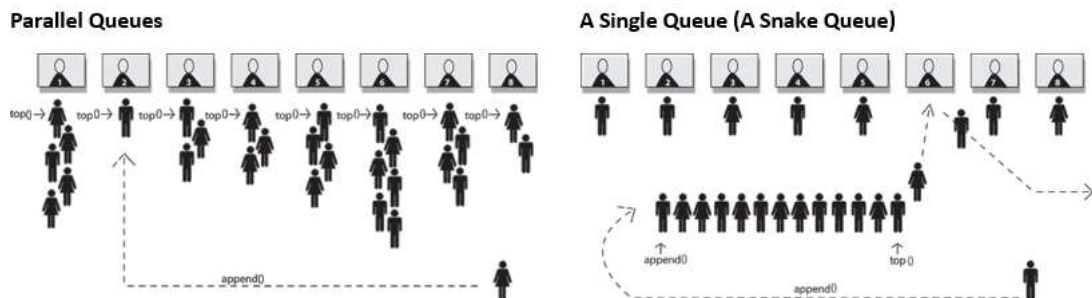


Figure 2. Parallel Queues vs. A Single Queue. (Ziegler, 2009.)

2.4.2 Relation with Level of Service

Although International Air Transport Association (IATA) revealed that queuing space and waiting time are highly related to level of service (LoS), and thus it is essential for planning and designing facilities and understanding queueing areas, (IATA 2014, 199.) Renner (2015, 49.), who is the principal at IATA Consulting mentioned that recent survey proved the higher appreciation of short hassle-free waiting time than queueing space.

Los Guidelines		Waiting Time Standards for Processing Facilities					
		in Economy Class (min)			in Business/First Class (min)		
Los Parameter;		Over-Design	Optimum	Sub-Optimum	Over-Design	Optimum	Sub-Optimum
Check-in	Self-Service Kiosk (Boarding Pass, Bag Tagging)	< 0	1 - 2	> 2	< 0	0 - 2	> 3
	Bag Drop Desk (Queue Width 1.4 - 1.6m)	< 0	1 - 5	> 5	< 0	0 - 3	> 3
	Check-in Desk (Queue Width 1.4 - 1.6m)	< 10	10 - 20	> 20	< 3	3 - 5	> 5
Security Control (Queue Width 1.2m)		< 5	5 - 10	> 10	< 0	0 - 3	> 3
Emigration (Queue Width 1.2m)		< 5	5 - 10	> 10	< 0	0 - 3	> 3
Imigration (Queue Width 1.2m)		< 10	10	> 10	< 5	5	> 5
Transfers		< 5	5	> 5	< 0	0 - 3	> 3
Baggage	****First Passenger to First Bag						
Claim Area	Narrow Body	< 0	0 - 15	> 15	< 0	0 - 15	> 15
	Wide Body	< 0	0 - 25	> 25			

*Business Class Check-in Desk

**First Class Check-in Desk

***Fast Track

Table 1. LoS Guidelines for Airport Terminal Facilities. (IATA 2014, 202.)

Table 1 illustrates the appropriate lengths of waiting times in different services with three different parameters; over-design, optimum, and sub-optimum. Over-design refers to over-provision of resources which often causes unprofitable operational expenses (e.g. the high proportion of open check-in counters to check-in passengers), optimum refers to acceptable processing and waiting times and sub-optimum means unacceptable processing and waiting times which requires some improvements. (IATA 2014, 191.) Hence, the green marked lines are suggested to aim by IATA. Yet, IATA (2014, 201.) calls attention to that this chart should be modified based on different region, countries and markets in order to meet its own needs.

Provided LoS undoubtedly affects passenger satisfaction, and IATA and other researches have claimed that the lengths of waiting time are highly related to LoS. By utilizing state-of-the-art technologies such as Wi-Fi tracking sensor, a thermal image counting and a facial recognition (See 2.3.), the aviation industry has attempted to reduce waiting times itself physically. However, we should not forget that reducing waiting times psychologically

also works. Many researches in the psychology of waiting lines have been studied, and they found out that most of the frustration people experience is caused by boredom and a lack of accurate information while waiting, and it is possible to mitigate boredom by providing some form of distractions. (Carstens, 16 January 2019.)

2.5 Education While Waiting

It is the healthcare facilities that are taking a step ahead of taking an educational aspect into the waits, especially at waiting rooms after registration. Nemschoff (2014, 1-2.), a healthcare furniture company, stated that the experience of waiting is an important component of overall patient satisfaction, and the forced waiting experience enormously affects the perception of quality of care.

For that reason, most of the healthcare facilities equip toys, reading material and TVs to decrease perceived waiting times so that patients do not feel bored. While these amenities occupy the patient times to some extent, they do not provide useful information about treatments nor illness that patients are going through. It is therefore not informative, and there is not productivity and benefits for both patients and healthcare facilities because these amenities do not address the upcoming interaction which is usually the source for increased stress and anxiety. (Hassan, Nah, Twyman & Siau 2016, 414.) This fact brought healthcare facilities to utilize patient's waiting times to educate them about some health or related topics.

2.5.1 Gamified Education

Hassan, Nah, Twyman, and Siau have examined the engagement possibility at a waiting room by providing educational information with gamification. As contents, the processes, professionals and environment in the emergency room were chosen. 49 eligible examinees were all recruited at a university, and divided into two groups; one spent their imaginary waiting times with the reading material and the other with the gamified application, supposing that they were having an arm injury. The given content was the same, but the different tools to approach; reading material vs. gamified application. By the 7-point Likert scale, user's enjoyment, interests and nervousness were measured. The familiarity of the knowledge about emergency department was also measured by a 5-point familiarity Likert scale. (Hassan & al. 2016, 417-418 & 421.)

Their research revealed that the knowledge about emergency department increased by educational engagement at the waiting room. The group used the gamified application perceived the knowledge much greater than the one used the reading material. Additionally, significantly less nervousness and more interest in the content were shown by the group used the gamified applications. The researcher explained that it is because the gamified application creates an environment for the users to integrate themselves into. In both groups, interaction confidence and willingness to discuss their healthcare issues also increased thanks to the given educative information which eventually lowered the communication barriers. (Hassan & al. 2016, 420.) The researcher, however, noted that inconsistencies in the results might have occurred due to the limitation of the examinees who were actually not patients, but pretended and imagined to be so. (Hassan & al. 2016, 421.)

2.5.2 Interactive-exhibit Education

In contrary, Leong, Horn, Thaniel and Meier have implemented their research with actual paediatric patients and the companies, often their parents, in a waiting room. On the premise of which waiting rooms at medical clinics are suitable for informal learning, they examined the potentiality of active and collaborative family learning about the sickle cells as if they were in a museum to explore interactively. (Leong, Horn, Thaniel & Meier 2018, 1.)

Leong (2018) propounds the idea of Active Waiting Education which brings Active Prolonged Engagement exhibits into the waiting rooms to promote engaging and effective learning. Active Prolonged Engagement exhibits refer to open-ended, visitor-driven explorations, and thus it is the way of display that enables a wide range of users to collaborate, explore, play and observe for longer engagement times and deeper involvement. (Leong & al. 2016, 2.)

Based on the concept of Active Prolonged Engagement exhibits, they prototyped a mobile application, a tangible blood vessel and cells, a supporting poster and a pamphlet, and exhibited them at a paediatric waiting room. (Figure 3.) All of them were exhibited together, under the name of the Sickle Cell Station. The learning material was designed to function independently, but at the same time, they were designed so that each part reinforced and helped the others for better understandings. The goal of this research was for patients to develop further questions and encourage own investigations by offered hands-on interventional material. (Leong & al. 2016, 3.)



Figure 3. The Exhibition Content. (Leong & al. 2016, 2-3.)

The researchers observed 81 users, including 48 children, and recorded and analysed their behaviours. (Leong & al. 2016, 7.) The research successfully showed that the average dwell time was 8.74 minutes, which is much longer than the average of Active Prolonged Engagement exhibits' one, at 3.3 minutes. The reason was assumed because waiting rooms as space was advantageous, and active times at the Sickle Cell Station let them stay longer. The conversations that users had were very rich with biological content and included questions such as “what if we...”, which demonstrated that learning material roused further interests and encouraged self-motivated investigations. Although the content was a difficult medical topic, especially for children, the users enriched their understanding about it by being introduced interactive technologies for learning. (Leong & al. 2016, 10.)

2.5.3 Video Education

Papa, Seaberg, Rees, Ferguson, Stair, Goldfeder and Meurer have also surveyed 1132 real patients at an emergency department in order to evaluate the effect of instructional video that was tailored for this research. The video described the process from registration to discharge at the emergency department, including triage principles that has used at the emergency department to explain why some patients need to wait longer than the others who came later. By playing the instructional video, they examined whether; 1. Customer satisfaction will be improved and 2. Perceived waiting time will decrease. (Papa, Seaberg, Rees, Ferguson, Stair, Goldfeder and Meurer 2008, 347-349.)

While 551 patients watched regular cable TV programs (Pre-video group), 581 patients watched the instructional video (Post-video group) during their waits. After their discharges, they were asked to take part in the 4-point Likert survey. The survey consisted of 12 questions such as “How satisfied were you with today’s visit?” and “How was the length of time in the waiting room?”. (Papa & al. 2008, 349.)

All of the post-video group reported that they watched the video. As a breakdown, 41% watched the entire program, and 59% watched at least a portion of it. The surveys showed that the proportion of those who answered their satisfactions as Excellent and Very Good from the post-video group was roughly 7% higher than those who answered so from the pre-video group, respectively at 65% and 58.1%. (Figure 4.) Hence, this research numerically demonstrated that playing an educational video at a waiting room increases patient satisfaction. (Papa & al. 2008, 354.) The researchers expected that it is because the educational video improved the awareness of the process of care, and formed the realistic patient expectation, and thus decreased the patient stress before the care. (Papa & al. 2008, 352.)

However, Figure 4 illustrates the unfortunate result which the perceived waiting time did not significantly decrease by the video. The researcher did not give any presumably explanations, nonetheless, loop playback might have affected the perceived waiting time. The video was set to repeat about the emergency department process every 15 minutes, (Papa & al. 2008, 349.) and thus the repetitive information was not perhaps enough to occupy the patients’ minds the whole time. Even though this research did not mention about the average waiting times when the surveys were conducted, In the United States, where this research was also implemented (at Orlando Regional Medical Center in Florida), the average waiting time was reported more than 90 minutes to enter treatment rooms, and total 145 minutes before being discharged in 2019. (Savva & Tezcan, 6 February 2019.)

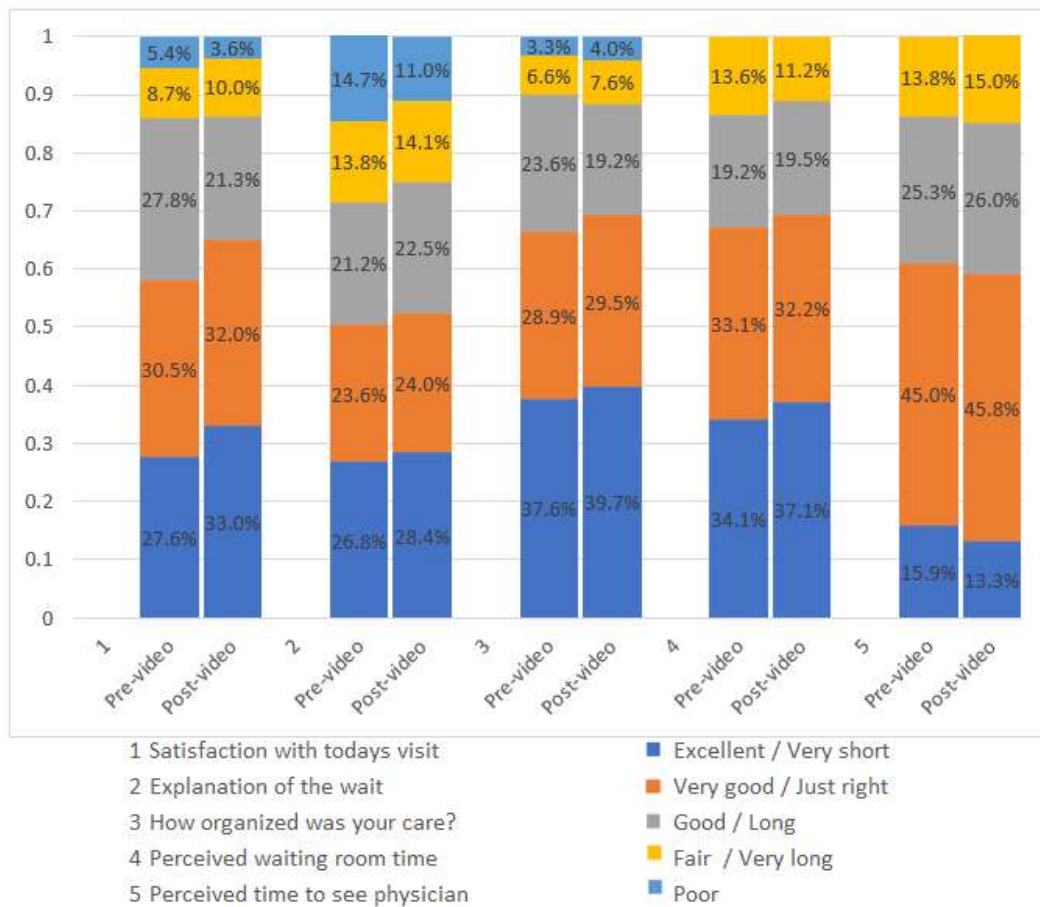


Figure 4. Results of Satisfaction Survey. (Papa & al. 2008, 351.)

Overall, all of the above-mentioned researches have demonstrated that education while waiting increases the satisfaction of patients, and that all the material (the gamified application, the interactive-exhibits and the video) helped patients deepen the knowledge about the given topics. In fact, higher satisfaction was created by providing accurate and realistic information to eliminate concerns and familiarize themselves with the topics. In terms of education while waiting, the healthcare facilities offer a promising point to emulate to the aviation industry because airports itself are also complex waiting rooms at a larger scale.

The longer people wait, the lower the satisfaction is, and thus it is very critical to manage perceived waiting times for satisfaction. (Papa & al. 2008, 353.) The researches so far, however, have not yet succeeded to demonstrate that providing education while waiting significantly reduces perceived waiting times. Yet, it has been apparent that people tend

to forget to check the time when they are involved with active and/or engaging experiences. (McGuire, Kimes, Kynn, Pullman and Lloyd 2010, 8.) Therefore, further researches should be implemented to seek how (e.g. material types, presentments) education while waiting can reduce perceived waiting times. Moreover, since most researches have been done in the healthcare facilities but not anywhere else, other environments where people involuntarily wait should be also tested.

2.6 Sustainability Communications

Recently, communication has been used as a means of marketing. Communication is viewed a magic bullet since it travels in one direction to achieve the predetermined effects, and communication is also considered to equate to marketing campaigns in terms of which a certain message is being conveyed to the targeted audience. The essence of communication was initially introduced into marketing in the light of sociology, which views communication essentially as about human interaction and understanding, and about the sharing information, knowledge and meaning. Hence, it is very suitable to comprehend and promote sustainable development, and thus to build and maintain favourable relationships with customers. (Belz & Peattie 2012, 202.)

Since communication is all about sharing information, knowledge and meaning, it gives few opportunities such as 1. For customers to learn about companies and 2. To have dialogues between customers and companies, which ultimately creates another chance for both to learn from each other. When promoted products and/or solutions are related to sustainability, then sustainability communications would benefit 1. In generating communication with customers through the sustainable products and 2. In generating communication strategies which also involves in other important stakeholders. The communication channels are diverse from advertising, personal selling, direct mail, sales promotion, labeling, point of sale, public relations to corporate reports. (Belz & al. 2012, 202-208.)

2.6.1 Objectives in Communications

Any kinds of communications have invariably objectives. The representative examples of the objectives are;

- a) Generating Awareness,
- b) Informing,

- c) Reminding,
- d) Persuading,
- e) Reassuring,
- f) Motivation,
- g) Rewarding,
- h) Connecting.

Undoubtedly, any companies would be successful without customer's awareness about the companies, and thus generating awareness is an essential objective in communication (a). Informing about the availability of products and the relation with customer's behaviours or lifestyles and sustainability (b), and reminding customers of the need of maintenance and replacement of products (c) can also be objectives. Other notable objectives are persuading customers to try own products in order to earn customer's loyalty from competitors (d), reassuring customers that they have made sensible choices to choose own products by criticizing competitor's products directly or impliedly (e), and motivating customers to respond further (e.g. making phone calls, visiting websites) not only purchasing products (f). There is another objective which directly gives benefits to customers; rewarding, which often gives rewards for last purchase or loyalty (g). The last presumable objective is to connect with customers through relationship-building activities and interactive communications. (Belz & al. 2012, 203-204.)

2.6.2 Sustainability Messages

Belz and Peattie (2012, 213.) stated that all the marketing communication messages have an appeal or a hook so as to make customers be more engaged and responded, and presented the six typical appeals in sustainability message. (Table 2.)

1	Financial Appeals	appealing to a financial aspect by e.g. product's price reduction, donations to charitable movements
2	Management Appeals	appealing a company position as a solution giver as a part of green movement
3	Euphoria Appeals	appealing to invoke a sense of well-being by emphasizing on its naturalness of the products and benefits to health
4	Emotional Appeals	appealing to customer's fears about the critical situations of the future planet and its impacts
5	Zeitgeist Appeals	appealing by linking to prevalent social concerns and sustainable issues
6	Others	e.g. comparative advertising or celebrity endorsement

Table 2. The Six Appeals in Sustainable Message. (Belz & al. 2012, 213.)

It is very challenging to choose the right appeal and tone of messages in sustainability message because an emotional appeal may disempower and demotivate customers, while a lively, upbeat, entertaining message might be interpreted as an ordinary-serious issue, which eventually causes a superficial response from customers. Some research also revealed that customers tend to react well with appropriate humour, a sense of participation and collective efforts, but not with messages that include guilt. (Belz & al. 2012, 213-214.)

2.6.3 Sustainability Communications and Competitive Advantage

Only little research has been conducted to explore the relationship between sustainability communication or CSR and competitive advantage. (Lasco 2015, 15.) However, Borga, Citterio, Noci and Pizzurno (2006, 5.) identified some benefits to communicate about corporate sustainability when sustainability reports are used as a communication channel. Such reports are valuable;

- 1) To improve relation with financiers first, general public and potential employees second, stakeholders in general and to promote a way to dialogue with them,
- 2) Reputational enhancement,
- 3) As a way of building trust and loyalty and gain competitive advantages,
- 4) To obtain contracts from multi-nationals,
- 5) To improve performance (if communication efforts force an effective increase of the performance reported) and
- 6) To have a direct-marketing tool.

Not only airlines but other companies cannot expand their markets and business without earning long-lasting trusts from customers, and as a means to earn and maintain their trusts, stepping into social responsibilities is very essential. (Tornes 2010, 64.) The positive attitude which tries to tackle the issue of social responsibilities leads a positive reputation toward a company, and thus to elicit customer's trusts. In the airline industry, this means the increased number of passengers, more revenue, and eventually better positioning within the airline market.

Tornes evaluated Australian Virgin Blue, British Silverjet, AirAsia, Qantas Airways (QFA) and Scandinavian Airlines System (SAS) respectively about their sustainability communications by examining their websites, sustainability and annual reports, CEO and chairman reports, code of conduct and contacting to the airlines for her query. Overall Tornes (2010, 64.) concluded that QFA and SAS communicate more actively about their corporate efforts in sustainability through websites and other communication channels than the others, and promote themselves as the well-being of society. Tornes (2010, 64.) at the end indicated that these sustainability communications can be competitive advantages for QFA and SAS to position themselves in a better place in the airline market.

Although the research in this area is primitive, it seems that sustainability communications or CSR could provide values such as improved operational efficiency, cost reductions, image enhancement and credibility. (Lasco 2015, 15.) Hence, sharing sustainability information, knowledge and meaning that companies have been tackling as a tool of communication can earn customer's credibility, and thus bring more financial benefits which definitely counts as one of competitive advantages.

Sustainability in the aviation industry has attracted immense attention over the recent years. Even though the global aviation industry produces only 2% of all human-induced carbon dioxide emission (Duncan & Bragadish 2017, 4.), the aviation industry has been under a lot of pressure. As the number of passengers is forecasted to keep increasing, the aviation industry has put lots of efforts on sustainability to respond the enormous social pressure. Yet, apparently, a powerful role of passengers is often overlooked even though passenger actions have a huge impact on sustainability.

In order to develop sustainability, all stakeholders, which indeed includes passengers, need to be involved at the same time. (Flouris & Ylimaz 2011, 81.) Sustainability is not only a matter for the aviation business sectors but for passengers too. There are surely many things that can be done by passengers as responsible members of the earth. Päivyt Tallqvist, who is a director of media relations at Finnair made a clear point that "if every Finnair passenger would take 1kg less baggage with them, we would save 1.2 million kg of fuel per year. And this would be enough to fly 20 flights between Tokyo and Helsinki." (Tallqvist 16 May 2019.)

While all the relative information is published, the problem is that there are not enough visibilities and possibilities for passengers to obtain it. Alan Joyce, QFA CEO, clearly stated that airlines need to promote their efforts more since airlines are taking its environmental

responsibility seriously. (IATA, 24 June 2019.) In fact, thinking from a passenger perspective, passive changes to learn about sustainability in the aviation industry (e.g. what passengers can do, how airports and airness have been working on) is evidently lacking. Therefore, here it comes a possibility to utilize sustainability communication to generate passenger's awareness, to motivate and inform, which ultimately will highly likely benefit to airlines to win competitive advantage.

2.6.4 Customer Education About Sustainability

Exploring a potentiality of which whether passengers are willing to be educated about sustainability while queueing is one of the important research contents. Sustainability as a topic itself is very wide, but the most common approach to sustainability has three main pillars; social, environmental and economic. (Figure 5.) In sustainability education (SE), therefore integration of the three pillars' knowledge by broad understanding is necessary. (Martins, Mata & Costa 2006, 31.)

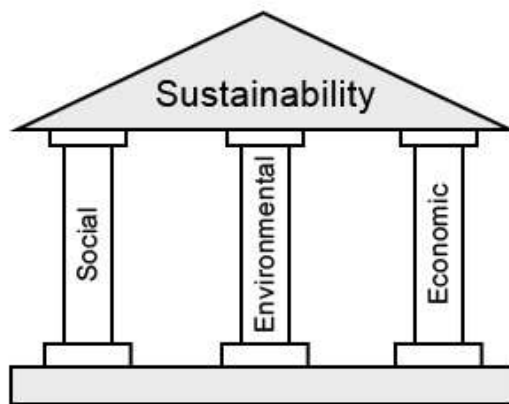


Figure 5. The Three Pillars of Sustainability. (Singh 30 March 2019.)

The argument of which what kind of competences should be aimed to provide though SE has become a core topic. Hesselbarth, Buhr and Schaltegger (2015, 29.) defined three crucial components; knowledge, skills and attitudes. Some concrete examples of knowledge such as ecological concepts and environmental management systems were given, whereas the importance of attitudes was explained as; learners need to be encouraged to question their views of the world, and to develop reflective thinking and the deeper understanding of complex problems.

In universities, some recent MBA programs have embedded ethic as a subject from two different aspects; CSR and sustainable management. The research that was conducted in 2007 (Christensen, Perice, Hartman, Hoffman & Carrier 2007, 347.) examined how the top MBA 50 universities, which are based on the Financial Times in 2006, introduced ethic, CSR and sustainability to their curriculums. 44 out of the top 50 universities responded to this research and showed that nearly one-third of the responding universities teach all of the three topics as mandatory subjects. Surprisingly, 84.1% of the responding universities answered that at least one or two of the topics need to be covered as mandatory subjects. In fact, over a quarter of responding universities mentioned that these topics are taught in combination with other mandatory subjects. (Christensen & al. 2007, 348-356.)

Moore (2006, 329.) interviewed 30 key people from the University of British Columbia including undergraduate students, staff, deans and vice presidents, and suggested seven recommendations about sustainability education in a university level. The suggestions are (Moore 2006, 331.);

1. Infuse sustainability in all decisions
2. Promote and practice collaboration
3. Promote and practice transdisciplinary
4. Focus on personal and social sustainability
5. Integration of planning, decision-making and evaluation
6. Integration of research, service and teaching
7. Create space for pedagogical transformation

However, opportunities for SE are not only existed at schools and universities as formal education. As informal education, lifelong learning is significant to learners' behaviours and actions since lifelong learning voluntarily takes place throughout life experiences alongside of learners' interests and purposes. (Martins & al. 2006, 36.) Lifelong learning is very powerful once learners are motivated, yet catalysts are not easy to create. (See 2.6.2.) Customers are unlikely to get much out of SE unless they find a personal linkage between customer's lifecycle and the environmental problems that they care. In other words, SE needs to hold values for customers. (Martin & al. 2012, 192.) As a means of SE, Martin and Schouten (2012, 193.) identified six possible approaches by reviewing literature and actual cases. The approaches are which;

- A. Tangible environmental benefits by persuasive illustrations and statics
- B. Utilize packaging and in-store displays to provide environmental information

- C. Desterilize point-of-sale demonstrations to explain environmental issues
- D. Distribute free samples to overcome initial reluctance of trying something new
- E. Adopt new channels which is more adept at education
- F. Make environmental issues more enjoyable and amusing to tackle with them based on the fun theory

The fun theory, that is represented in the bullet point F, is the theory pioneered by Volkswagen and its advertisement company named DDB Stockholm. Originally it started as a competition with a financial award to encourage people to do boring but vital tasks by choice, such as excising and recycling. (Imagination for People 2019.) The fun theory is operated on the premise of which people are willing to do constructive things more when they are given enjoyment or amusement as added values. (Martin & al. 2012, 193.) To test their assumption of the power of fun, Volkswagen and DDB Stockholm have implemented some projects and posted their promising results on its YouTube channel.

For instance, Volkswagen had a project which have attempted to make people to use the stairs rather than the escalators, and their idea was to install piano keyboards on the stairs which actually make sounds when people step on it. (Figure 6.) As a result, 66% more people than normal chose the stairs over the escalator. (Volkswagen 26 October 2009a.) Volkswagen surprisingly managed to encourage people to use the stairs instead of the escalators by not mentioning anything like doom and gloom but providing enjoyment.



Figure 6. The Piano Stairs. (Exmark 22 August 2017)

Another example from Volkswagen is the project named the world's deepest bin. Volkswagen designed a bin in which the sensor was installed on the backside of the lid. The sensor detects trash when being thrown into the bin and makes sound like the trash is falling down so deep. (Figure 7.) It turned out that 72kg of the trash was collected into the bin during the day, which was 41kg more than the normal bin just a small distance away. (Volkswagen 26 October 2009b.) Here again, Volkswagen successfully managed to encourage and educate people to throw trash into a bin by making fun out of it without mentioning anything about the sustainable issues. Volkswagen (26 October 2009b.) insists that “fun can obviously change behaviour for the better”, and also Martin and Schouten (2012, 193.) supported their statement at the bolder extent to which the fun theory is effective in sustainability education because “even tackling the problem of sustainable consumption is fun if we make a game of it”.



Figure 7. The World's Deepest Bin. (Design DB 2 July 2010.)

It is, therefore, assumable that the reaction of the vital content in this research; whether passengers are willing to be educated about sustainability while queuing, could be positive if proper approaches with the right message are implemented. The fun theory, for example, proved that it can create catalysts which accordingly induce knowledge, skills and attitudes. SE affects the attitudes and behaviours of consumers, producers and citizens, and consequently, it is influential for executing their collective responsibilities and duties. (Martins & al. 2006, 31.) Martin and Schouten (2012, 192.) also mentioned that educated customers can be beneficial partners. Hence, SE apparently brings added values to customers, as well as beneficial partners (loyal customers) to companies. Although the aviation industry has not yet actively taken account of SE, the synergetic effect of SE should not be overlooked.

Speaking of the fun theory, the environments of airports are presumably suitable for implementing the fun theory. Even it was new and fun in the beginning, new will turn to be ordinary and no longer fun when ideas were experienced too frequently. Thus, airports where the majority of people occasionally visit can be ideal to keep passengers be entertained longer than other places.

3 Methodology

Most commonly adopted methodologies are qualitative, quantitative and mixed-methodology research. Yet, qualitative research and quantitative research do not position themselves at the extreme opposite, but “they represent different ends on a continuum”. (Creswell 2014, 3.) The general differences between qualitative and quantitative research are 1. Qualitative research is structured by words while quantitative research is formed by numbers, and 2. Qualitative research tries to understand individual’s or organization’s social or human problems by employing open-ended-question interviews, whereas quantitative research tries to identify the relationships among variables, and proof or deny the hypotheses by employing closed-ended questionnaires. (Creswell 2014, 3-4.)

The decision to choose between two research methods largely attribute to research problems, study issues and personal experiences. In case of which research problems ask for 1. The identification of factors that influence outcome, 2. The utility of an intervention, and 3. Understanding the best predictors of outcomes, quantitative research is suitable. On the other hand, if only little research has been done and researches do not have tangible ideas about what the essential variables are, qualitative research is preferred. (Creswell 2014, 20-21.)

In my research, the scope was already set in the beginning of the research to proof a potentiality of an educative passenger journey and to verify that sustainability can be one of suitable and entertaining topics to educate passengers while queueing. By identifying how passengers wish to spend their queueing times and how much passengers are ready to accept sustainability as a topic to be educated, this research ultimately aims to prove a potentiality of an educative passenger journey. As a means to demonstrate so, quantitative research was chosen. Airports and airlines are very diverse in terms of passenger’s nationalities, genders, ages, and the purpose of trips. Due to its variety, it can be easily assumed that their perception and action toward queueing time vary a lot. In other words, this diverse affects to its outcome of how they wish to spend their queueing times. Quantitative research allows to analyse a lot of data from various passengers, and help to generalize it with its numerical objectivity. Borrowing the words of Creswell, understanding the best predictors of outcomes is the determinant to choose quantitative research in my research.

3.1 Quantitative Research

Quantitative research is the approach of which to test objective theories by identifying the relationships between variables. (Creswell 2014, 4.) Punch (2003, 11) stated confidently that “the essence of quantitative research is the study of the relationships between variables.” In Creswell’s words, “a variable refers to characteristic or attribute of an individual or an organization that can be measured or observed and that varies among the people or organization being studied.” (Creswell 2014, 52.) Variables are measured by instruments to analyse as numerical data through statistical procedures. (Creswell 2014, 4.)

In quantitative research, the reality is conceptualized as variables. The ultimate objectives are set to illustrate how variables are related and influenced, and why. It should be noted that the central interest of qualitative research is revealing its relationships among variables, not simply explaining variables itself. Variables are categorized into two; independent variables (IV) and dependent variables (DV). IV is a causation and DV is an effect. (Punch 2003, 5-6 & 12.) The basic framework of IV and DV is;

Independent Variable (IV) → Dependent Variables (DV)

In this research, the conceivable variables are;

- 1a. What is the relationship between the length of queueing time (IV) and the eagerness to be educated (DV)?
- 2a. What is the relationship between the number of people who are waiting with (IV) and the eagerness to be educated (DV)?
- 3a. What is the relationship between the length of queueing time (IV) and the preferred types of education (DV)?
- 4a. What is the relationship between the number of people who are waiting with (IV) and the preferred types of education (DV)?
- 5a. What is the relationship between the eagerness to be educated (IV) and sustainability as a topic (DV)?

Punch (2003, 19.) also mentioned about two different kinds of variables; continuous variables and categorical variables. While continuous variables focus on the relationships between IV and DV, categorical variables emphasize the differences between IV and DV. Questions that include continuous and categorical variables are therefore both logically equivalent, but categorical variables are more specific than the other. Thinking from the

perspective of categorical variables, the above-mentioned variables (1-4a) can be transformed as;

- 1b. Does the eagerness to be educated (DV) differ in the length of queueing time (IV)?
- 2b. Does the eagerness to be educated (DV) differ in the number of people who are waiting with (IV)?
- 3b. Does the preferred types of education (DV) differ in the length of queueing time (IV)?
- 4b. Does the preferred types of education (DV) differ in the number of people who are waiting with (IV)?

In this research, categorical variables are apparently more accurate than continuous variables but not 5a. Figure 8 visualizes the research variables of this research by using a diagram. The numbers that are displayed in the boxes are related to the numbers of the psychology of waiting lines, which is the theory of this research. (See 2.2.1.)

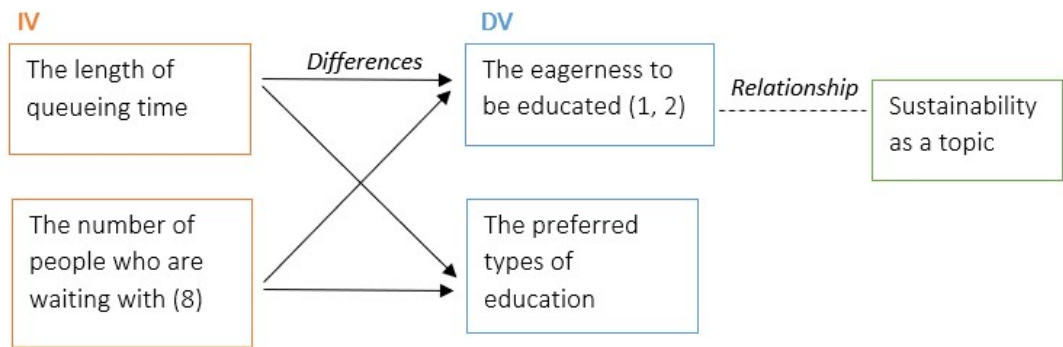


Figure 8. Diagram of the Research Variables.

Given the type of the variables that are illustrated in Figure 8, it is likely that these research variables have linear relationships. Hence, by analysing the specific relationships among them, a potentiality of an educative passenger journey while queueing and a possibility of sustainability as a topic could be demonstrated. Correlation research is therefore used to analyse the data since correlation research excels in discovering the linear relationships. Correlation research can indicate whether the variables share something in common, and thus it is a very powerful method to correspond the relationships among variables. (Salkind 2014, 275.) More about correlation research will be discussed in 3.6., the chapter of data analysis.

3.2 Research Questions and Hypotheses

According to Creswell (2014, 143.), “research questions inquire about the relationships among variables that the researcher seeks to know.” Synthesizing the above-mentioned variables, the three main research questions can be found;

- I. How keen are passengers being educated while queueing?
- II. How much are passengers willing to learn about sustainability in the aviation field while queueing?
- III. What types of education methodology would passengers prefer? (e.g. gamified education, Interactive-exhibit education, video education, poster)

In order to measure and answer the first two research questions, the four-grade evaluation was employed. The four-grade evaluation refers to the evaluating system on a scale of one to four. However, in the questionnaires, the scales were stated like; *Very interested, Interested, Not sure* and *Not interested*. (See Appendix 1.)

Hypotheses, however, “are predictions the researcher makes about the expected outcome of relationships among variables.” (Creswell 2014, 143.) As Creswell (2014, 55.) stated that researchers should embed research theories into research proposals and hypotheses in several ways, the hypotheses are generated mainly based on this research theory; the psychology of waiting lines and other findings from literature review.

Hypothesis

1. *The longer passengers queue, the greater their eagerness to be educated is* because people want to get started as soon as possible. When the education is also considered as a part of services, passengers may be willing to be educated more actively while they are queueing.
2. *The longer passengers queue, the greater they are interested in gamification and interactive-exhibit than videos* because occupied time feels shorter than unoccupied time. As it has been discussed in chapter 2.5.3., the perceived waiting time did not significantly decrease by the video. Therefore, passenger may prefer gamified or interactive-exhibit education since it might easily occupy their minds.
3. *The less people to wait with, the greater the eagerness to be educated is* because solo waits feel longer than group waits. When passenger queue solely, the person is not at least occupied by accompanies, and this may create more interests in being involved with education.

4. *The less people to wait with, the greater they are interested in video or gamification rather than Interactive-exhibit education* because interactive-exhibit education is the concept of learning by doing and it often encourages for participants to talk with others and interact. (See 2.5.4.) People are probably not willing to take part of interactive-exhibit education if they have to interact with strangers.
5. *There is no positive relationship between the eagerness to be educated and sustainability as a topic (A Null Hypothesis)* because passenger may demotivate or feel guilty when they learn about sustainability in an inappropriate way. (See 2.6.2.) It might be therefore possible that passengers are not pleased to learn about it before heading to holiday destinations.

3.3 Data Collection Method: Survey Research

The typical examples of quantitative research are experimental research and survey research. Experimental research is an approach which attempts to discover how the specific treatment would influence its outcome (DV) by providing the specific treatment to one group, but not another. The other approach is survey research which attempts to identify the trend, attitudes and opinions of the targeted population by collecting samples from the targeted population. Survey research also tries to generalize to the population from the samples with questionnaires and structured interviews to collect data. (Creswell 2014, 13 & 155.) Parker and Rea (2014, 2.) insisted that the ultimate goal for survey research is to generalize about a large population by studying only a small portion of that population.

This research employs the latter; survey research to answer the research questions and to test the research ideas by identifying and generalizing passenger's trends, attitudes and opinions because survey research is advantageous for its numerical objectivity and rapid turnaround in the stage of data collection. (Creswell 2014, 157.) The survey was cross-sectional, means that the data was collected one point in time (Creswell 2014, 157.) and chose a form of self-report questionnaires, means people answer about themselves to measure a variety of constructs like attitudes and feelings. (Science Direct 2019.) The questionnaires were handed out individually to the randomly selected people since this personal method allows researcher to get high response rates. (Jones, Baxter & Khanduja 2013, January.) The questionnaire was completely anonymous, and it promised to use for only this thesis purpose. In addition, the respondent's privacy was secured since there was no interventions during the questionnaires such as recording or filming.

3.4 The Sample and Population

All the respondents were the passengers who flew by airplanes and continued their trips to the next destination by trains via HEL railway station. In general, respondent's frame of mind and attitude would enormously affect to survey validity and reliability (Punch 2003, 42.), and thus it was assumed that respondents would show higher conscientiousness and cooperativeness when respondents are asked to recall their earlier experiences as soon as it happens, rather than recalling them after a while. Punch (2003, 44.) articulated that the more cooperative and positive the respondents are, the higher its reliability and validity are.

Since the targeted population was narrowed down to people who used HEL, the number of necessary samples was calculated based on HEL arrival passengers. Finavia (2019) has announced the number of HEL arrival passengers monthly. By using their report, the sum of both domestic and international arrival passengers was used to calculate the average number of HEL daily arrival passengers. Since Finavia Official Website (2019) also displays all the latest arrival flight information, the number of flights per day was also counted from there to calculate the arrival passengers per flight. The number of flights on 24 October was 267, so 267 is used to estimate average arrival passenger per flight. Judging from the same website page of Finavia, only three belts of baggage claim are currently in use; 1 at Terminal1, 2A and 2B at T2. Hence, the population size was set for the arrival passengers for 3 flights. To have more applicability, the average number from January to June was used, and that is 329. (Figure 9.) Assuming that 329 is the population size, a margin of error is set at 10%, confidence interval is 90% and the proportion of the sample which will respond in a given way at 50%, the required number of samples is at least 57 people. Yet, 72 were collected for its high confidence interval, which raised the confidence interval to 94%. (Select Statistical Services 2019.)

Month - 2019	Jan	Feb	Mar	Apr	May	Jun
Domestic Arrival Passengers	145536	145928	166853	125259	111835	101039
International Arrival Passengers	646946	611199	714400	774541	856892	906234
Sum	792482	757127	881253	899800	968727	1007273
Average Arrival Passengers Per Day	25564	27040	28428	29993	31249	33576
Estimated Average Arrival Passengers Per Flight	96	101	106	112	117	126
Estimated Arrival Passengers for 3 flights	287	304	319	337	351	377
Average Estimated Arrival Passengers for 3 flights						329

Figure 9. The Calculation of Sample Size.

During the data collection, the selection of respondents was randomly done irrespective of their nationalities, ages (over 18 years old) and genders. Random sampling is very effective in terms of providing the ability to generalize to a population from a representative sample. (Creswell 2014, 158.) All the questions were written in English, so the main respondents were those who can handle English at some level. However, Japanese translations was orally conducted due to the researcher's language ability. This fact actually contributed to obtain some amount of the research results from the Japanese population since they have low English proficiency. (EF 2018, 26.) It was also a meaningful contribution because Japan is one of the largest passenger volumes in long-haul flights at HEL. (Finavia 11 January 2019.)

3.5 Data Collection Limitations

The basic premise of this research is utilizing the inevitable queueing and waiting times at airports by introducing educative passenger journey to improve LoS. Thus, reducing waiting time itself is out of this research scope to discuss even though it is undoubtedly essential. Within this research scope, two limitations mainly occurred during the stage of the data collection;

Firstly, from the fact that this research does not own any commissioner, survey implementation was not allowed at any airports. Yet, judging from the reliability and generalizability of the survey, the respondents who flew by air to Helsinki airport (HEL) were only selected at the HEL railway station. Even though this fact gave a merit that those who attended to the survey were not from one particular airline, the respondents were narrowed down to the arrival passengers who used HEL railway station. As a consequence, this limitation caused 1. Time pressure to answer the questionnaires (5 to 10 minutes) since the respondents were those who waiting for the next trans at HEL railway station after their flights, and 2. Having no other choices than asking arrival passengers to recall their baggage claim experience for its freshness and actuality of memories.

The other one is that all the questions were written in English to obtain international response, but on the other hand, it confined the dynamic of the sample (e.g. age, nationalities) because the main respondents were most likely those who can handle English at some level. The fact was indeed that younger people were more cooperative to take part in the questionnaires than elderly people. (See 4.1.) However, Japanese translations was

orally conducted due to the researcher's language ability. This fact actually contributed to obtain some amount of the research results from the Japanese population since they have low English proficiency, at 51.80 of English Proficiency Index (EPI) (Education First 2018, 26.) It was also a meaningful contribution because Japan is one of the largest passenger volumes in long-haul flights at HEL. (Finavia 11 January 2019.)

How these two limitations affected the questionnaire result will be reviewed in the section of 5. Discussion as they brought some necessities of further research.

3.6 Designing the Survey

The first step of designing surveys attributes to research questions. Getting back to the research questions in order to reconfirm what to identify with surveys helps researchers decide what to ask in surveys. (Punch 2003, 30.) The survey was therefore designed for the respondents to recall about the earlier experience at the baggage claim based on the psychology of waiting lines by Maister; 6) Unfair waits are longer than equitable waits. As this report discussed in 2.4.1., the fairness of queueing is secured when a snake queue is adopted since the policy of FCFS is established, which means that the turns to be served is equal to every single person who lined up. On the other hand, passengers would highly likely perceive their waits in the parallel queues as equitable ones because there are often the cases that someone who is in a different queue that came later than the other gets served first due to the differences of the service speed. In this case, the policy of SIRO is employed.

The waits at baggage claim are often seen as unfair waits as well because either checked-in luggage is nearly returned to passengers by SIRO, or it seems like so at least to passengers. In other words, baggage claim is a place where its equality or perceived equality is relatively low compared to other places such as check-in counter where passengers are mostly served by FCFS. As also discovered in 2.4.2., queuing time is highly related to the LoS, and this is why understanding how passengers perceive, actually spend and desire to spend their waits at baggage claims could substantially improve the LoS.

In addition, the survey was designed to answer the education-related questions with four-grade evaluation (Q13-15). Although this type of response generates the higher possibility of variance, at the same time, it creates the possibility of criterions to decide whether the particular variables share the common variance or the particular variables vary together.

(Punch 2003, 60.) At the very end of the survey, an open-ended question was also embedded so that the respondents can freely leave any comments, for examples, regarding the topics that they are particularly interested in or the reasons why they are not interested in learning. Open-ended questions require more powerful analytical techniques than rating-scales questions, but it worth investigating so as to educe deeper content and information such as possible reasons and feathers. (Punch 2003, 57-58.)

Table 3 illustrates how the items on the survey, variables, research questions and hypothesis are related to each other. The survey was consisted of two sections with independent questions to identify the relationships among variables. In the section of travel experience, the respondents were asked to answer about their travel experience of this time. (e.g. how long they waited at the passport control, at the baggage claim, how many people they travelled with (IV)). The next section asked the respondents to assume that they would do the same trip again with the same number of people and the same amount of the time they spent at the baggage claim on the day of survey, and then to answer whether the respondents were interested in being educated while waiting, learning about sustainability and the preferred types of education (DV).

In Survey		Variables	Research Questions	Hypothesis
No.	The section of			
Q8, 9	Travel Experience	(IV) The length of queueing time	–	<p>1. <i>The longer passenger queue , the greater their eagerness to be educated is</i></p> <p>2. <i>The longer passenger queue , the greater they are interested in gamification and interactive-exhibit than videos</i></p>
Q7		(IV) The number of people who are waiting with	–	<p>3. <i>The less people to wait with , the greater the eagerness to be educated is</i></p> <p>4. <i>The less people to wait with , the greater they are interested in video or gamification rather than Interactive-exhibit education</i></p>
Q12	Education While Waiting	(DV) The eagerness to be educated	I. How much are passengers keen on being educated while queueing?	<p>1. <i>The longer passenger queue, the greater their eagerness to be educated is</i></p> <p>3. <i>The less people to wait with, the greater the eagerness to be educated is</i></p>
Q16		(DV) The preferred type of education	III. What types of education methodology would passengers prefer?	<p>2. <i>The longer passenger queue, the greater they are interested in gamification and interactive-exhibit than videos</i></p> <p>4. <i>The less people to wait with, the greater they are interested in video or gamification rather than Interactive-exhibit education</i></p>
Q13, 14, 15		Sustainability as a topic	II. How much are passengers willing to learn about sustainability in the aviation field while queueing?	5. <i>There is no positive relationship between the eagerness to be educated and sustainability as a topic (A Null Hypothesis)</i>

Table 3. Interrelationship of Items on Survey, Variables, Research Questions and Hypothesis.

Q1 to Q6 were the demographic questions. Q10 and 11 were to understand the passenger's behaviour while waiting at baggage claim and how they felt about the time. The terminology of queueing was avoided to use for passenger's better understanding, so waiting was used in the survey. (See Appendix 1.)

In fact, the process of designing the survey took advantage of the impact from the other survey being conducted in advance at HEL railway station. As a starting point to initiate the survey research, the first survey was designed to check the awareness of arrival passengers at HEL Terminal 2 (T2) about the project, which Finavia collaborated 17 contemporary design students and five water researchers from Aalto University to appeal the problem of water consumption in general. (See Appendix 2.) The glass exhibitions that were created by the students were there to express its fragility of water, and the posters

that were made by the researchers supported the topic with informative texts. (Figure 10.) (Aalto University 26 September 2019.) The aim of the first survey research was simply to understand;

- Whether the respondents noticed the exhibitions and posters,
- If so, whether they read the posters,
- How those who read the posters and noticed the exhibitions perceived their waiting time.

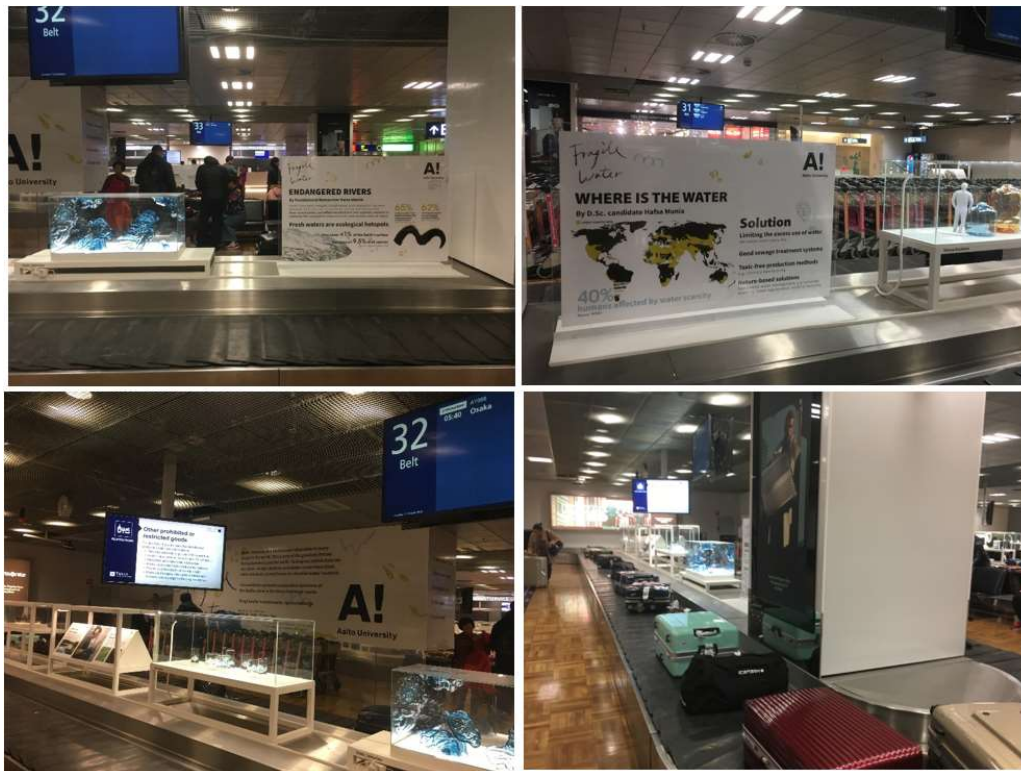


Figure 10. Aalto Exhibition Space at HEL T2.

3.7 Date Analysis Method: Correlation Research

Correlation research, which explains linear relationships between two or more variables (Salkind 2014, 275.), frequently uses the formula named Pearson Product Moment Correlation to indicate the relationships of variables by numbers. This formula calculates the correlation coefficient (r), which ranges between -1.00 and +1.00. A minus number refers to a negative or indirect correlation, while a plus number refers to a positive or direct correlation. A negative or indirect correlation means that if one variable changes in value to one direction, the other changes to the opposite direction. On the other hand, a positive or

direct correlation means that if one variable changes in value, the other also changes in the same direction. (Salkind 2014, 276-277.)

The arrowed line in figure 10 explains that the closer a correlation coefficient (r) is to +1, the stronger the positive correlation is – and vice versa. In general, the eyeball method tells how strong or weak the variables are. For instance, the positive relationship can be described as follow;

Correlations between	Are said to be
0.8 – 1.0	Very strong
0.6 – 0.8	Strong
0.4 – 0.6	Moderate
0.2 – 0.4	Weak
0.0 – 0.2	Very weak

When describing the relationship between variable X and variable Y with scattergrams, upward-sloping ones indicate positive correlations and declining ones indicate negative correlations. (Figure 10.) As it can be noticed, the stronger correlation appears as the pattern aligns itself in a 45-degree angle. (Salkind 2014, 277-280.)

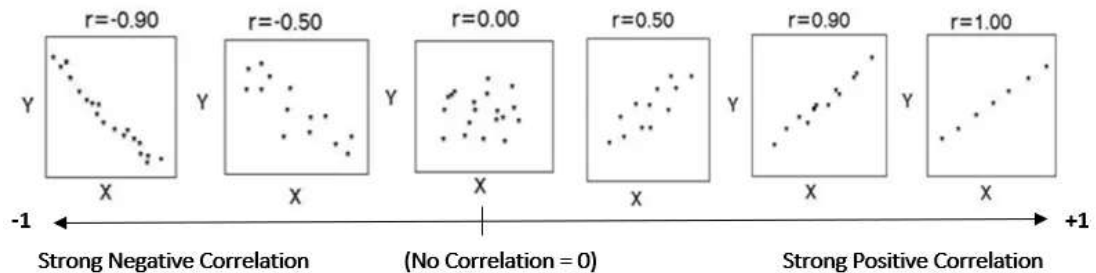


Figure 11. Scattergrams and Correlation Coefficients. (McLeod 14 January 2018.)

Salkind (2014, 279.) presents the formula of the Pearson Correlation to calculate the correlation coefficient (r) as follow;

$$r = \frac{n(\sum xy) - (\sum x)(\sum y)}{\sqrt{[n\sum x^2 - (\sum x)^2][n\sum y^2 - (\sum y)^2]}}$$

where r = the correlation coefficient

Σ = the summation sign

n = the size of the sample

- x = the individual's score on the x variables
- y = the individual's score on the y variables
- xy = the products of each x score times its corresponding y score
- x^2 = the individual x score, squared
- y^2 = the individual y score, squared.

Thus, it is essential for the correlation coefficient (r) to have a pair of scores from both variable X and Y . (Salkind 2014, 276.) As long as these scores are extracted, Excel can automatically calculate the correlation coefficient (r) by using the formula code of CORREL. In this research, therefore, all the necessary answers were transformed to scores in Excel and utilized the automatic calculation in Excel.

Hence, the waiting time (Q8-9), the eagerness to be educated (Q12) and sustainability as a topic (Q13-15) in the questionnaire were transformed to scores. Table 4 shows how the scores (0 to 3) are arranged in each question. In order to calculate the waiting time at baggage claim, the sum of waiting times at passport control and baggage claim is used because the waiting time at passport control influences the waiting time at the baggage claim. Hence, all the units in the graphs that are going to be displayed later are point, including the total waiting times at the baggage claim passport control. To give you an example, a person who waited at the passport control more than 20 minutes (score = 3) and at the baggage claim less than 5 minutes (score = 1) calculated the total sum of the scores, and that is 4. This does not mean that the person waited 4 minutes in total, but roughly more than 20 minutes in his/her real life.

Score (point)		0	1	2	3	4	5
Rough assumption of actual total waiting time (mins)		0	1~5	5~10	10~	20~	30~
Q8	Waiting time at passport control	Did not go through the passport control	Less than 5 mins	10 to 20 mins	More than 20 mins	N/A	
Q9	Waiting time at baggage claim	Did not have own baggage					
Q12	Eagerness to be educated	Not interested	Not sure	Yes, but X (with conditions)	Yes, no matter what		
Q13-15	Sustainability as a topic			Interested	Very interested		

Table 4. The Scoreboard.

4 Results

4.1 Demographic Results

Figure 11 describes the demographics of the 72 respondents. With the number of 72, the margin of error is 10% and the confidence interval is 94% when the population size is 329 based on the formula that is presented by Creswell (2014, 159.) and the related calculator. (Select Statistical Services 2019.) The selection of respondents was random, but the demographic shows some bias in nationality and age. Figure 12 illustrates the overview of the demographics of this research. Each of them is still going to be reviewed more carefully afterwards with the pie charts.

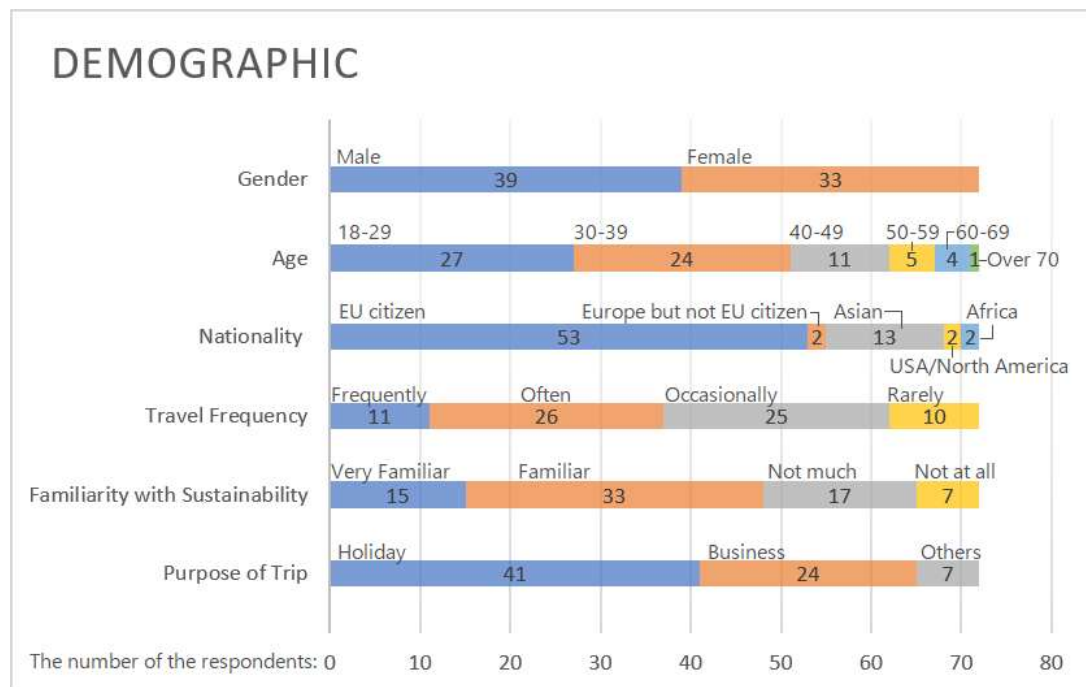


Figure 12. The Demographic of the Respondents.

The number of males was slightly larger than its female, at 54%. Since the survey was written in English, which was a limitation to some people, younger people were cooperative to take part in than elderly people. This fact surely affected the demographic, and most respondents were 18 to 29 years old, at 38%, followed by people in their 30's, at 33%. In other words, the millennials, who were born between 1980 to 2000 (19 to 39 years old as of 2019), accounted for 70% of all the respondents. (Figure 13.) According to ITB Berlin (2019, 9.), the millennials dominate 40% of international travels and make half of the international luxury trips. Taking into account its dynamic in age bracket of the millennials, it is foreseeable that people in early 20's who now earn little will be the age group

who will get stable income in future years. Hence, the millennials have immense impact on upcoming travel trends. As this research aims to bring a future potential of educative passenger journey, their opinions are very beneficial and meaningful.

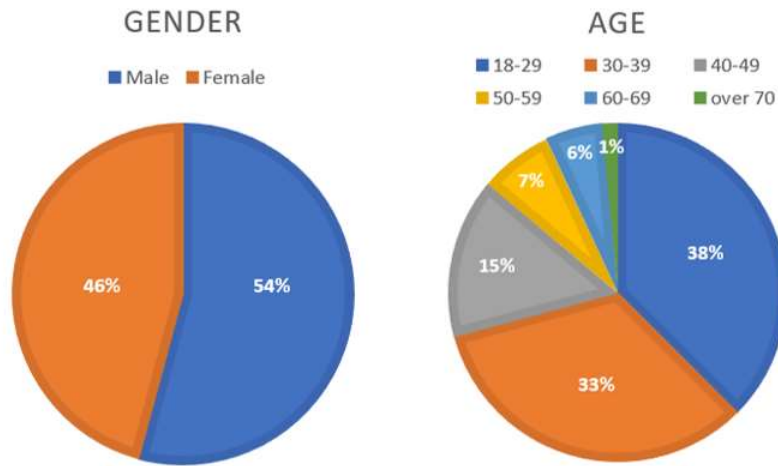


Figure 13. The Pie Charts of Gender and Age.

Due to the location of where the survey was conducted, HEL railway station, most of respondents were EU citizen. (Figure 14.) It is also possible that the language barrier might have affected since all the questions were written in English. According to the report from Education First (2018, 11.), the average of EPI in Europe is 56.64 while the world average is 53.34.

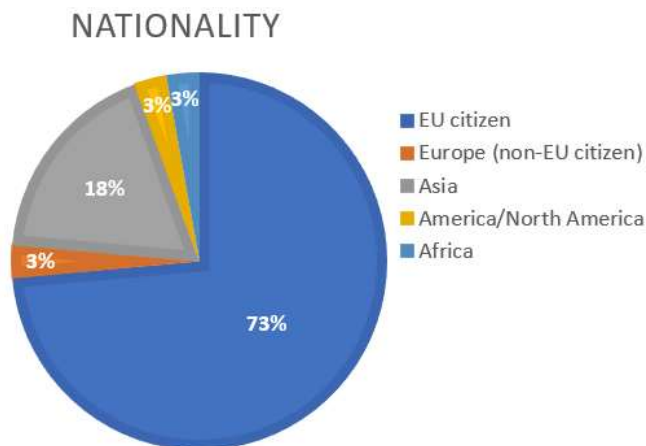


Figure 14. The Pie Chart of Nationality.

More than half of the respondents was there for holidays. The proportion of frequent travellers who fly once a month, and that of travellers who fly once every three month were 15% and 36% respectively. (Figure 15.) That is to say, half of the respondents travelled by air once every three months or more frequently.

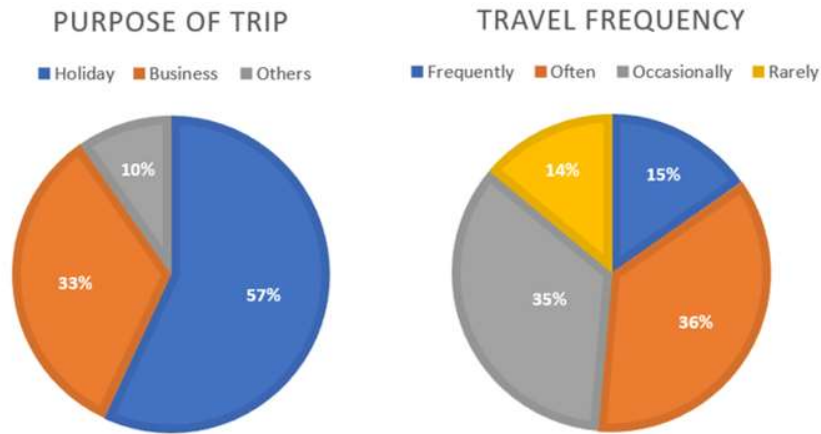


Figure 15. The Pie Charts of the Purpose of Trip and Travel Frequency.

One-fifth of the respondents insisted that they were very familiar with sustainability in the aviation industry, while 45.8% of the respondents expressed that they were also familiar with aviation sustainability. (Figure 16.) Therefore, the total sum of these two makes 66.6% of the respondents have knowledge about sustainability in the field of aviation at some extent.

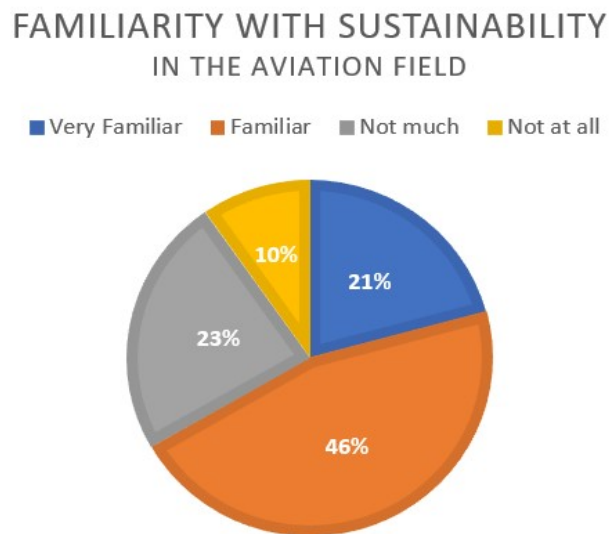


Figure 16. The Pie Chart of Familiarity with Sustainability in the Aviation Field.

This high percentage probably appeared because the survey was conducted in Finland. The research from non-profit organization named Bertelsmann Stiftung and the UN Sustainable Development Solutions Network announced that Finland is at the third place among 162 countries when it comes to Sustainable Development Goals (SDG) that were set by the Millennium Development Goals in 2015. This research measured 17 different sustainable goals such as climate action, quality education and gender equality, and ranked to show how close the countries to achieve the Millennium Development Goals. (Sachs, Schmidt-Traub, Kroll, Lafortune & Fuller 2019.)

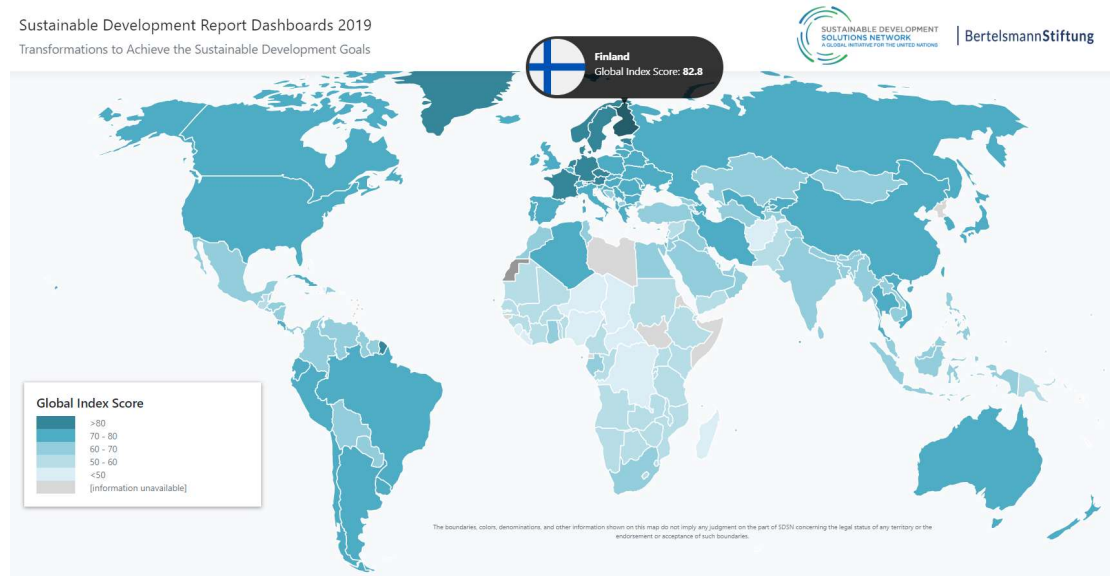


Figure 17. The Global SDG Index. (Sachs & al. 2019.)

Figure 17 illustrates that the darker the blue is, the higher the SDG scores are. As can be seen, Northern Europe and France marked over 80 score, and most of Europe countries marked high score at between 70 to 80 as well. Since 76% of the respondents were from European countries, there is no great surprise that 66.6% were familiar or very familiar with sustainability. Under such a situation, therefore, whether the respondents are interested in knowing about sustainability will be key findings.

4.2 Hypotheses Validation

4.2.1 The Longer Passengers Queue, The Greater Their Eagerness to Be Educated Is

The hypothesis that the longer passengers queue, the greater their eagerness to be educated is, was generated rest on the psychology of waiting lines; people want to get started as soon as possible. Therefore, the correlation coefficient (r) between the waiting time and the eagerness to be educated was calculated based on the scoreboard. (See Table 4.)

The total number of the eligible respondents is 62 as 10 respondents who did not have waiting times both at the baggage claim and passport control were excluded. The reason why they were excluded is because this research is to utilize inevitable waiting time, not to stop passengers intentionally when there is no waiting and/or queueing times. As a result, the correlation coefficient (r) appeared at -0.06 , which refers very weak or nearly no correlation (Figure 18.), that is to say that there is no obvious relationship between waiting times and the willingness to spend their waiting times for educational purposes.

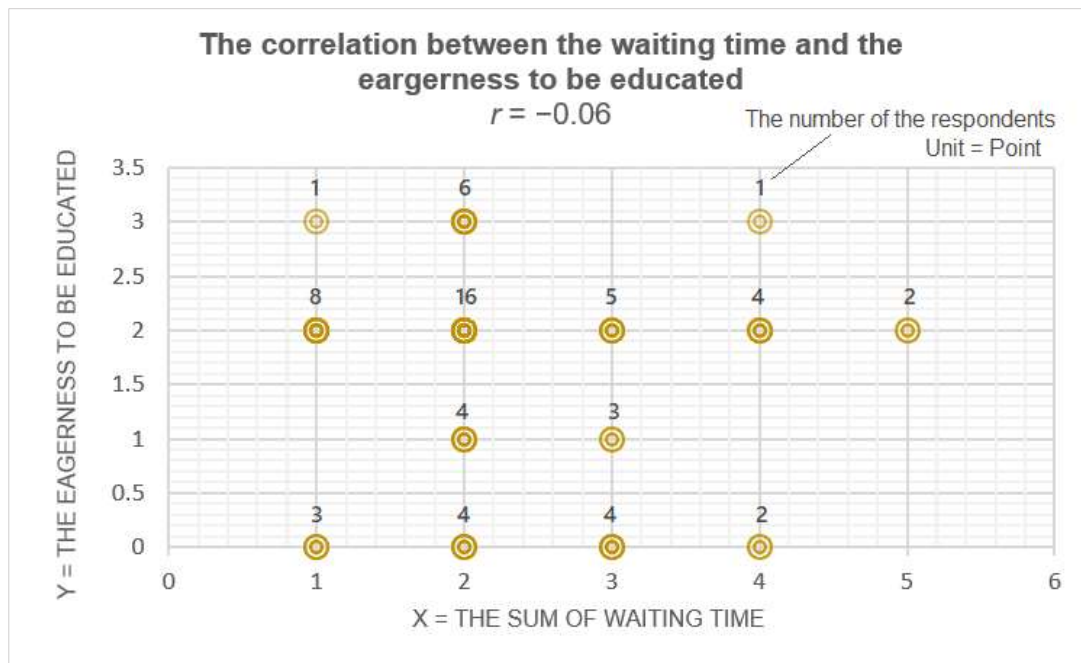


Figure 18. The Correlation Between the Waiting Time and the Eagerness to be Educated.

4 respondents actually specified ideal waiting times for educational purpose, and that varies from 10 to 30 minutes. Although the value of the parameter is very small, the average ideal waiting times of these 4 people was 17.8 minutes. (Figure 19.)

16 out of all 72 respondents insisted that they are not interested to learn while queuing, which accounts for 22%. One male who occasionally travel left a comment that he is too tired to be educated after flights, and thus it is more important to reduce waiting times itself. In this survey, the respondents were asked to imagine about their waiting time at baggage claim, and this fact surely affected his opinion and brought this particular and very critical comment. This fact might have also increased the negative interests of using their waiting time for educational purposes. However, as it has discussed in 1.1., this research focuses on utilizing the inevitable queuing waiting times at airports to improve LoS. Therefore, reducing waiting time is not a topic of this research to discuss even though it is undoubtedly essential.

While 16 people showed null interest, 39 respondents answered that they are interested to be educated under some conditions. As conditions (multiple answers allowed), 32 respondents selected that it depends on learning topics, 12 respondents said that it depends on education styles, 4 respondents specified ideal waiting times to be educated and 5 respondents claimed that they are willing to use their waiting time if they were travelling alone. In addition, 9 respondents that they are interested to be educated while waiting without any conditions. Hence, 48 respondents in total are interested to use their waiting time for educational purposes, and the proportion is 66%. (Figure 19.)

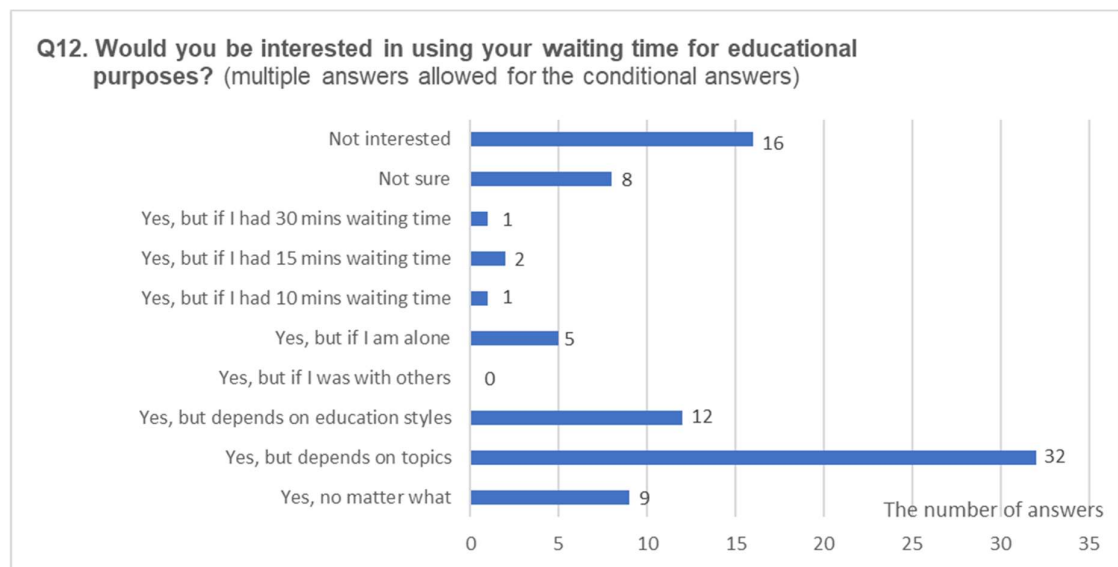


Figure 19. The Answers to Q12: Would You be Interested in Using Your Waiting Time for Educational Purposes?

Taking a closer look at the respondents who marked *Not sure*, 3 out of 8 people showed that they are interested in learning about sustainability in general while waiting, and 4 out

of 8 people marked that they are interested in learning about sustainability in the aviation field (The aviation sustainability) and what they can do for sustainability when flying (The personal sustainability). Counting these 3 people in the positive 48 respondents, it is then 51, which makes its proportion at 70%.

By judging from the fact that nearly 45% of the respondents' interests in learning while queuing depends on topics, and that half of the respondents who answered *Not sure* also showed their positive interests when the specific topics were given, the eagerness to be educated while waiting has a stronger relationship with topics to learn than the length of waiting time. The chapter of 4.2.5 will investigate about this relationship deeper.

4.2.2 The Longer Passengers Queue, The More They Are Interested In Gamification And Interactive-exhibit Than Videos

Although the questionnaire was designed to choose only one preferred education style, 35 respondents chose more than one option. Since 35 are nearly half of all respondent, all the chosen education methods were counted as the major tendency.

As Figure 20 illustrates, it turned out that the respondents prefer the video education regardless of their waiting times. In fact, gamification was liked by those who had the least waiting time at the baggage claim and passport control, whereas posters were preferred by those who had the longest waiting time. This result might be attributed to the fact that passengers can passively study by simply watching when being tired at the baggage claim after their flights. On the other hand, one female respondent who is familiar with sustainability pointed that the video education has a drawback that people usually cannot choose when to start watching as it is automatic loop playback, and this sometimes demotivates to watch videos.

Method	Number Who Chose	Average Waiting Time (Unit = Point)
Video	24	2.08
Game	19	1.79
Poster	19	2.47
Interactive-exhibit	15	1.87
Total	77	—

* Multiple choice was accepted

Figure 20. The Preferred Method and Average Waiting Time.

The poster education that was advocated by 19 respondents is widely and commonly accepted at airports, of course at the baggage claim as well. At the point of conducting the survey, there was also the posters and exhibitions about water consumption at HEL T2. (See 3.5.) In order to understand people actually notice and read the posters, another survey was implemented. 32 out of 68 respondents arrived at T2, and only 9 passengers noticed the posters. In other words, the rest of 60% did not realize when they were at baggage claim. Yet, what to be considered is that the average waiting time at the baggage claim. Those who noticed about the posters had 0.74 point longer waiting time than those who did not, at 1.04 and 1.78 respectively.

Among 9 respondents who noticed the posters, 2 people read the whole texts, 3 read some parts, 1 read only the headlines and the rest of 3 did not read at all even they noticed. 2 people who read the whole texts in the posters evaluated their waiting time as fine, the breakdown of 3 people who read some parts is fine and satisfied (1 person), boring (1 person), and nothing particular (1 person). The person who read only the headlines expressed his experience at the baggage claim as nothing particular. (Figure 21.) Taking into consideration that the satisfaction is higher when people read the posters while waiting, LoS can be improved when posters are able to occupy people's minds. However, judging from the low percentage of those who actually read the posters, the gain from the poster education might be relatively low even though it is the second preferred method in this survey. In the questionnaire, one female who frequently travels made an interesting point that poster should be infographics.

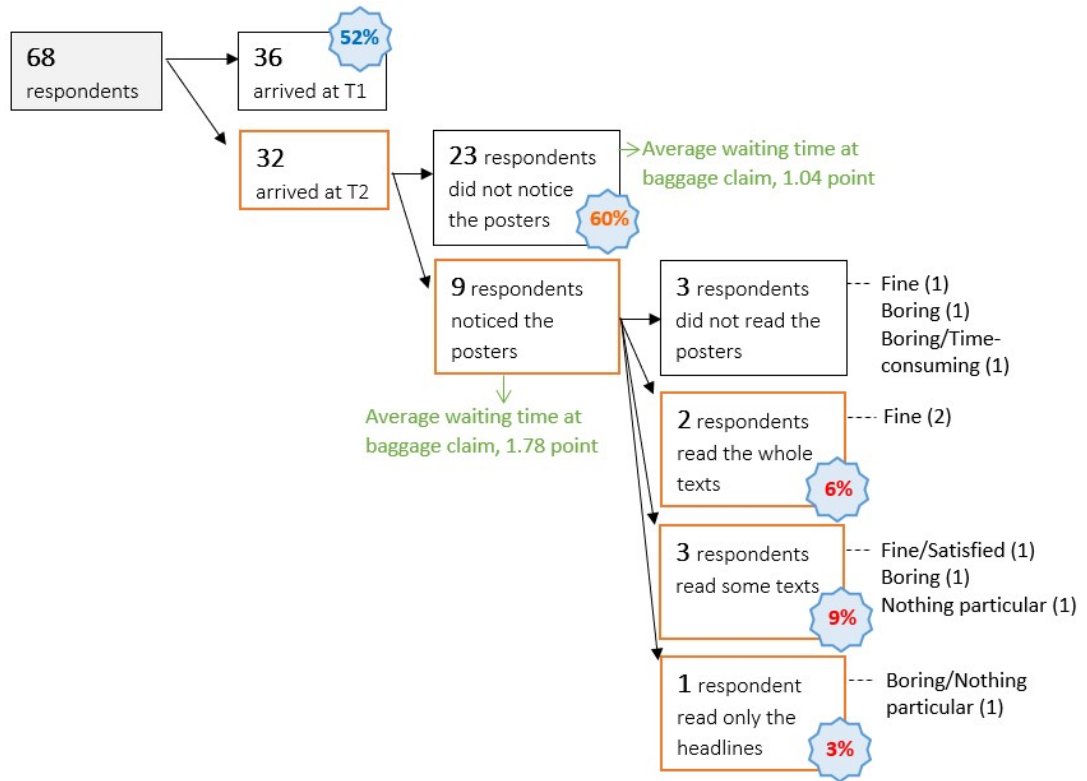


Figure 21. The Diagram of Poster Realization.

Gamification is another preferred method, which was advocated by the same numbers as the poster education. As it has been discussed in 2.5.1., gamification as an educational method allows learners to obtain deeper knowledge about topics than reading material, and also helps to alleviate stress while waiting. Furthermore, since gamified application can easily create an environment for the users to integrate themselves into, there is a possibility that people perceive their waiting time shorter than what it actually is. Gamification can also take advantage of the trend that 94% of leisure passengers have their own device when flying (See 2.3.), and of the fact that it is a fun way to learn by playing. Thus, this method holds a high potential to contribute to LoS of waiting.

Going back to the numbers who chose each preferred education method in Figure 19, however, none of the education method won or lost by far, but all of them have narrow margins. For instance, there are only five people more who selected the video education than game or poster as a tool to be educated.

4.2.3 The Less People To Wait With, The Greater the Eagerness to Be Educated Is

Based on the scoreboard (See 3.7.), the average of the eagerness to be educated while waiting was calculated as 1.58 for solo travellers, 1.53 for travellers who were with others and 1.57 for group travellers. Although the highest score was marked by the solo travellers, it is not enough to conclude that there is a predominant relationship between the number of people who travelled with and the eagerness to be educated while waiting because group travellers (more than 5) showed the higher interest in using their waiting times for educational purposes than the travellers who were with others (1-4).

However, when the specific topics were introduced, such as topics like sustainability in general, sustainability in the aviation field (The aviation sustainability) and how passengers can help to improve the environmental issue when flying (The personal sustainability), the interests from the solo travellers to be educated about such topics were mostly higher than the ones from those who travelled with others or as a group. As Figure 22 shows regarding the personal sustainability as a topic, the willingness to study about how individuals can help to improve the environmental problems was much higher when people travelled alone. Comparing the interest scores, solo travellers have 0.23 point higher than travellers with others and 0.29 point higher than group travellers.

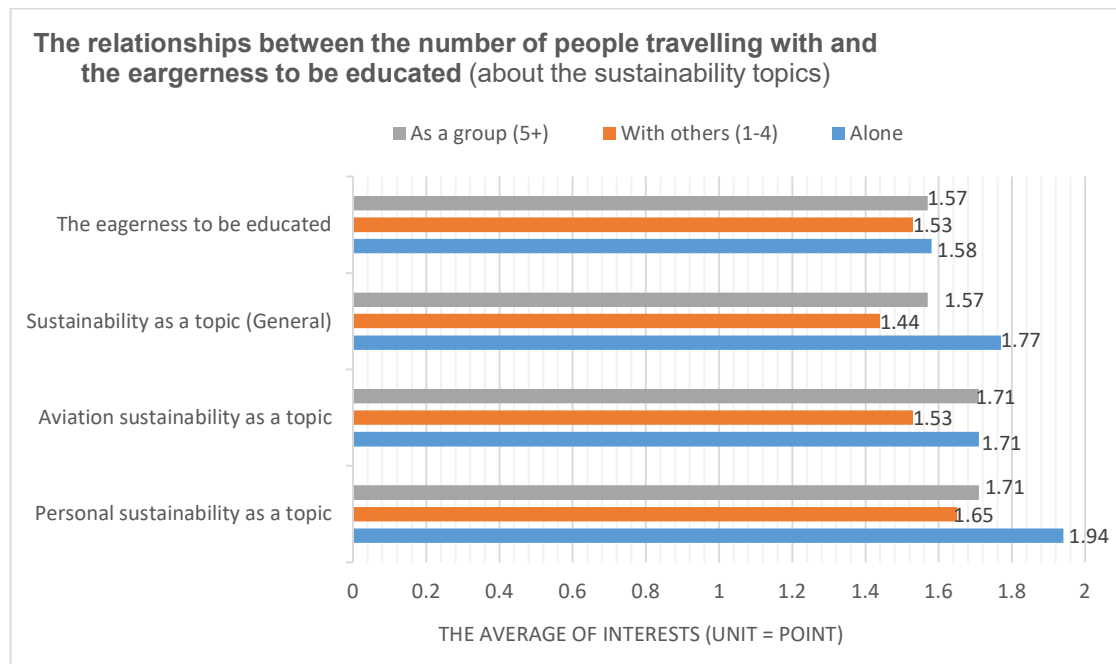


Figure 22. The Relationships Between the Number of Travellers and the Eagerness to Be Educated.

Therefore, it can be said that solo travellers tend to be willing to use their waiting time to learn about sustainability, but the topics should be the one that can draw passengers' enough attention. In fact, 5 people marked that they want to be educated if they travel alone, while no one marked that they want to be educated if they are with others.

4.2.4 The Less People to Wait With, The More They Are Interested In Video Or Gamification Rather Than Interactive-exhibit Education

The result shows that the most preferred education method is video irrespective of the numbers of people travelling with even though other methods were preferred by nearly the same respondent. (Figure 23.) In the category of group travellers, the poster was chosen by the same number who selected video. The percentages in Figure 22 describes the ratio to the total. For example, the percentage of video in the category of Alone was calculated as $(10 \div 26) \times 100 = 38\%$.

	Alone		With Other (1-4)		As a Group (5+)	
Total Numbers	26		25		5	
Poster	6	23%	10	40%	3	60%
Video	10	38%	11	44%	3	60%
Gamification	9	35%	9	36%	1	20%
Interactive-exhibit	9	35%	5	20%	1	20%

**Multiple choice was accepted*

Figure 23. The Preferred Education Method by Travelling Groups.

Observing the preferred method by age categories (Figure 24.), the video education was the least preferred method by the respondent's age between 30 to 39 years old, whereas it was the most common selected methods by the respondents age between 40 to 69 years old. Remarkably, the gamification was most liked by the respondent's age between 30 to 39 years old, and the second liked by the respondent's age between 18 to 29 years old with only one vote difference. On the other hand, only one respondent from each age category (40-49 and 50-69 years old) chose gamification as an educational method. Yet, here again, all the numbers are close to each other, but it shows that age matters when it comes to choose the suitable educational methods.

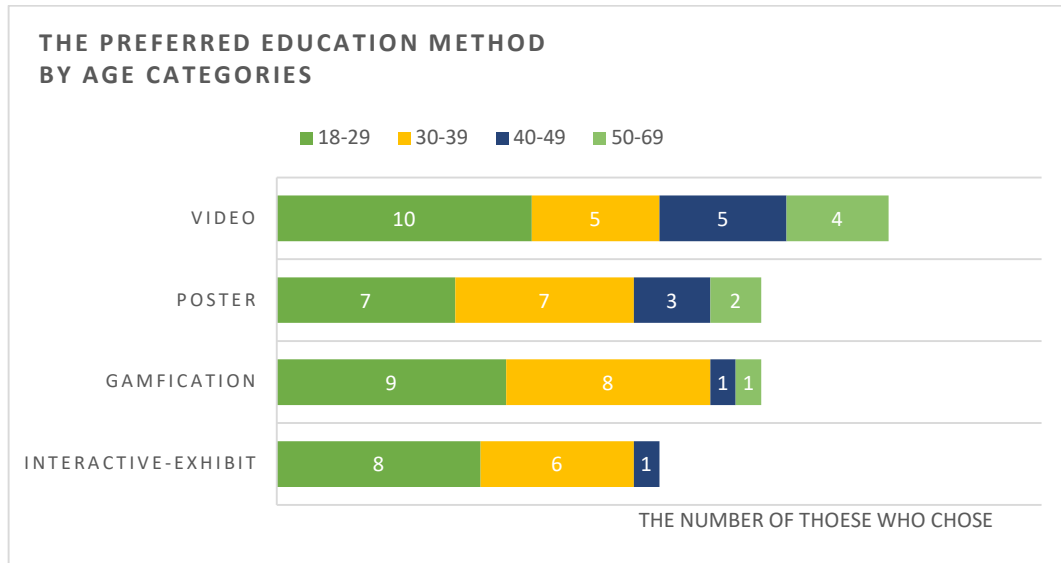


Figure 24. The Preferred Education Method by Age Categories.

Figure 25 only focuses on the millennials respondents who are going to be key players in the future aviation and travel industries, as well as the sustainable society. As a result, 17 out of 43 millennials chose gamification, and the proportion is 40%. The millennials have grown up with games (The Nielsen Company 6 June 2019.), and thus they are aware of the possibility to learn by playing games. Oblinger (2003, 40.) mentioned about Nintendo learning strategy, which is the trial-and-error approach in solving problems. By this approach, the gamers can learn faster with making mistakes. Since the millennials are so familiar with such simulated experience in games, they are probably well aware that learning by playing is effective to get knowledge promptly. This is possibly why gamification was the best by the millennials.

	Millennials	
Respondent no.	43	
Video	15	35%
Gamification	17	40%
Poster	14	33%
Interactive-exhibit	14	33%

Figure 25. The Preferred Education Method by Millennials.

Although there was no obvious relationship between the number of people travelling with and the educational styles, it is apparent that age affects the preferred educational styles. According to the result from the survey, it seems that the millennials prefer to play in order to learn while people in their 40's to 60's like to learn by watching.

4.2.5 There Is No Positive Relationship Between The Eagerness to Be Educated And Sustainability As a Topic (A Null Hypothesis)

In the questionnaire, the three specific topics were given; Q13. Sustainability in general (The general sustainability), Q14. How the aviation industry has tacked with sustainability (The aviation sustainability) and Q15. How passengers can help to improve the environmental issues when they travel by air (The personal sustainability). The eagerness to be educated while waiting (Variable X) and the interests to know about these topics (Variable Y) are then examined by using the correlation research.

First of all, the correlation between the eagerness to be educated while waiting (Variable X) and the interest to know about general sustainability as an educational topic (Variable Y) was measured based on the scoreboard. As a result, the correlation coefficient (r) appeared at 0.78, which can be categorized as *Strong* (positive) in the eyeball method. (Figure 26.) Therefore, it can be said that people are interested in using their waiting times for educational purposes, and general sustainability is a strongly recommended topic to be educated.

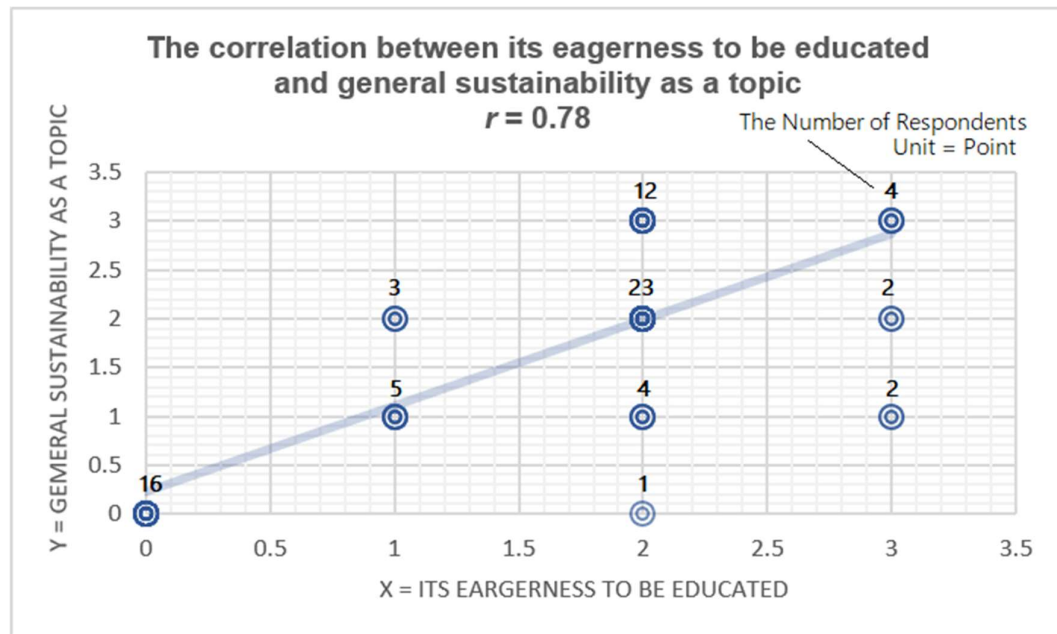


Figure 26. The Correlation Between the Eagerness to Be Educated and General Sustainability as a Topic.

Second, the correlation between the eagerness to be educated while waiting (Variable X) and the interest to know about aviation sustainability as an educational topic (Variable Y) was measured based on the scoreboard. The result showed again *Strong* (positive) as in

the eyeball method, at the correlation coefficient (r) 0.75 (Figure 27.). Yet, r of this time was slightly lower than the previous one. One male respondent requested no greenwashing when it comes to this kind of topics even though he is willing to know about how the aviation industry has tackled with sustainability.

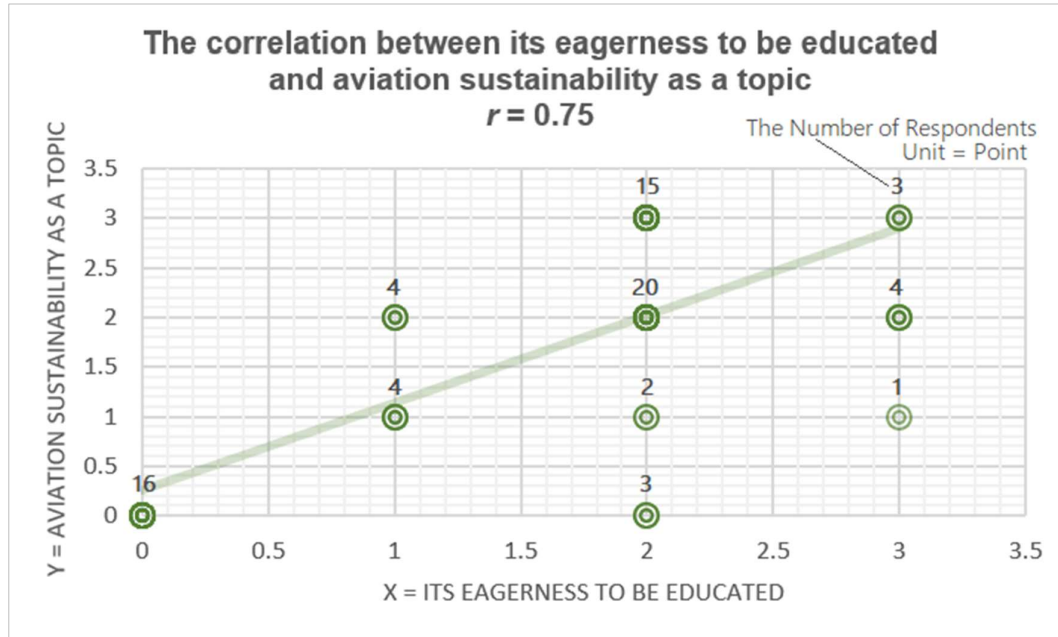


Figure 27. The Correlation Between the Eagerness to Be Educated and Aviation Sustainability as a Topic.

Lastly, the correlation between the eagerness to be educated while waiting (Variable X) and the interest to know about personal sustainability as an educational topic (Variable Y) was calculated based on the scoreboard. It surprisingly turned out that this topic has the highest correlation, at the correlation coefficient (r) 0.85 (Figure 28.). In the eyeball method, 0.85 is categorized as *Very strong*, so it can be confidently concluded that people are willing to use their waiting times for learning about what they can do for the environmental problems when travelling by air. An impressive fact is that half of the respondents who answered *Not sure* to whether they want to use their waiting times for educational purpose stated that they are interested to know about what they can do for the environmental issues when flying while waiting.

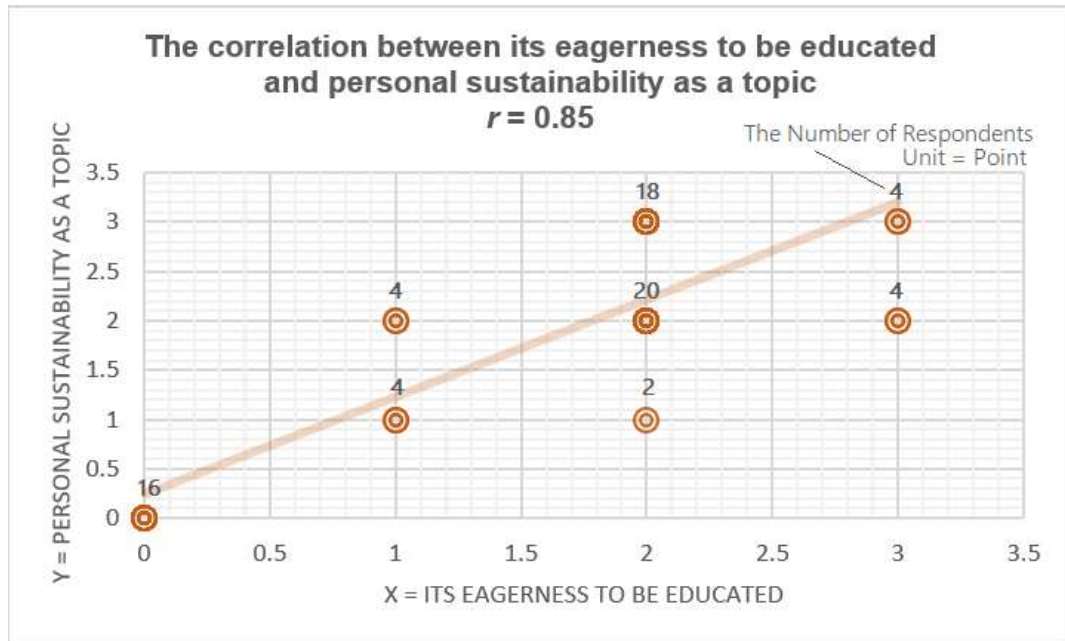


Figure 28. The Correlation Between the Eagerness to Be Educated and Personal Sustainability as a Topic.

As this research paper touched the point in 4.1., the majority of the respondents of the questionnaires was from Europe, where the notion of sustainability has been recently accepted in their daily lives. As a result, one-fifth of all the respondents stated that they are *Very familiar* with sustainability in the aviation field (the aviation sustainability) and 45.8% also answered that they are *Familiar* with it. The total proportion which people have knowledge about the aviation sustainability at some extent is therefore 66.6%.

Considering that fact, one question arose; what is the relationship between the familiarity about the topic (the aviation sustainability) and the willingness to learn about the topic. It could be that the respondents would like to know about the aviation sustainability more because they had some knowledge about it.

So as to use the same approach, correlation research, the familiarity was formed into scores as follow;

Q5. Are you familiar with sustainability in the aviation field?

Not at all = 0

Not much = 1

Familiar = 2

Very familiar = 3

Subsequently, the relationship between the familiarity about the topic (the aviation sustainability) and the willingness to learn about the topic (Q13) was measured using the formula code of CORREL in Excel. The correlation coefficient (r) turned out at 0.05, which refers very weak or nearly no correlation, that is, the familiarity about the aviation sustainability would not affect to the willingness to learn about it.

Overall, there is no doubt that the eagerness to be educated while waiting and sustainability as a topic sustainability have a strong positive relationship. Hence, this null hypothesis can be refuted. The most fascinating topic to be educated for the respondents was personal sustainability, and it is consistent with the finding from the literature review that SE requires to dissolve the topics at the personal levels. (See 2.6.4.) Last but not least, a noteworthy comment was left by a female respondent who is from Asia. She pinpointed that local languages are needed for such education.

5 Discussion

The results brought three critical points to discuss;

- a) What is the certain time for passengers to be willing to learn while queueing (if there is any),
- b) How would different points of passenger journey affect outcomes (including preferred education types), and
- c) How can gamified education exactly contribute to queueing time learning.

5.1 A Certain Queueing Length for Education

This research identified the relationship between the length of queueing time and the eagerness to learn while queueing is not distinguishing and correlative. Yet, there are still four respondents answered that they would like to learn while queueing if they had 10, 15, 30 minutes (average 17.8 minutes). It is therefore still impossible to deny completely that there is the notion of which people want to be educated if they had more than the certain length of queuing times. In case there is a certain length queueing times for education, further research should probably find out the exact time.

In the section of *Education While Waiting* in the survey, all the respondents were asked to assume that they had gotten the same number of people they travelled with, and the same time they waited at passport control and/or baggage claim as the day when the survey was conducted to answer the questions like whether they are interested in using their waiting time for educational purposes. In order to fully catch the respondents' eyes for the vital assuming part, the pilot icon was used with a word balloon. (See Appendix 1.) Although the verbal warning to read the instructions carefully was also given to every single respondent, the possibility that some respondents did not read the instruction attentively cannot be fully denied because all the respondents were under some pressure of getting on their trains that would come in 5 to 10 minutes. From the perspective as well, re-examining the correlation between the length of queueing time and the eagerness to learn while queueing can be valuable, and if so, the certain length of queuing times for passengers to be happy to learn should also be clarified.

5.2 Different Points of Passenger Journey

This research was done without any commissioners, and this is why implementing a survey at any airports was not possible. This became surely a limitation for this research in a way that the respondents were chosen at HEL railway station, who just flew to Helsinki by air and were about to take trains to the next destination. Thus, for the respondent's easiness to recall the memory, fresh experience was highly needed to get started with the questionnaires, and that was the queueing experience at the passport control and the baggage claim.

Thus, comments such as passengers are too tired to be educated after flying a long time, or all passengers wish is to have as short queuing time as possible after arriving are very understandable. It is then immeasurable how this fact actually influenced the 16 respondents' frame of mind, who responded *Not interested* to use their waiting time for educational purposes.

Here, then some questions aroused like what if people were requested to recall experiences of check-in counter or security check. According to the passenger journey stress chart (See 2.3.1.), the experience at security is one of the stressful experiences while check-in experience is apparently less stressful than one from security check. More importantly, both the experiences at check-in and security are before flying, which means passengers might have more energy to learn while queueing. Stating differently, different points of passenger journey might bring other outcome in terms of the willingness to be educated while queueing. To be able to identify so, it is highly likely that the tight cooperation with airports and/or airlines is indispensable.

Furthermore, video education, which was the most preferred educative method, might have also been influenced by the image of waiting time at the baggage claim and passport control. Video education has a merit that can be passively studied by simply seeing when being tired at the baggage claim after their flights. For that reason, there is a chance that passengers like to study by other means depending on the education spots. Hence, it can be meaningful to identify with further research whether educational methods will vary based on different points of passenger journey, and if so, what the preferred types of education point by point.

5.3 Further Research About Gamified Education While Queueing

Gamification was selected as the second preferred educational type by 72 respondents, and as the best by Millennials, who accounted for 70% of all the respondents. Yet, gamified education *while queueing* needs further research to understand how it can contribute to learning outcome or perceived waiting time because only little research has been done in this area.

On the other hand, the topic of gamified education has been studied by many researchers. Gamification takes full advantage of the competitive instinct that is usually inherited in most people, and tries to encourage productive behaviours or discourage unproductive behaviours. (Glover 2013, 1999.) Therefore, Glover (2013, 1999.) articulated that gamification “can make learning activities more active and participatory,” and thus claimed the great effectiveness of gamified education.

Generally speaking, games are very goal-oriented that require to overcome some obstacles and experience few wins in order to complete activities. This concept of goal-oriented in games shares something in common with learning. Players and learners undertake the given tasks to achieve desired outcomes, and move on to the next mission if games, master difficult topics if learning. Basically, game and learning share the same concept of goal-oriented, and this is the biggest reason why game can be used in educational situations. (Glover 2013, 2000.) Glover (2013, 2004-5.) pinpointed the eight questions to be answered before deciding to use gamification in education;

1. Is motivation actually a problem?
2. Are there behaviours to encourage/discourage?
3. Can a specific activity be gamified?
4. Am I creating a parallel assessment route?
5. Would it favour some learners over others?
6. What rewards would provide the most motivation for learners?
7. Will it encourage learners to spend disproportionate time on some activities?
8. Are rewarding too easy to obtain?

The most critical question to be answered is the very first one; Is motivation actually a problem (1). This question should be carefully answered since incorporating gamification in educative activities is non-trivial. If this is not the case, for example, activities are too easy or difficult, learning design must be modified. One thing is to be aware of is that

generating long-term changes in people's behaviours probably needs to have constant incentives even though gamification is effective to encourage productive behaviours or discourage unproductive behaviours (2). The key of gamification is goal-oriented activity, and because of the concept, learners need to be always informed their progress as well as the remaining tasks when gamification is used in educational activities (3). Moreover, it should not be forgotten that there might be people who get demotivated by gamification while many people are motivated. Thus, for those who are demotivated to use gamification as a learning means, it is essential for gamification aspects to be optional (5). To motivate learners, certain rewards are powerful. Yet, what kinds of rewards are the best and how much effort is needed to get it to motivate everyone should be carefully planned beforehand (6&8.) (Glover 2013, 2004-5.)

By thoroughly considering these eight questions of implementation, gamification is able to encourage good behaviours and discourage bad behaviours. Since gamification shares the common characteristic of goal-focused with learning, gamification can make learning more engaging, and thus it is expected to be one of the effective tools to motivate learners. (Glover 2013, 2006.) However, the critical problem is that the most of the recent research about gamified education does not include the condition of queuing and/or waiting time, and thus here is the necessity of further research about gamified education while queueing.

As it has been explained in 2.5.1., one research revealed that the benefits of using gamified education in waiting time are mainly 1. Significant acquisition of knowledge (compare to a means of reading material) and 2. Mitigation of stress. Yet, practical research in this area is tremendously few to generalize. In fact, this research recruited students from a university and asked them to assume that they were having an arm injury. If further research will be implemented, 1. What kinds of benefits gamified education while queueing can bring to learning outcomes, and 2. How gamified education while queueing will contribute to perceived waiting time need to be answered. Creating gamified applications is again non-trivial and pricey, so careful planning is necessary with tight corroborations with the companies dedicated to gamification and airports and/or airlines who are willing to give actual environments to test the prototypes. Yet, here, the unknown but powerful potential of gamified education while queueing is definitely worth researching.

5.4 Summary of Further Research Possibilities

In summary, the fact that the survey was conducted at HEL railway station to ask arrival passengers about their experiences at the baggage claim and whether they would like to be educated while waiting because this research did not own any commissioners became a limitation and brought further research questions to be answered such as;

- What is the relationship between the length of queueing time and the eagerness to learn while queueing?
- What is the certain length of queueing times for passengers to be happy to learn if there is any positive relationship between them?
- How the outcome will be different if different points of passenger journey are selected as places to provide education?
- How does the preferred education methodology differ when different points of passenger journey are selected?
- What kinds of benefits gamified education while queueing can bring to learning outcomes? and
- How gamified education while queueing will contribute to perceived waiting time?

This research eventually brought some points to be researched further, nonetheless, it is not at all the negative outcome but actually, the contributing value to generate a brand-new approach in queueing and waiting times, passenger journey and sustainability in the aviation industry. Provided the left questions were solved and managed to generate solid value out of it, competitive advantages to airports and airlines should be achieved and eventually, more revenue will be generated.

6 Conclusion

Airports are the locations where complicated networks of various queuing systems are tangled, and thus there are always queues irrespective to the length of waiting time. Therefore, the recent research about queueing theory has been focused on reducing its queueing time as much as possible, and it has very vital for designing airports. In addition, as a part of PFM, new technology such as Wi-Fi tracking is now being actively used to ease passenger's stress. By Wi-Fi tracking, for example, a holistic passenger experience picture can be comprehended or displayed the calculated waiting time can also be implemented.

The effort to reduce queueing times is indeed essential and this research is not here to deny the great importance of the efforts, but it is here to utilize the inevitable queueing times in case people are forced to wait. As an epochal idea to do so, an educative aspect was brought into passenger journey. Furthermore, as a topic to educate passengers, sustainability was chosen in order to prove a possibility to improve LoS while waiting. Accordingly, the three research questions were therefore formed;

- I. How keen are passengers being educated while queueing?
- II. How much are passengers willing to learn about sustainability in the aviation field while queueing?
- III. What types of education methodology would passengers prefer? (e.g. gamified education, Interactive-exhibit education, video education, poster)

I. How keen are passengers being educated while queueing?

66% of all the 72 respondents answered that they were interested in learning while waiting, that is, more than half of the respondents. In here, however, all readers should be fully aware of the survey conducted condition, which the respondents were asked to recall their experience that just happened at the baggage claim and passport control. As one male respondent commented, there might be other passengers who feels too tired to be educated after a flight or flights. Considering the possible effects of the respondents' frame of mind, thereby, different points of passenger journey such as check-in must be investigated to answer this question impeccably.

What is more intriguing is actually that there was no obvious relationship found in the length of waiting time and the willingness to learn while waiting from this survey research. While only four respondents marked that they were interested in learning if they had certain waiting times (average 17.8 minutes), 32 respondents stated that a learning topic matters whether they were interested in learning. Judging from the numerical fact, it can be said that nearly 70% of the respondents were interesting in learning while waiting, but it very depends on a topic to learn.

II. How much are passengers willing to learn about sustainability in the aviation field while queueing?

To answer this question, correlation research was used in order to identify the relationship between the eagerness to be educated while waiting and sustainability as a topic to learn. In addition to a topic the general sustainability, two more sustainability-related topics were added; 1. How the aviation industry has tacked with sustainability (The aviation sustainability) and 2. How passengers can help to improve the environmental issues when they travel by air (The personal sustainability). The reason why the aviation sustainability was added attributes to the comment from Alan Joyce, QFA CEO; airlines need to promote their efforts more since airlines are taking its environmental responsibility seriously. (IATA, 24 June 2019.) The personal sustainability was added due to the findings from the literature review; SE requires to dissolve the topics at the personal levels.

The result showed that the relationship between the eagerness to be educated while waiting and the general sustainability as a topic is *Strong* in the eyeball method of correlation research ($r=0.78$). To sum up so far, nearly 70% of the respondents were interesting in learning while waiting, and as a topic, the general sustainability is very attractive and interesting for passengers to learn. Surprisingly, the stronger relationship was discovered in the relationship between the eagerness to be educated while waiting and the personal sustainability as a topic ($r=0.85$). This falls into *Very strong* in the eyeball method, and thus this result is consistent with the findings from the literature review; people are unlikely to get much out of SE unless they find a personal linkage between people's lifecycle and the environmental problems that they care. Although the relationship between the eagerness to be educated while waiting and the aviation sustainability as a topic was the weakest among all, it can still be considered as *Strong* in the eyeball method ($r=0.75$). What can be concluded from the result is, therefore, sustainability is a suitable and attractive

topic for passengers to learn while waiting, and more powerful outcomes or better LoS will be achieved if sustainability as a topic can be dropped to the personal levels.

III. What types of education methodology would passengers prefer?

Although one drawback of playing video was pinpointed and every education method had the close preferred numbers (See 4.2.2.), the most selected type of education was video. However, here as well, readers should not forget about the possible effects of the respondents' frame of mind due to the survey conducted condition. Since it is assumable that the respondents might have chosen the passive learning method because of its fatigue from the flights when they were asked to recall their experience at the baggage claim, preferred education methods could be different if different points of passenger journey were tested. Thus, further research about it should be conducted.

The remarkable discovery about the preferred educational methods is actually that gamification was the most selected education method by the millennials, who are surely going to key players in sustainability and sustainable society in the upcoming future. The millennials are the generations which have grown up with games, and thus they are fully aware of its high potential of the concept of learning by fun-playing. As the literature review disclosed, one of the challenging parts in SE is choosing the right tone of message. Volkswagen, for instance, chose *Fun* as a tone and led a few sustainable projects successfully with the belief that fun can obviously change behaviour for the better (The fun theory). From this result, Martin and Schouten (2012, 193.) supported that "even tackling the problem of sustainable consumption is fun if we make a game of it".

As it has been reviewed in 2.5.1., gamified education while waiting could highly likely generate benefits to LoS. The research, which recruited students from a university and asked them to suppose that they were having an arm injury, showed that significant acquisition of knowledge (compare to a means of reading material) and mitigation of stress. The researchers presumed the reason why people felt less stressed is because gamified application might have created an environment for the users to integrate themselves into. Therefore, it can be easily expected that gamified education would perform outstandingly under the situation of even waiting time. Yet, the research about gamified education while queueing is relatively few. All the more, the further research holds a great possibility to change inevitable waiting times to something more enjoyable.

This research was limited in a way of no supports from any possible commissioners, and this fact brought some points to be researched further, nonetheless, it is not at all the negative outcome but actually the contributing value to the future aviation industry, and they are surely assets of this research. Yet, the biggest achievements of this research are that it successfully demonstrated the potentiality of an educative passenger journey by utilizing inevitable waiting times, and that sustainability as a topic to educate is attractive to passengers.

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Appendices

Appendix 1. The Questionnaire 1

Questionnaire About Queuing Time Utilization

This questionnaire takes only 5 minutes (max) to answer 16 simple questions. The purpose of this questionnaire is to understand whether passengers at airports are willing to use their waiting times for educational purposes. And if so, passengers like to learn about sustainability in the aviation industry. Your answers are anonymous and will be only used for my thesis research purpose. * = required to answer

-
1. Your gender is *
 - Male
 - Female
 2. Your age is between *
 - 18 - 29
 - 30 - 39
 - 40 - 49
 - 50 - 59
 - 60 - 69
 - over 70
 3. You are *
 - EU citizen
 - from Europe but not EU
 - from Asia
 - from Middle or near East
 - from America or North America
 - from Central America
 - from South America
 - from Oceania
 - from Africa
 - from others
 4. You travel by air *
 - frequently (once a month)
 - often (once in 3 months)
 - occasionally (twice a year)
 - rarely (once a year or less)
 5. Are you familiar with sustainability in the aviation field? * *e.g. fuel efficiency and consumption, waste, air quality, climate change, natural resources (alternate aviation fuels), noise etc...*
 - Very familiar
 - Familiar
 - Not much
 - Not at all

Travel Experience *Please tell me about your travel experience of THIS TIME.*

6. The purpose of your trip was *
 - Holiday
 - Business trip
 - Others
7. You travelled *
 - Alone
 - With others (1 - 4)
 - As a group (more than 5)
8. You roughly waited at the passport control for *
 - Did not go through the passport control (for those who arrived at T1)
 - Less than 5 mins
 - 10 to 20 mins
 - More than 20 mins
9. You roughly waited to pick up your luggage at the baggage claim for *
 - Did not have own checked-in luggage
 - Less than 5 mins
 - 10 to 20 mins
 - More than 20 mins
10. You spent your waiting time at the baggage claim with [multiple answers allowed] *
 - No waiting times
 - Using your mobile devices
 - Chatting with your companions
 - Looking at the advertisement
 - Looking at the exhibitions
 - Reading at the posters
 - Doing nothing
 - Others: _____
11. You felt about the waiting time at the baggage claim as [multiple answers allowed] *
 - No waiting times
 - Boring
 - Time-consuming
 - Stressful
 - Worried
 - Not fair (because you did see the right order to get your luggage)
 - Fine
 - Satisfied
 - Fun / Interesting
 - Educative / Informative
 - Nothing particular
 - Others: _____

Education While Waiting



Attention! Please now ASSUME that you have gotten the same number of people you travelled with and the time you waited at passport control and/or baggage claim today.

12. Would you be interested in using your waiting time for educational purposes? * [multiple answers allowed]

- ❖ Yes, no matter what
- ❖ Yes, but depends on topics
- ❖ Yes, but depends on learning styles
- ❖ Yes, but if I had longer waiting time about () mins *please fill the number
- ❖ Yes, but if I was with other people
- ❖ Yes, but if I was alone
- ❖ Not sure
- ❖ Not interested →the end of the questionnaire, thank you!

13. Would you be interested in learning about sustainability while waiting? *

e.g. fuel efficiency and consumption, waste, air quality, climate change, natural resources (alternate aviation fuels), noise etc..

- Very interested
- Interested
- Not sure
- Not interested

14. Would you be interested in knowing how the aviation industry has tackled with the environmental issues while waiting? *

- Very interested
- Interested
- Not sure
- Not interested

15. Would you be interested in knowing how YOU can help to improve the environmental issues when you fly while waiting? *

- Very interested
- Interested
- Not sure
- Not interested

16. How would you like to learn about the topics mentioned on the left side? with the same time you had today or wish to have to be educated, and the same number of people you travelled with today. *



Learning by Playing : Game



Learning by Watching : Video



Learning by Doing : as if you were in a science museum



Learning by Reading : Posters

Leave here any comments! Thank you!

Appendix 2. The Questionnaire 2

Travel Experience: Please tell me about your travel experience of THIS TIME.

1. Your gender is *

- Male
- Female
- Prefer not to say

2. Your age is between *

- 18 - 29
- 30 - 39
- 40 - 49
- 50 - 59
- 60 - 69
- 70 - 79
- over 80

3. The purpose of your trip was *

- Holiday
- Business trip
- Others

4. You travelled *

- Alone
- With others (1 - 4)
- As a group (more than 5)

5. You roughly waited at the passport control for *

- Less than 5 minutes
- 5 to 10 minutes
- 10 to 20 minutes
- more than 20 minutes
- Did not go through the passport control (For the travelers within EU countries)

6. You roughly waited to pick up your luggage at the baggage claim for *

- Less than 5 minutes
- 5 to 10 minutes
- 10 to 20 minutes
- Longer than 20 minutes
- Did not have own checked-in luggage

7. You spent your waiting time with [multiple answers allowed] *

- Using your mobile devices (to check SNS, watch videos, chat with people, search about the destinations, etc.)
- Chatting with your companions
- Looking at the advertisement that is displayed at the baggage claim
- Looking at the exhibitions that are displayed at the baggage claim
- Reading at the posters that are displayed at the baggage claim
- Doing nothing (means you simply wait to be served)
- Others: _____

8. You felt about the waiting time at the baggage claim as [multiple answers allowed] *

- Boring
- Time-consuming
- Stressful
- Worried
- Not fair (because you did not see the right order to get your luggage)
- Fine
- Satisfied
- Fun / Interesting
- Educative / Informative
- Nothing particular
- Others: _____

9. You arrived at

- T1 (Domestic and Schengen countries) → *The end of the questionnaire*
- T2 (Non-Schengen countries and long-haul)

For those who arrived at T2

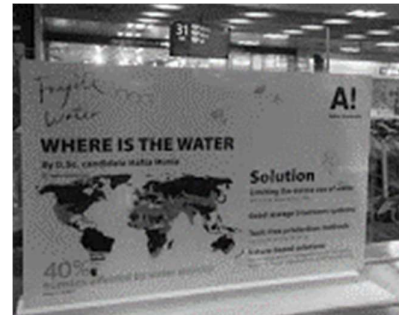
9a. Did you notice that the posters & exhibitions about sustainability at the baggage claim at T2? *

- Yes
- No → *The end of the questionnaire*

For those who answered Yes

9b. Did you read the posters? *

- Yes, the whole part
- Yes, but some parts
- Yes, but only the headlines
- No



Appendix 3. The List of Abbreviations

ACI	Airport Council International
CEO	The Chief Executive Officer
CSR	Corporate Social Responsibility
EPI	English Proficiency Index
DV	Dependent Variables
FCFS	First-come, First-serve
HEL	Helsinki Airport
IATA	The International Air Transport Association
IV	Independent Variables
LoS	Level of Services
MBA	Master of Business Administration
PFM	Passenger Flow Management
QFA	Qantas Airways
SAS	Scandinavian Airlines System
SDG	Sustainable Development Goals
SE	Sustainability Education
SIRO	Service in Random Order
T2	Terminal 2 at Helsinki Airport (For non-Schengen and long-flights)

Appendix 4. The List of Glossaries

Millennials	Those who were born between 1980 to 2000 (19 to 39 years old as of 2019)
The General Sustainability	Sustainability in general as a topic to educate
The Aviation Sustainability	Sustainability in the aviation field as a topic to educate
The Personal Sustainability	Sustainability as a topic in a way that how passengers can help to improve the environmental issues when they travel by air