ICT Use by Refugees

The Role of Technology in Refugee Mobility

by

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Preface

About ten months have passed by since I started this journey. Ten months of searching, reading, investigating, writing, deleting, writing again, that resulted in this thesis. Ten months filled with doubts, fears, happy moments; ten months full of new stories and new acquaintances but with one goal, to write a humanitarian centric project combining it with technology. A project that could not only develop my scientific skills but also my character.

I am a supporter of innovation and technology, and I always believed that the main role of technology is to help people and improve the quality of their life. This was my initial thought as I started looking for the ideal topic of my thesis. Migration is a "trending" topic, and as a Greek resident, I was curious to further investigate this phenomenon. In Greece I was used to watching images in the news of people seeking a better life, people on small boats trying to survive; I had no idea how technology and the internet can contribute to their journey. A common misconception, for society and myself, is that refugees do not own smart devices. However, this is not always the case.

Many of us may have a misinformed, prejudiced or incomplete image about refugees. In my opinion, news outlets and the media have an important responsibility for this impression. One of my goals for this project was to inform; even if one person read this report, and benefited by having more awareness about the refugee journey, this goal would be achieved. During the empirical phase of this project, I spent one month in Greece, interviewing refugees in two hot spots. Many refugees mentioned that through their involvement in this work, they want to share their words, raise awareness about their situation and trigger change. They want to underline that they are human beings and that they use the internet and innovation as the rest of us, with the difference being that they use it to survive.

One of the first people to whom I announced the topic of my thesis was my father. As a former officer of the Hellenic Police, he was negative about this idea, wondering about my approach in this complicated matter. However, seeing me every day returning from the visits to the hot spots, and as I repeated their stories, he became the biggest supporter of the project. Thus, having managed to change the opinion of one person, the first goal of this project has been achieved.

During the interview phase, I had the chance to meet many refugees, talk with them, and hear another story every day. Still, I cannot comprehend the thought of leaving my house and wondering if I could ever reach it again. I cannot imagine having a beloved dying in my arms, or how it feels to

be forced to a move far away from my home, leaving everything behind and travelling for days without sleeping or eating. Dealing with the emotional aspect and trying to avoid bias were the greatest challenges of my project. My interaction with these people made me realise that goods that I take for granted are life achievements for others.

If you read this thesis, keep in mind that we all have equal rights. Refugees are just trying to live their lives with safety. They do not choose to become refugees, and they need all of us. We are all humans, and as a connected planet, we are part of the problem and are obligated to help each other in our own way.

Abstract

The refugee crisis is one of the most critical phenomena worldwide. Every day people leave their houses and seek a safer place to live. Social media and digitisation have dramatically changed the migration process and play a core role in Human Mobility. It has been reported that during the migration, refugees use their smartphone as a survival tool. While the importance and effects of technological innovations in social science research have been increasingly recognised, the role of new technologies and how these shape the security of people on the move is still limited in scope.

The purpose of this study is to research the use of Information and Communication Technology (ICT) during the three phases of the journey, the pre-migratory, the migratory and the post-migratory phase. The current thesis presents qualitative research that aims to paint a broad picture of how refugees use ICT while exploring for which reasons they use technology during their journey. The data for this study was gathered by interviewing 61 refugees in different hot spots in Greece and analysed using statistical methods. The knowledge gained in this study will add to the claim that people that have been forced to a movement use their smart devices to plan and execute the journey.

Additionally, the focus of this project is on the problems and challenges that refugees face in regard to technology and on how the European Union (EU) tries to minimise this phenomenon by releasing new legislation for border security. Finally, an artefact is proposed as a future recommendation that could help refugees during mobility.

Table of Contents

List of Figures

List of Tables

1 Introduction

Migration is one of the most critical worldwide phenomena. 2015 was the year of the outbreak of the refugee crisis and the most significant mass movement of people in Europe since the Second World War [1].

War, poverty and climate change have displaced more than 214 million people from Syria, Afghanistan, Iraq, but also from other African and Asian countries [2]. The high number of refugees and migrants is more intense in the European area due to the geopolitical rearrangements internationally but also because Europe appears to be the land of opportunity for populations that experience a long-standing economic recession. It is believed that this phenomenon is magnified by social media, which paint a picture of a continent of wealth and opportunity [3].

Refugees on a new destination country face a different kind of communication and settlement challenges. Information and Communication Technologies (ICTs) that are growing rapidly can definitely help refugees for the planning and the adaption of their journey. In the past, the primary ways of communication for migrants were the press and post [4].

In the modern migration crisis, a mobile phone is usually the only way for refugees to stay connected with what they have left behind and what they are forced to face. During their journey, many refugees use the applications of their smartphones as navigation for their journey. Besides the communication with their relatives, ICTs give them the opportunity to be informed of the difficulties that are constantly emerging on the streets that followed the migratory flow.

Paul Donauchi of the International Rescue Committee (IRC), stated to CNBC that phones are a vital tool for them. "If they lose the phone, it is a great challenge ... they have to find new ones to communicate with their family." He also refers to the wide use of free messaging services (WhatsApp, Facebook, Viber, etc.) to communicate with other refugees/migrants and their family, even taking “selfies” in some cases to inform their acquaintances that have arrived in Europe safely [5],[6].

In addition, along with the (mainly illegal) migration, there is a boom in illicit trafficking and transfer of people, also known as human trafficking and migrant smuggling. Many traffickers and smugglers exploit the low educational level and the economic hardship that forces many people to migrate,

and for a fee, they carry them away from their place of origin in order to entrap them into the organized crime industry. ICTs are very often a mean of communication between traffickers and their "customers". Important, according to researchers, is the role of WhatsApp, which provides a valuable way of communicating with friends and family [5]. Among human trafficking and smuggling, migrants, refugees and asylum seekers have to face many different challenges concerning technology. Institutional, legal frameworks and information systems have been developed by the European Union (EU) with regard to its digital borders, for security and border management.

This report starts with the research goal and the methodology that has been implemented. In chapter 3, the definitions and descriptions of the migration crisis and the Information and Communication Technologies are described, as well as the literature of other studies. Additionally, smuggling and trafficking in the digital world and ICT challenges in this setting are explored. In chapter 4 the empirical study results are presented. The document ends with chapter 5 and chapter 6, the discussion and the conclusion, followed by the Appendix.

2 Research Goal

Few empirical studies have been conducted in the Greek setting on how refugees use ICT during their journey. Most studies on social media use in migratory decision-making thus far, have focused on labour migrants, students and family migrants [7].The main goal of this research is to collect suitable information on the technology, and the digital devices that are used by refugees, before, during and after their journey. This research is based primarily on literature review and on qualitative research conducted in March and April 2019 in Greece. The description of the most used digital devises and applications will be provided in order to paint a broad picture of how refugees use ICT and for what reasons they use technology. Additionally, the focus of this project will be on the problems that refugees face in regard to technology and the new EU legislation for border security.

2.1 Research Questions

In this section, the main research questions and the subquestions are proposed. The methodology to answer them is also explained. The subquestions contribute to the answers of the primary research questions of the thesis. In the sections that follow, the subquestions will be answered, which will lead to answering the main research questions. To this end, the thesis addresses the following primary research questions:

1. ***What is the role of Information and Communication Technology (ICT) during refugee mobility****?*
2. ***What are the most common challenges that refugees face in regard to ICT?***

In order to answer the main research questions, it is important to consider the following subquestions:

1. *What types of Information and Communication Technology do refugees use during the three phases of migration?*

   This question aims to collect data regarding all the hardware and software applications that the refugees use more during their migration. In order to make the journey process more coherent, it has been divided into three categories, the pre-migratory phase, the migratory and the post-migratory phase.
2. *How and for what purposes do the refugees use ICT?*

An analysis of all the different ways and purposes that refugees use ICT during their mobility will be performed.

3. *What kind of fraud and victimisation do the refugees face during the journey?*
   The answer to this sub-question will determine whether the refugees face any kind of problems or fraud in regard to ICT.
4. *How do EU nations contribute to the minimisation of the refugee crisis?*
   The answer to this question is followed from the previous one and will explore the ways and the legislation that EU governments have established in order to minimise the phenomenon.
5. *How can technology help to make the process of migration better?*
   The answer to this sub-question will come from the perspective of refugees and will explore the ways that ICT can help refugees to overcome some challenges.

To seek answers for the aforementioned research questions and subquestions, it is initially necessary to have a better insight into the bigger picture of the immigration on Europe and the role of ICT. For this reason, the author has searched for literature focused on migration and how this phenomenon is connected with technology. Many researchers from different disciplines have been carrying out research on illegal human mobility and the "connected" refugees. However, there are only a few empirical studies on how technology affects and disrupts the long journey of refugees.
A generally structured literature review will follow, referring to the migrant and refugee crisis, on the role of new technologies and how these shape the security of people on the move. It is important to understand in depth the difference between refugees and other kinds of migrants, as this research will focus on this group of individuals. Additionally, focus will be given to the definition of ICT and how this concept is connected with the migration crisis. The approach is twofold, theoretical and empirical research.

2.2 Research Contribution

The thesis aims to contribute to the perception that society has about refugees and on how digitisation has dramatically changed refugees' lives. The contribution of the present research is central to refugee populations but can be categorized into two groups, the research perspective and the societal perspective.

From a research point of view, the literature illustrates that smartphones and social media are crucial for the refugee journey who at the same time, is exposed to many challenges. Migrants and refugees use the internet for many different reasons, before, during and after the mobility. According to the literature, people that have been forced to a movement use their smart devices to plan and execute the journey. The contribution to this perspective aims to be an investigation of this claim.

From the societal perspective, the project is inspired by the unawareness and ignorance about this phenomenon of people in the European area. Currently, there is a lack of refugee voices in media, and the audiences may be prejudiced by misleading or biased reports which present refugees as "bad". The role of mass media cannot be ignored as they are the main source of information for the majority and thus a source of influence for the public. Research in multiple countries shows that refugees are often portrayed negatively [8, 9].

The results of the thesis aim to help the readers to paint a broad picture on how refugees use ICTs, why do they use digital devices, and bring them a better overview of a side of the refugees that has not been portrayed and explore why they are moving to EU countries.

2.3 Thesis Structure

The thesis is divided into six chapters, followed by the bibliography. Each chapter has sections and subsections based on the information that is being discussed. The thesis is structured as follows. In Chapter 3, the background and prior research on the refugee crisis and the technologies that have been used to facilitate the displaced people are presented. In this chapter, the challenges that appear and the information systems that European governments have established for border management are being discussed. In Chapter 4, the methodology of the qualitative research and the sample are presented. Furthermore, a brief analysis of the findings will be described, giving a better understanding of how refugees use technology in the three phases of the migration. Further on, in Chapter 5, contains the discussion over the findings. To summarise, the conclusion, in Chapter 6, the answers to the research questions, the research limitations and possible future recommendations are discussed.

3 Background and Related Work

The primary goal of this chapter is to collect suitable information on the use of digital devices and application during the migration process. This is done by formulating and clarifying the definitions of the relevant topics while presenting findings from related work. This Chapter starts with presenting the research methods used for the literature review. Then, defining the general meaning of migration and the differences between legal and illegal migration, followed by a definition of Information and Communication Technology.

3.1 Research Approach

For stating all the relevant definitions and the use of ICT by refugees, a review on prior researchers had to be done. Below, in this subsection, the literature approach and research are described.

3.1.1 Literature approach

The literature was chosen mainly from the following academic databases:

- Google Scholar
- Scopus
- ResearchGate

Other than these platforms, a part of the literature was acquired from websites of associations related to refugees and governmental bodies. The material includes papers, reports, books and conference presentations. The Google search engine was used to find sources and other useful information for the refugee crisis, the technology that has been used, as well as the challenges that refugees face. Moreover, YouTube was a valuable tool to obtain information from the testimonials of refugees. Finally, the author attended events in relation to the refugee situation and reviewed press articles.

The search on the aforementioned databases was performed by using a combination of the following keywords: *ICT*, *refugee crisis*, *connected refugees*, *refugee smuggling*, *smartphone travelling*, *illegal travel agencies*.

3.1.2 Literature research

The focus of this research is both on the technology being used by refugees to plan and execute their journey as well as the challenges in the digital word. For this reason, a better understanding of the refugee crisis, human smuggling, trafficking and the related ICT challenges is needed. This

investigation will centre around the population group that is known as refugees. To this end, the terms “migrant” and “refugee”, as well as their association, will be defined, along with an investigation of the migration crisis, as described by other researchers.

3.2 Migration

The term "migration" refers in the broad sense to the movement of people from one country to another, in order to work, stay or seek asylum [10]. In fact, migration is a complex occurrence with many different manifestations that are observed in our daily lives in one way or the other and is divided into two major categories, the legal and the illegal migration.

Legal migration

Legal migration refers to persons who have entered and remain legally in their new country as residents; the authorities have recorded their presence, and they are provided with the required residence and work permit. Foreigners of foreign nationality are divided into two main categories. Those coming from a Member State of the European Union, who have the right to freely establish themselves in another member state and third-country nationals requiring a pre-approval procedure for entry and stay in the country [10].

Illegal migration

This phenomenon refers to the foreigners who have either entered the country without legal travel documents so that they are classified as "illegal migrants" or entered lawfully for a particular purpose (tourism, study, legal work and so forth), but then remain illegally in the country, as irregular migrants.

Historically, “illegal migration” as a social phenomenon coincides with the emergence of the legal status of countries and related concepts of the sovereignty of borders, which have restricted and placed individuals under the control of the state authority, free entry and stay within the boundaries of foreign individuals and groups. From a sociological approach, illegal migration is an unlawful form of "external" movement, the mobility of individuals or groups from their country of origin to another country-state with a different ethical entity, social structure and culture.

The leading cause of the phenomenon of migration, and consequently of illegal migration, has always been the search of better "living conditions" that creates a strong "dynamic" movement of

people or groups from low-living countries to economically, socially and politically advanced countries. A manifestation of this phenomenon is the refugee crisis since this group is technically moving illegally [10].

3.2.1 Reasons for migration

There is a variety of reasons that may lead an individual to migrate to a new country. The idea of migration always starts from the mind, but the time of planning, execution, and the facilities that the migrants can use vary. Usually, the factors that lead an individual to migrate are called push factors, while those that attract the migrant are called pull factors [10].

War and economic crisis are the most important and common reasons that contribute to migration [11]. Unemployment, the lack of services or amenities, poor safety and security, concerns about high crime rates, and poverty are some of the most common factors that lead a person to migrate.

Additionally, people have migrated due to sudden or continuing climate change in their local area. Changes in the natural environment that make the daily life difficult include drought, floods, earthquakes and more. The importance of these factors is augmented if the level of technology is low, and therefore, the dependence of a population is on nature. These groups are called environmental migrants [12].

Marginalised subpopulations of refugees are driven by push factors such as human right violations. Refugees in the LGBTQIA+ community face harsh conditions, be subject to violence or even death, due to their sexual identity. However, LGBTQIA+ individuals are not necessarily migrating because of their identity, but it acts as a major push factor. Due to the sensitivity of their situation, they are held in different camps in the host countries. Other refugees may take advantage of the complexity of the issue and falsely claim to be LGBTQIA+ to receive asylum [13].

Moreover, Information and Communication Technologies play a core role in migration. The primary sources that affect potential refugees to migrate are the news, social media, advertisements, and films. Most times, press and media through ICT act as a better marketing tool than word of mouth. They bombard the readers with ideal images about the host countries, the vacancies, the life and the opportunities they will have. ICT is always a lure for potential migrants, especially for the European countries that are related to wealth, beauty and liberation. That does not mean that ICT has only a bad influence, but it affects a lot the decision of potential refugees [2, 14].

3.3 Migrants versus Refugees

The term "migrant" describes an individual moving from the country of birth to another country for settlement (often referred to as "permanent settlers"). Migrants usually seek work and residential rehabilitation. Often family reunion is another push factor for migration [10]. There are many different types of migrants, such as emigrants, which are the individuals who leave their country, and also immigrants, known as those who enter a country [15]. Migrants are also distinguished in temporary mobile workers and brief professional transitions, where their mobility is exclusively due to a brief job search and depending on whether they are skilled or unskilled workers.

On the other hand, refugees are referred to the individuals who have been forced to leave their country, with this being the main difference between them and migrants. As aforementioned, refugees are the individuals who cross the borders illegally, in contrast to other types of migrants. Regarding the term refugee, the official meaning was defined in the 1951 Geneva Convention - Article 1 - and the Protocol of 1967. According to this definition, a refugee is considered the person who is crossing the borders of their home country and going to another due to fear of persecution [11].

According to the Office of the United Nations High Commissioner for Refugees (UNHCR), refugees are individuals “fleeing armed conflict or persecution” and “for whom denial of asylum has potentially deadly consequences” [12]. However, many different definitions are being used to refer to refugees, such as asylum seekers, illegal migrants, smuggled migrants or even victims of trafficking. Basically, not every asylum seeker will be recognised as a refugee, but every refugee is initially an asylum seeker. To conclude, being a refugee is not a choice, but being a migrant is.

3.3.1 Refugee crisis

The migration crisis is a multidimensional and multi-level phenomenon, one that affects many different levels the development of the society, the economy, politics, and the world culture. As a result of the Balkan Wars (1912-1913) and the First World War (1914-1918), the entire region of Eastern Europe saw a migration flow of millions of refugees. The total number of refugees from World War II and the post-war era lead immigration into Europe to almost reach 64 million people [2, 16]. European states face the most significant influx of refugees since World War II [1], with refugees originating mainly from the Middle East and Africa [2].

Although migration has its roots in the past, it now appears with new features. Considering the illegal nature of much of the migration streams, it is impossible to accurately estimate the size of transit and the extent of illicit migrants because, by definition, illegal migration and smuggling are challenging to count in statistics. According to recent analyses of the migration mobility's data, collected in Europe but also internationally, about 214 million people in 2017 were living outside the borders of their country of origin, seeking the comfort of a better place. Surveys have shown that more than 1.8 million refugees and asylum seekers that came to Europe since 2014 have not gone away [16].

Nowadays, between the countries that are the most popular for accepting refugees are Jordan, Greece, Lebanon, Spain, Egypt, Turkey, and Italy. Migration to these countries represents 51% of the total international movement. Their geographical position plays a vital role in the current crisis as host and transit countries, in both in and outside of the European Union.

Within the three European countries, Greece has a high volume of refugees that arrive every day on the northeast coast. There are 16.387 who made the journey to Greece so far in 2019. 11.318 out of this population arrived from the sea borders, while 5.069 were land arrivals [17]. Lesvos is one of the most known Greek refugee host islands since around 60% of the refugees have travelled through this island [18]. Many refugees try to reach Europe, often via Turkey into Greece, and then towards countries like Germany, Sweden and the Netherlands.

Some countries have taken a stricter approach; Hungary has built a fence along its borders with Serbia and Croatia. Austria has erected a barrier at its main crossing with Slovenia, which has also begun to seal its borders [19]. However, ever since Europe shut its borders to refugees coming through Greece, in 2016, approximately 60,000 people are now stranded there [2].

The UNHCR mentions that Spain has taken in 58.569 irregular migrants arriving by sea in 2018, while Greece had taken 50.508 total arrivals and Italy 23.370 [17].

3.4 Information and Communication Technology (ICT)

According to researchers, there is no specific definition for the Information and Communication Technology term. In general, it is the infrastructure and technologies that enable modern computing [20]. These technologies include computers, the internet, phones, broadcasting technologies like radio and television, and allow the exchange and the sharing of information as well as the communication between individuals or groups. ICTs have been proclaimed as potentially

powerful enabling tools for educational and economic change, for societal development and even for migrants' mobility [21].

Applications, software, and hardware are found to play a role in migration. Applications or 'Apps' are computer programmes, which, in the everyday use of the term, almost always refer to programmes run on smartphones or other mobile devices. Within this category, it is also being included, web-based applications (e.g., databases) that are a form of a programme that is designed to fulfil a specific purpose. Lastly, 'software' is included, "the programs and other operating information used by a computer". Hardware is the physical tools and machinery that either enable applications and software to be used or, that act in a standalone fashion and are forms of technological equipment in their own right (e.g., television and cameras) [20].

3.5 ICT and Mobility

The growth of the internet and the progress in Information and Communication Tool has an impact on the migration all over the world. In the past, the role of ICTs was replaced by the press, that was newspapers in the native language of the refugees who informed them about the timeliness of both their home country and the host country. In this way, migrant and refugee communities have had the opportunity to be informed about local services and products, which has helped their gradual adaption [4]. Diminescu (2007) has said that we are experiencing the period of the "connected migrant", a person who can be present in the developments of both societies [22]. Other researchers refer to a "digital passage to Europe", where internet and smartphones are lifelines [23].

Gillespie, Osseiran and Cheesman (2018) remark that in the Middle East and North Africa, the regions where some of the most massive migration flows originate, 98% of the population own a mobile phone, 84% of which is a smartphone. Half of these devices are high-end [23].

Nowadays, as the refugee crisis is ongoing, refugees are trying to reach Europe by using a variety of means and services that modern technology provides to help them during their dangerous journey. Latonero (2015) has mentioned that advanced technology can be as critical as roads [24, 25]. Hiller and Franz (2004), in their research, state that the different types of ICT are used depending on the several phases of migration [26]. In order to structure the role of ICT, the migration process is divided into three phases, the pre-migratory phase, the migration and the post-migratory phase.

According to the literature, and the interviews that have been conducted in this study, a cell phone and a power bank are the most common devices [27]. Many migrants and refugees have stated that the most essential item for them was a smartphone, usually of Android type [28]. Samsung dominates as it has almost half of the market in refugee preference, followed by Nokia. During a study by Gillespie, Osseiran and Cheesman (2018), refugees remarked that they prefer Samsung phones in order to exchange phone batteries when they get depleted [23].

Refugees arriving in European camps for migrants, ask for Wi-Fi codes before they check whether there are food, water and basic sanitation, the Times of London writes. Asylum seekers often use their mobile phones to head to Europe, and when they arrive, they need a strong Wi-Fi signal to stay in touch with their people in their home country [6].

Meanwhile, the use of an unusual "patent" has been reported. Volunteers have been transformed into "moving Wi-Fi routers". For about $ 100, a ready-to-use Wi-Fi hotspot and prepaid SIM are purchased, loaded into one's backpack, and the volunteer is the "access point" for the group. These networks last about 6 hours before the need for recharging and can serve around 10-12 people at any time [29]. For instance, near the entrance of many camps in Greece, some stands sell local SIM cards for 5 euros [28].

3.5.1 Functions of ICT for Refugees

Refugees often use the smartphone to deliver their cultural values, their religion and beliefs. The technology bridges the gap of the cultural distance. Refugees that usually travel to EU countries, far away from their homes, have to face the cultural divide. A foreign place, an unfamiliar language and strange culture are enough to make the process of inclusion of the refugees more difficult. People who work in the cultural field believe that culture helps refugees in uncomplicated and painless resettlement [30]. However, smartphones and technology, apart from supporting the newcomers to carry their culture and their language, help them also to interact with the culture of the destination country. Facebook, for instance, can help them to find out events for refugees, like the refugee week, an art and culture event being organised in the UK and aim to bring communities together [31].

Refugees' skills to use technology has become one of the main factors of effective social integration. Internet and computers are used to find out the information they want for the local society. Refugees use their smartphone for networking, to search for vacancies, house and find out how the

system of the local community works. Many countries have created a variety of applications to facilitate refugee inclusion and help them become part of society [32].

Communication is another aspect that technology enables, facilitating regular contact with friends, families but also with smugglers and people that help refugees during the migration. It is being reported that refugees keep diaries with photos and videos to send them to their loved ones, or even they use the live streaming and live channels to participate digitally in wedding ceremonies [33]. Smartphones and internet are lifelines; many refugees have stated that a disconnection, even a short time of no communication, may lead to being lost by others or to fail to meet the smugglers on time [23]. It has been reported that most deaths have occurred to refugees on the move when there is no internet connection, or when refugees are not able to use their phones [23].

Refugees use their smartphones for entertainment reasons [28]. During the stressful and dangerous journey, digital devices are the only way for refugees to escape from their routine. During their stay in hotspots, refugees are watching multimedia products on YouTube. They spend their day watching movies, listening to music, playing online games or just surfing the Web. [5],[34].

One of the most important reasons that refugees use ICT is to develop the migration process [23]. Each refugee uses technology and smart devices for different purposes and in a different way, as it is analyzed in the following sections. Although, most of the studies that have been conducted on the usage of ICTs by refugees agree that although the circumstances of the refugees differ across most aspects, the ways they use the internet was comparable.

3.5.2 ICT and the migration process

The migration process can be divided in three phases, the pre-migratory, the migratory and the post migratory phase. Research has shown that refugees use ICT and its services differently in each phase of their journey.

3.5.2.1 Pre-migratory phase

The pre-migratory phase is the planning of a refugee's journey. It starts the time that the potential refugees think that a possible solution is a migration for a better life.

The initial step is how the potential refugees will cross the borders illegally. The need to migrate due to armed conflict, persecution, socio-economic hardship, mobility regulations and restrictions as

well as expensive and lengthy procedures to obtain regular travel documents are some of the factors that determine the demand for smuggling. As a consequence, most of the refugees have to find a smuggler to help them to reach the dream country [35].

According to this research, there are two distinct ways for refugees to find smugglers. Social media, and especially Facebook, is one source where most smugglers are marketing themselves, promising a better and safer life. While, the "luckiest" refugees find the illicit travel agencies through friends and other migrants, without having to search on the internet. The "not so lucky" have to use Facebook, in a similar way as a travel agency, to find the most trustworthy and cheapest smuggler [24]. The extent of the search along with the bargain depends on the available time that the refugees-to-be have before they begin their journey. In countries where war is ongoing, time is limited, and decisions are taken without much consideration. In these cases, the search for a smuggler is not done individually, but usually in groups, through online smuggler recruitment or communities that embark on the same journey. The respective groups are being shut down when they are detected by Facebook but due to the nature of the platform the groups are recreated [36].

The next step is the preparation and planning of the journey. There are cases where potential refugees do not have to use the internet for planning as the smuggler has taken care of the process [37]. Thus, the sole obligation of the refugee is to find the appropriate smuggler. Additionally, mobile technology can enable refugees to become more self-reliant because they can check information on the internet about smugglers, travel routes and places to stay or they can ask friends through online social networks.

In other cases, the potential refugees plan the whole trip by themselves without the smuggler's help. In that case, ICTs give power to the individuals as they can use the internet and the search applications to find out the cheapest tickets, and even to use an application to modify counterfeit travel documents digitally. However, this is a rare technique [38].

3.5.2.2 Migratory phase

At this phase, the long and dangerous journey starts. During this phase, the use of digital devices is limited. According to the literature, the potential refugees carry only their smartphone and in many cases, more than one phone battery to be sure that they will not run out of battery during the journey [23].

At the report entitled "ICT4refugees" on behalf of the German government, it is mentioned that the ownership of a mobile phone is more usual among the high-income and more advanced nations. Moreover, according to the report usually each family owns a single device, that is used from all the members of the family and is kept by the patriarch, instead of the younger members that supposed to have more technical skills [28]. On the other hand, it has been recorded that in some cases, refugees of a younger age that are skilled in the use of computers and of the English language, are responsible for the guidance of the group through the use of a mobile device [23].

During the journey, refugees use smartphones for many different and unexpected reasons. As mentioned before, the most common reason is for contact purposes. To communicate with friends and their family that are usually travelling together. Some refugees that do not have a digital device while travelling via boat leave messages to their family in the only place they can, their life vests [39].

Besides the traditional telecommunication capabilities, Global Positioning System (GPS) services are also necessary for a long journey to Europe. GPS allows them to be more independent and organised in their journey. Refugees feel safer during the journey when they use navigation apps as they are aware of the routes and the destinations [40].

Refugees who cross the borders by boat use plastic bags to keep the devices dry. The cell phones are used as beacons in the night to inform of their arrival to the people that are waiting at the coast or calling the coastguard [23].

Remarkable use of smartphones is for celebration [36]. The newcomers use their phones not only for survival-related reasons but also to take pictures, videos and selfies. Reaching a new country safe and achieving a goal that leads to a better life is a valid reason to celebrate. Refugees are taking photos of each new state for fun, to express their happiness and keep that moment forever. Additionally, refugees are sending overjoyed selfies to their relatives to reassure them. Very often they upload these photos and information, like GPS coordinators, routes, border controls through publications in social media, like Facebook pages and groups of the travel agencies as a review, to confirm the trustworthiness, the reliability of the page and help other potential refugees [41]. By creating groups and private communities in communication apps, refugees help with photos and clues of locations, to locate their compatriots who are missing [42].

Rania Mustafa Ali, 20, travelled from Syria to Austria and filmed her journey by using different types of ICT. The video was then shared via the English magazine "The Guardian". In the video entitled "Rania's Odyssey" the devices that were used throughout the journey can be seen.

Rania's most crucial items were her smartphone as well as a small camera and a microphone. She also carried a tripod and a selfie stick in order to have a better result in her video. While crossing the borders from Syria to Turkey, she had to make a choice between the items she was carrying with her, and she chose to keep all her digital devices instead of her clothes. To ensure that they will not be destroyed she wrapped the items in plastic. During the migration phase, whenever she had access to Wi-Fi and electricity, especially during their stay at the refugee camps, she was using social media like YouTube for entertainment and charged all her digital devices [34].

3.5.2.3 Post-migratory phase

The post-migration phase refers to the usage of ICT since the newcomers have reached their final destination. Now, the smart cells are becoming an essential survival tool for their settlement and also for communicating with friends and family that have remained in the country of origin.

Most of the interviewers demonstrated that one of the initial things that are doing when they reach a country is to buy a local SIM card in order to activate the internet. ICT can help the refugees to establish contacts with representatives of their country and provides new opportunities, support and advice in term of social adaption [43]. They use them to find the refugee rights and how the home country can protect them, and they often visit the official sites of each government. ICT can help them to find a job and study opportunities and even to learn the local language.

3.6 ICT challenges

During the aforementioned phases, refugees have to face many challenges regarding technology. The most dangerous and challenging phenomena are **refugee smuggling** and **trafficking in the digital world**. Human trafficking and refugee/migrant smuggling are two interlinked phenomena and two international problems that are different according to different geographical areas. The lines between migration and human trafficking can be easily blurred. As it has already been mentioned, for many decades Europe has been the destination of strong migratory flows. This refugee crisis has resulted in a strong connection between human trafficking and refugee smuggling not only in Europe but internationally.

Human trafficking is considered a crime involving the exploitation of an individual for commercial sex or forced labour [44, 45]. Human trafficking is actually an enterprise that delivers enormous profits to the traffickers. As an illegal phenomenon, traffickers have a low risk of being discovered and punished. For the refugees, it is a hazardous activity since they are often vulnerable to life-threatening risks or exploitation by various trafficking networks [46].

The term refugee smuggling means the provision of illegal services to the potential refugee who voluntarily seeks to enter a foreign country illegally. Usually, these services include illegal transportation, and travel documents, like a false visa or counterfeit passports. Sometimes the services supplied by the smugglers include guiding, accommodation along the route and escorting during an irregular border crossing. The main and most important difference between these two crimes is that the traffickers victimise, deceive the individuals and they force them to execute their orders. On the other hand, the individuals are aware and give their consent to smugglers to lead them in the agreed destination [45].

According to estimations of the IOM, around 3,116 refugees died last year during their effort to reach a better place to live [10]. Some of the deaths that have been reported are results of human trafficking and others due to unreliable smugglers. Moreover, recent research has indicated that roughly two-thirds of refugees use smugglers to access Europe [47]. The Secretary-General of INTERPOL, Jürgen Stock, has commented "Men, women and children are shuffled around like commodities as the traffickers focus their efforts on making even bigger profits. These are terrible crimes targeting vulnerable victims, and it is essential that we continue with a holistic approach across all sectors if we are to effectively combat this threat" [48].

For the smuggling, one of the strongest tools of “marketing” is word of mouth, which is considered to be one of the traditional ways of attracting potential refugees. In the Information Age, a modern form of human trafficking is the traffickers who are marketing themselves via the internet and social media. Organized crime networks have been using technology, and specifically, the internet and social media to attract potential customers and advertise their services. In this way, social media facilitate the role of the smugglers [38]. Concurrently, many researchers agree that the power of social media and technology increase the independence of asylum migrants and weakens the influence of smugglers [40].

Apart from refugee smuggling and trafficking, there are additional challenges that the refugees face in the host countries, in regard to technology. Perhaps the biggest issue stemming from migration

and technology is the "**digital divide**". The digital divide describes the distance between the people who can use the ICTs and those who cannot.

In the literature, a gap between migrants, refugees and the new technologies is mentioned. Due to the press and governments not always displaying the situation objectively, many people are led to believe that the refugees are deprived of knowledge such as ICT skills [49].

Many scientific studies have been conducted with regard to the migration phenomenon. Nevertheless, there is limited refugee representation in media, as the refugee experiences and voice are lacking [23]. As already mentioned, this a problem the current investigation tries to solve. The research of Trintafullidou (2005), regarding the **lack of representation of refugee populations in the public debate**, concludes that many times the media indirectly link the nationality of immigrants with characteristics that can associate to illegal conduct, thus associating crime with the national origin [50]. At the same time, refugees may have trouble trusting the media since in their country, it is common that the media are controlled by non-objective forces, which result in the spread of propaganda [28]. Refugees may be exposed to misinformation or disinformation online [23], similarly to the internet users altogether [51].

A challenge of the social media age is the possibility of fraud in the form of **identity theft**, where someone is impersonating a vulnerable individual for misinformation or disinformation purposes. In the context of migration, an example of online "trolling" was the case of Abdou Diouf who pretended to be a refugee in a series of Instagram posts while in reality, he was promoting a social media campaign [52]. In this case, the purpose was the promotion of a Spanish photography festival.

Another challenge that may unfold is the unrelated difficulties that the potential host country may be facing. This can have an **indirect impact** on refugees as well. Many European countries but mainly Greece, are undergoing a serious economic crisis and cannot support the refugee flows. In this case, there are not enough resources to aid the refugees, such as the electricity needed and the chargers they ask for [28]. This also leads to a variety of changes in refugee legislation and migration laws, such as the closing of borders that adds to the complexity of the refugee journey [53].

3.6.1 Digital border management

European governments face the refugee crisis as an ongoing internal threat. Without border management, European citizens may feel insecure since they may fear the possibility of becoming subject to danger due to terrorist activities and attacks.

Various information systems at EU level currently exist for sharing information, exchanging data and border management, so that the authorities and the border guards can have all the useful information they need. However, there are structural deficiencies in the management of the current information system's architecture. National authorities have to deal with complicated and different information systems. Additionally, the data management architecture is disintegrating, as all the databases that the information is located are not connected. As a result, all these European Information Systems are not interoperable.

In order to cover these gaps, protect better the EU's borders and make more efficient and effective information management, a recent initiative of the EU concerning its digital borders, namely the new legislation the EU adopted in April 2019. The EU council will establish a framework for building interoperability between the EU information systems that already exist.

The existing Information systems of the EU are:

1. The **Schengen Information System (SIS)** is the "most widely used and largest information sharing system for security and border management in Europe" [54]. It is the database that includes the Schengen agreements and has information on persons and objects that enables national authorities to enter and consult alerts on them. It is used by 31 European countries and a second version of the system was released on 9 April 2013.
2. **Eurodac**, the European Asylum Dactyloscopy Database (Eurodac) is the EU asylum fingerprint database. "*When someone applies for asylum, no matter where they are in the EU, their fingerprints are transmitted to the EURODAC central system." Eurodac is linked to the Dublin II regulation and was introduced in 2003 to prevent 'asylum-shopping"* [55].
3. The **Visa Information System (VIS)** was established in June 2014 and "*enables border guards to verify that a person presenting a visa is its rightful holder and to identify persons found on the Schengen territory with no or fraudulent documents. Using biometric data to confirm a visa holder's identity allows for faster, more accurate and more secure checks" [56].*

4. On 5 September 2018, the European Council established the **European travel information and authorisation system (ETIAS**). This system ought to become "*an automated system that would gather information on visa-exempt travellers before their arrival, in order to determine any irregular migration, security or public health risks associated with them*" [57].
5. The **entry/exit system (EES)** regulations will be launched in 2020 by the European Union and aims "*to contribute to the modernization of the external border management by improving the quality and efficiency of the external border controls of the Schengen Area*" [58].

In addition to these information systems, the scope of this framework will also include a connection with the Interpol's Stolen and Lost Travel Documents (SLTD) and Europol data. Finally, in order to achieve the main goal of this framework, interoperability, four technical components need to be established:

- A European search portal (ESP)
- A shared biometric matching service (shared BMS)
- A common identity repository (CIR)
- A multiple identity detector (MID)

4 Empirical Research Study

As described in Chapter 2, the purpose of this study is to discover the role of ICT and internet during the migration process. Utilising the theoretical constructs of the literature that was reviewed, the empirical aspect of this research focuses on how refugees use technology and digital devices during the three phases of their journey as well as how much they trust technology for their activities. This research project relies on data gathered from refugees that currently reside in Greece. The aim of the empirical study is to evaluate said data and gather new data in regard to the use of ICT.

This chapter describes the procedures and methods used, including research design and sample population. In addition, the methodology and the data collection are presented. Finally, the chapter discusses the data analysis of this study.

4.1 Institutional Review Board

Due to the nature of the study and to ensure an ethically responsible research practice, approval by the Ethical Committee of the University of Twente was necessary. After submitting the research proposal for ethical assessment, the Ethical Committee of the Faculty of Behavioural Management and Social sciences (BMS) from the University of Twente, provided the researcher with the ethical approval, under request number 190033. The ethical approval proves that the research proposed conforms to ethical standards, is up to date in terms of secure data management, and is compliant with the General Data Protection Regulation (GDPR) of the European Union.

4.2 Research Methodology

To answer the research questions, an exploratory interview study was set up. The interview guide is presented in Appendix A, page 56. The questions of the interview were designed by using the methodological guidelines of Boyce and Neil [59].

The research was conducted in Greece, where the interviewed refugees were staying in hotspots that were under the auspices of the Hellenic Ministry of Migration Policy. Thus, permission from the ministry was mandatory. After the researcher provided all the necessary documents to the ministry, the approval for visiting hotspots was received. The ministry provided the researcher with all the useful instructions regarding which hotspots can be visited and under which dates and timeframe.

Before the main study in Greece, three pilot interviews were conducted in the Netherlands with refugees that were currently living in the Netherlands. This pilot study aimed to prepare the researcher for the current project in terms of the subject, the content and length of the open interviews and to receive possible insight or feedback from the three refugees. The scope of the fieldwork and the data collecton is described in sub-chapter 4.3, while the procedure of the data analysis is explored in sub-chapter 4.4.

4.3 Content of the Study

The fieldwork consisted of 61 interviews, that were conducted on March and April 2019 in two different hot spots in Greece. The first hotspot was the Theoxenia Hotel at Mesologgi, where newcomer refugees from Africa are temporarily placed there. The second hotspot was at Eleonas camp in Athens, which mainly hosts Syrian and Afghan refugees. These camps are not classified as reception centres but as secondary host locations.

Respondents were chosen randomly to be subjects of this research. Although they were randomly picked, it was preferred that the refugees could communicate with the researcher. This was either done with refugees who could speak English, or with refugees that could not, but there was a third refugee from the same origin who volunteered to translate.

In total, 61 individuals agreed to participate in this research. All of the participants had to sign the informed consent form that can be found in Appendix B. For confidentiality reasons, the names of the interviewees have been replaced with Respondents 1, 2, …, 61.

The questionnaire (Appendix A) consisted of 39 open questions. The interview questions can be divided into seven categories. The first category includes general questions regarding demographic information, their computer skills and their knowledge of ICT. The next three categories refer to the three migration phases. Within this section, the reasons that lead them to migrate, the tools that are used to plan and execute their journey as well as the ICTs that have been used to help their settlement in the destination country, are analysed. The last category of questions focuses on refugee trustworthiness of technology and its practices, the angle of digital forensics, and how ICT can help them during their dangerous journey.

4.4 Data Analysis Procedure

The results of the questionnaire were analysed using IBM's SPSS (Statistical Package for the Social Sciences) [60].The answers of each of the 39 individual questions in each questionnaire were exported to an Excel file and then categorised, as most of the answers were common.

Finding the possible associations between two qualitative variables is achieved through creating the link table (crosstab or contingency table). The two-dimensional link table is reported as RxC, where R is the number of categories for the row variable, and C is the number of categories for the column variable. This created RxC cells, each of which represents a combination of the two variables and values which have recorded the observed frequencies of occurrence. The independence control between the two quality variables obtained by the Chi-square (x^2) test. The results that are analysed in this section are presented with x^2, representing the value of the Chi-Square, df, representing the degree of freedom which is calculated using the following formula: df = (r-1)x(c-1) where r is the number of rows and c is the number of columns and p, the significance. All the quantitative variables have been analysed via descriptive statistics and frequencies.

4.5 Interview Results

The findings of the qualitative questionnaires will be analysed in this sub-chapter. The tool that has been used will be explained, and all the results from each different category of the questionnaire will be discussed.

4.5.1 Socio-demographics

The demographic questions refer to more general questions regarding the age, the nationality, ICT skills and educational level of the interviewees. The questionnaire has kept the anonymity of the respondents. Following the data collection ethics and policies, questions regarding personal data were avoided. The socio-demographic questions mainly aim to build the foundation for a relationship of trust between the researcher and the refugee.

In the 61 interviews conducted for this research, 27 respondents were from Afghanistan and 34 from different countries of Africa.

Table 1. Country of origin of participants

Country of origin	*Afghanistan*	*Somalia*	*Cameroon*	*Demographic Republic of Congo*	*Senegal*	*Sierra Leone*	*Guinée Conakry*
Participants	27	26	4	1	1	1	1

Only 6 of the participants were women, and 55 were males. The refugees from Africa were newcomers, having arrived in Greece the year before, contrary to the Afghans that live in Greece for more than three years. The dominant age groups were 18-25 years old, with 32 participants, and 26-35, with 17 participants. Due to different permit procedures for minors, refugees under the age of 18, this group could not participate in the research.

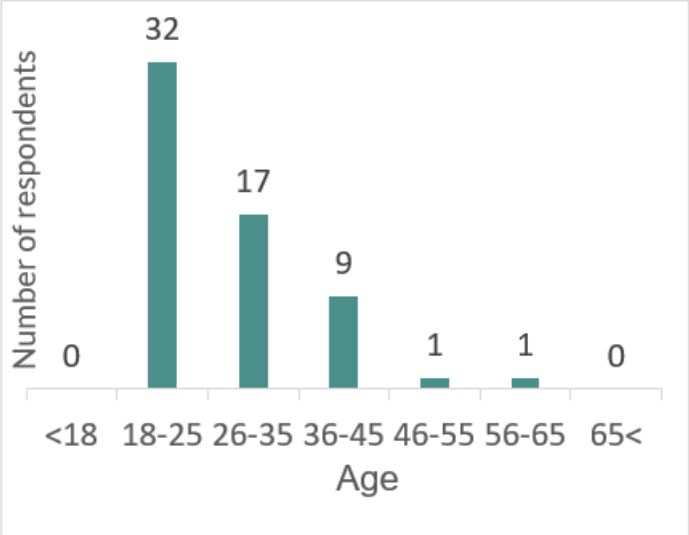

Figure 1. Age of respondents

More than half of the contributors have low education (52,46 %), with 16,39 % not attending high school and 36,07% not completing primary education. From the rest of the respondents, 37,7% have completed secondary education. Only 9,84% have a university degree equal to a bachelor or master.

Figure 2. Common Routes

All the participants followed similar routes. From Africa to Iran and then to Turkey or from Afghanistan to Iran, then to Turkey and finally ending up in Greece. Some of them bought a passport from their own government to reach Turkey. To acquire a legal passport for the EU countries, the process is more complicated and much more expensive.

Regarding the transportation methods, the majority of them used a plane, their feet and a boat to cross the borders. Many respondents were on foot, walking for months at the time to reach Greece.

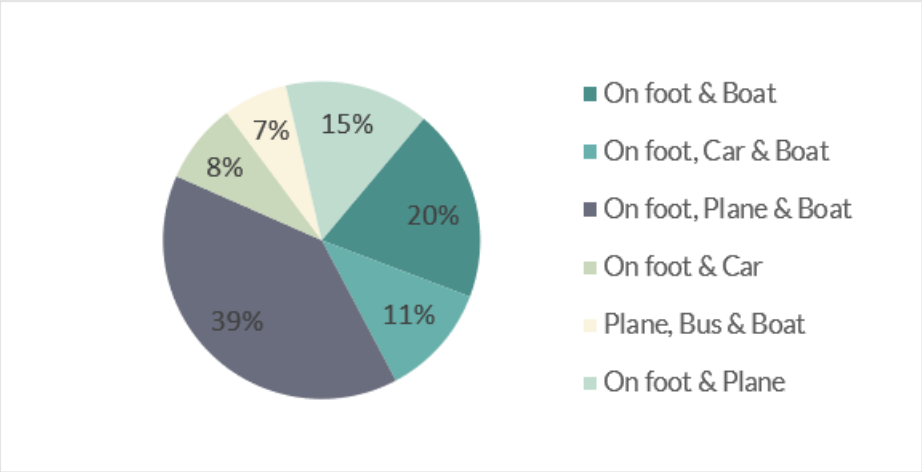

Figure 3. Transportation types

4.5.2 Impact of ICT during the pre-migratory phase

During this phase, all the digital devices and applications that have been used before the start of the journey will be analysed. Furthermore, an analysis regarding the effect of social media during the decision of migration will be presented.

4.5.2.1 Use of the Internet in the home countries of the respondents

Regarding the use of internet in the home countries, 26 (43%) of the participants did not have access on the web, while 35 (57%) used the internet in their home countries. The most common devices for those that were using the internet were a smartphone, a laptop or a desktop computer.

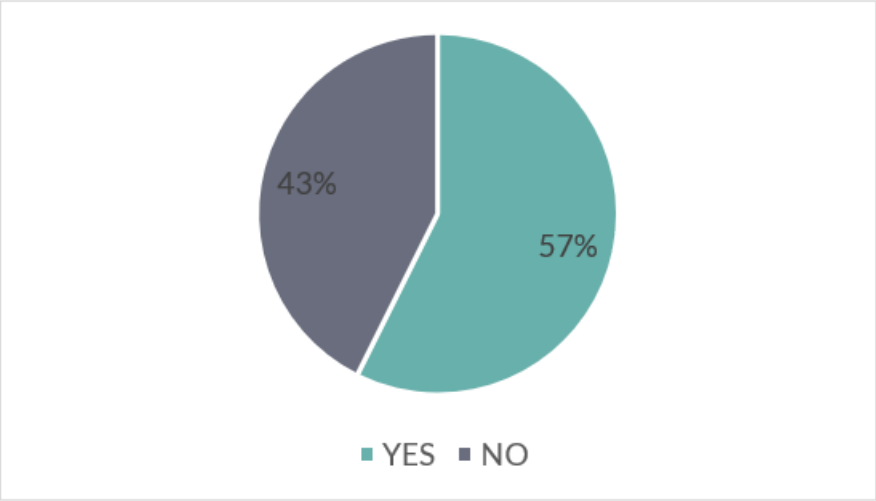

Figure 4.Use of the Internet in the home countries of the respondents

Refugees from Afghanistan (No:7 participants, Yes: 20 participants) used to use the internet more than the refugees from Africa (No:19 participants, Yes: 15 participants). A Somalian refugee stated that they did not have internet access in their hometown and that she was hiding her phone in public.

From the Chi-square test, we can say that the "country of origin" and "use of internet" variables are dependent because the p=0.023 is smaller than the price 0.05 (x^2=14.6, df=6, p=0.023). Thus, we can trust these two variables and rely on them in order to export some safe and useful results.

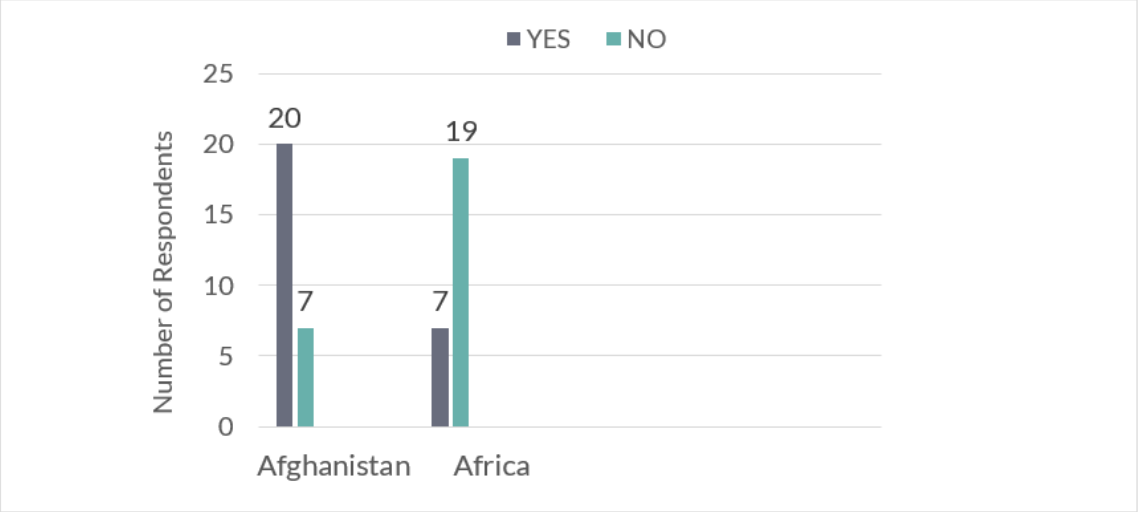

Figure 5. Use of internet in each country

4.5.2.2 The level of proficiency of the respondents' computer skills

In the question "how would you rate your computer skills" only 6 participants considered themselves as high technological users while 26 as very low.

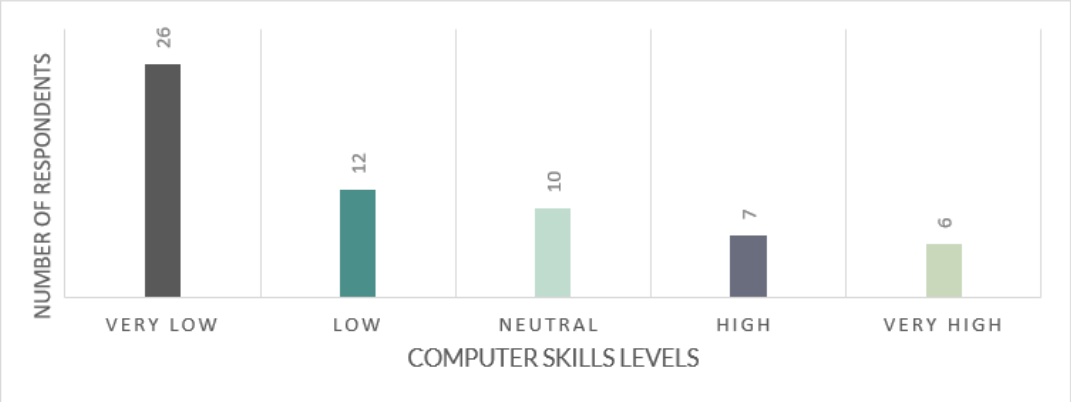

Figure 6. Level of proficiency of the respondents' computer skills

Studies have displayed that the education level of refugees affects the way that refugees use social media and digital devices. This has become evident through this research as well since the respondents with higher education also had higher computer skills as Figure 7 shows.

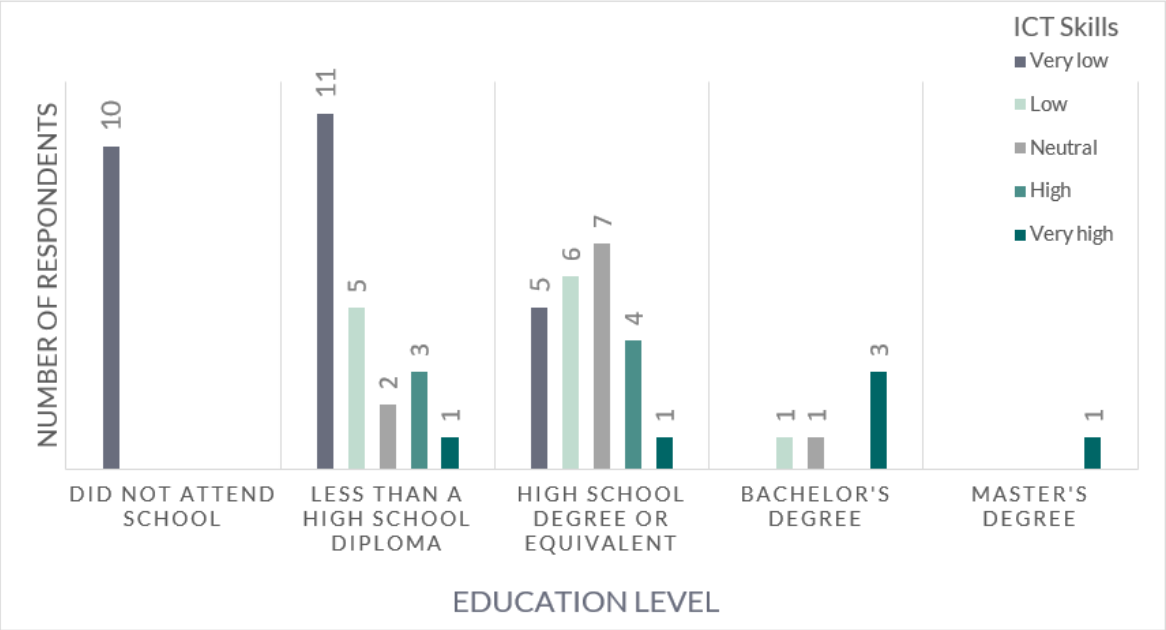

Figure 7. Correlation between educational level and computer skills

4.5.2.3 Influence of respondents from social media and internet

The previous question may justify the following findings, that only one person has been informed by social media and decided to migrate. Respondent 47 stated that she saw lovely images on social media from friends that have already resettled in the EU, and she decided to follow them. The rest left their homes to search for a safer place, with the leading causes being war, civil war, and because they were forced to flee due to persecution or human rights violations such as torture or procedures like clitoridectomy. Respondent 48 from Somalia, said that although he did not migrate because of social media, the media and internet added more value to his choice.

Furthermore, two individuals responded positively to the question if the internet affected their decision to choose the host country. Most of the respondents agreed that they never thought of searching where they have to go; they just followed the refugee flows. Respondent 48 mentioned that he searched on the internet to find out information about Greece if it is an EU country in particular. Respondent 37 said *"I wanted to go to Europe, cause it is the best place for refugees, so I searched on google "best places near Turkey" and I found about Greece. I didn't have any other option"*.

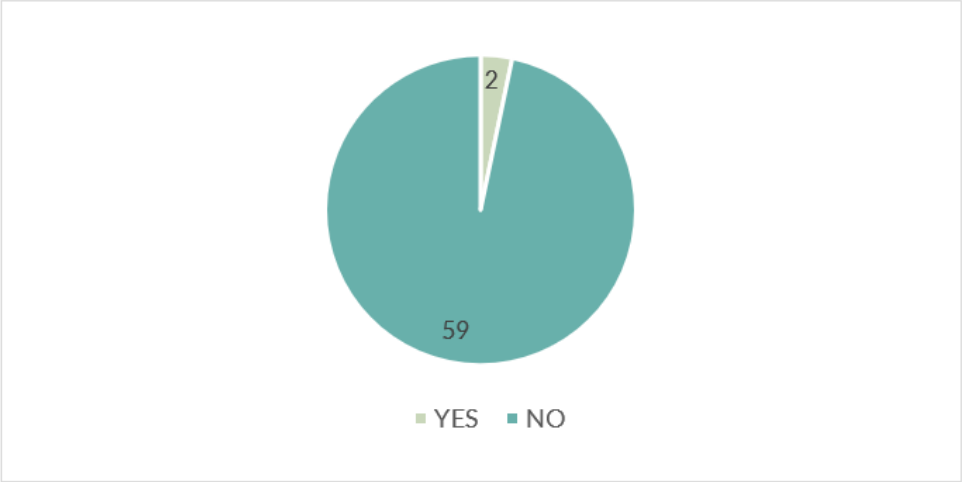

Figure 8. Number of respondents that the internet affected their decision to choose the host country

4.5.2.4 Use of internet for planning the journey

Regarding the planning of the journey, only three refugees used the internet to plan the journey. They mostly used Facebook and Google in order to communicate with other refugees and to collect information about their destination and individual routes, as the internet facilitates communication.

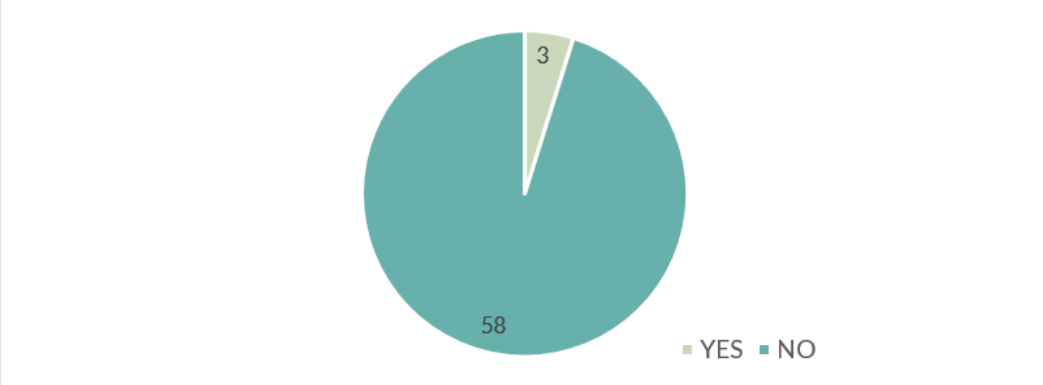

Figure 9. Number of respondents that used the internet to plan the journey

The rest agreed that they did not have to search on the internet as all of them were aware of the routes and the process that they have to follow. Most of them asked help and directions from other refugees, from friends, relatives and smugglers. WhatsApp and Messenger were the main communication tools between Respondent 57 and their smugglers.

"No, I didn't plan the journey based on the internet, you don't have to, we all know where we should go. I just used my phone to search for Greek islands to have an idea", Respondent 29 stated.

4.5.3 Impact of ICT during the migration

Moving to the third category, consisting of data from the moment the refugees left their houses until the moment they reached Greek land, participants were asked about the digital devices they carried and the use of them during the journey.

4.5.3.1 Use of digital devices during the journey

Regarding the devices that they used, 23 of the participants did not use any digital device, 34 were using their smartphone, 3 were carrying a power bank to ensure that they will not be run out of battery and 3 stated that they had a feature phone without internet access. Some of the refugees remarked that although initially, they had devices, smugglers forced them to give their phones up. Thus, they bought a new device in Greece.

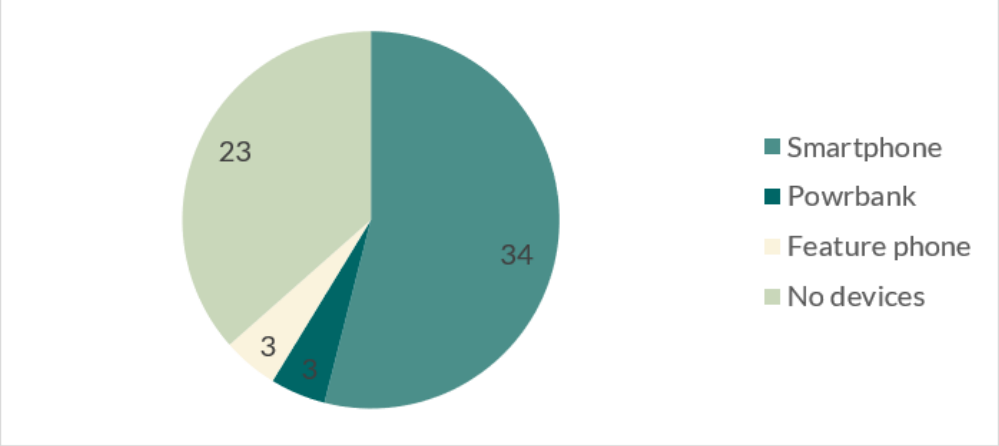

Figure 10. Use of digital devices during the journey

4.5.3.2 Use of applications during the journey

During their journey, 37 refugees were not using any application. Google Maps was the most used app within the sample with 16 users in total, followed by Messenger (8 users), WhatsApp (7 users), IMO (6 users), Facebook (6 users) and Viber (2 users). While on the journey, the internet connection was weak, so some refugees were solely using Google Maps to ensure that they were heading in the right direction. *"I was always checking the GPS to be sure of where I am because I was not trusting the "man" and also to navigate around the cities"*. Respondent 57 referred to his smuggler as the "man".

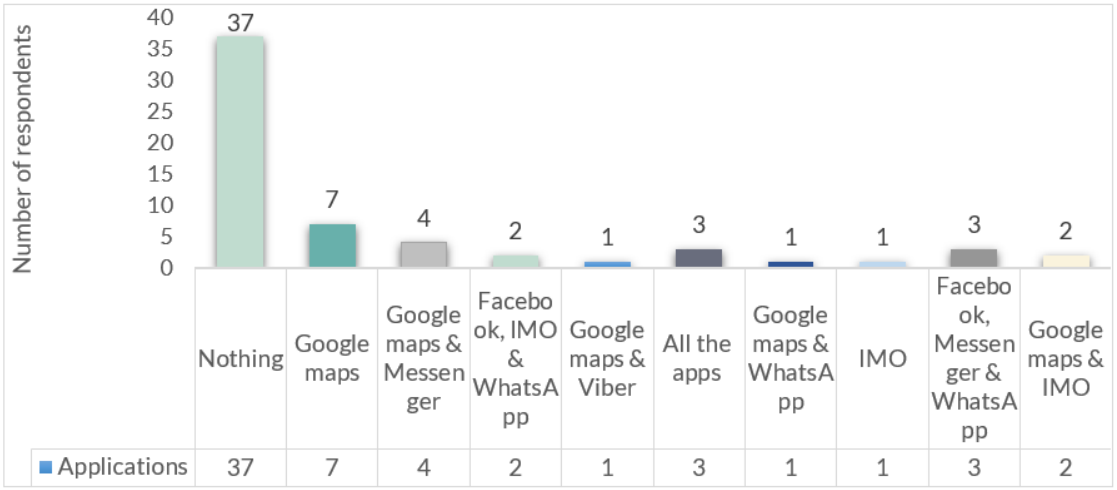

Figure 11. Applications that have been used from the respondents during the journey

4.5.4 Impact of ICT in the post-migratory phase

Moving to the next step of the migration process, general questions about the use of ICT in the host country were asked and how the internet helped the participants during their settlement.

4.5.4.1 Internet access in the host country

Almost all of the newcomers (92%) bought a local SIM card in Greece, and as a result, the same percentage had internet access at the time of the interviews. In the hot spot located in Mesolongi, which was a hotel, since the connection was stronger at the lobby, all the refugees were spending a lot of their time in that area.

"I bought a new SIM card in Chios island, for 10 euros because I did not have an internet connection with my old SIM card", respondent 37 added.

Those refugees that were not connected to the internet claimed that they were either not familiar with technology and new techniques or that they did not have any money to purchase digital devices.

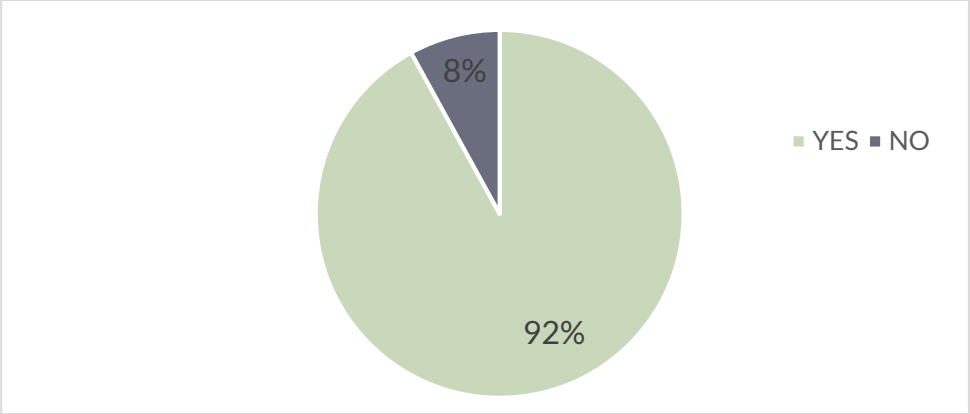

Figure 12. Internet access in the host country

It is remarkable how much the refugees use the internet in the host country in comparison to their home countries. As they mentioned, the internet is their life as they have much free time and the most creative way to spend it is by navigating the web.

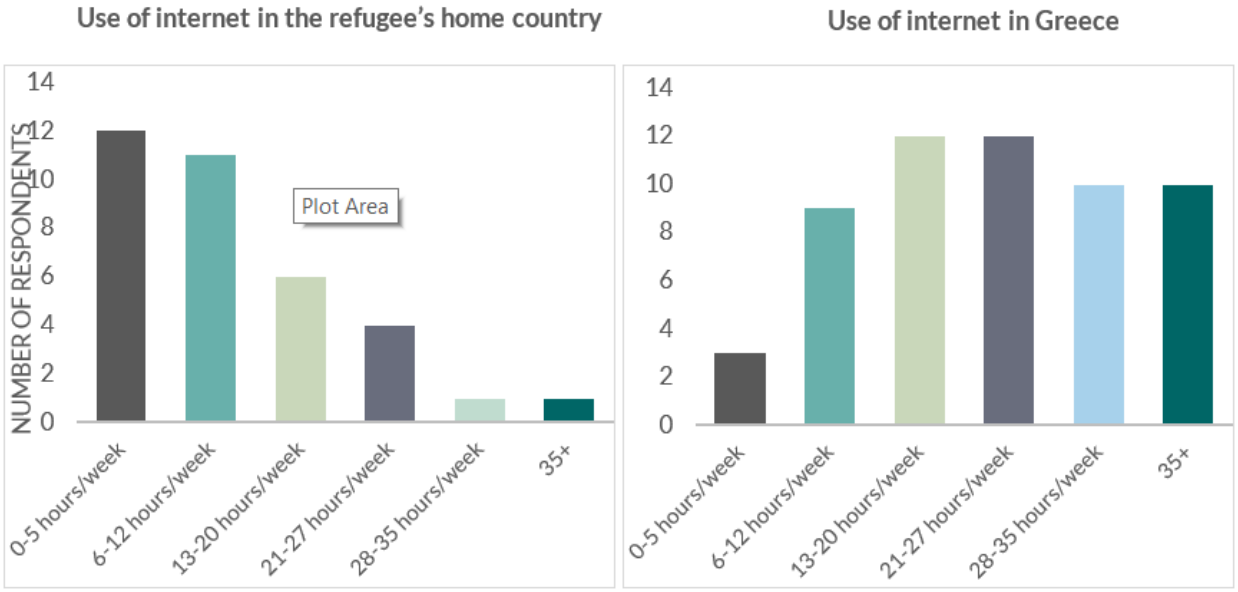

Figure 13. Correlation of the use of the internet in Greece and in refugee's home country

4.5.4.2 Use of digital devices from the respondents in the host country

Only 4 participants did not have any digital devices in Greece. A smartphone is the most commonly used device, as 56 of the respondents owned one, with the majority having Android as operating software. Some of the respondents own a laptop (6 users), a desktop (3 users) and one person used a feature phone.

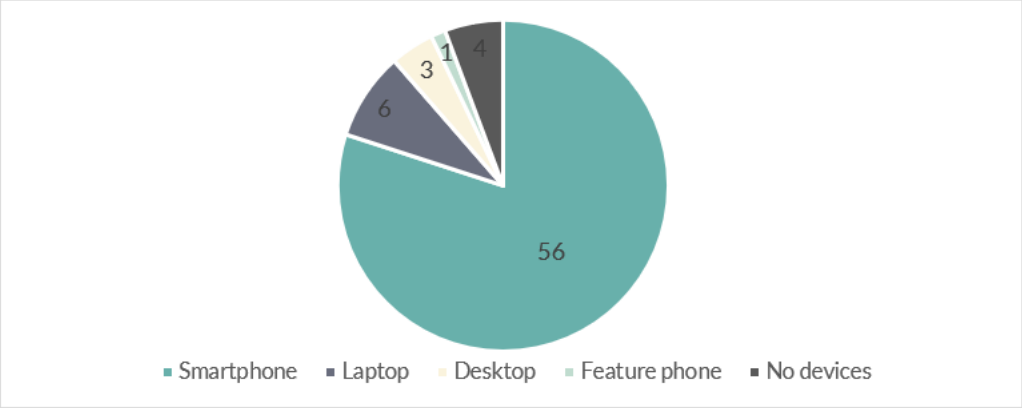

Figure 14. Digital devices in the host country

The Chi-square test shows that the variables "age" and "digital devices" are dependent because the p=0 is smaller than the price 0.05 (x^2=79.4, df=35, p=0). Digital devices have a direct correlation with the age of the respondents, as displayed in Figure 13 below. Figure 13 proves that the majority of the younger refugees owns a digital device.

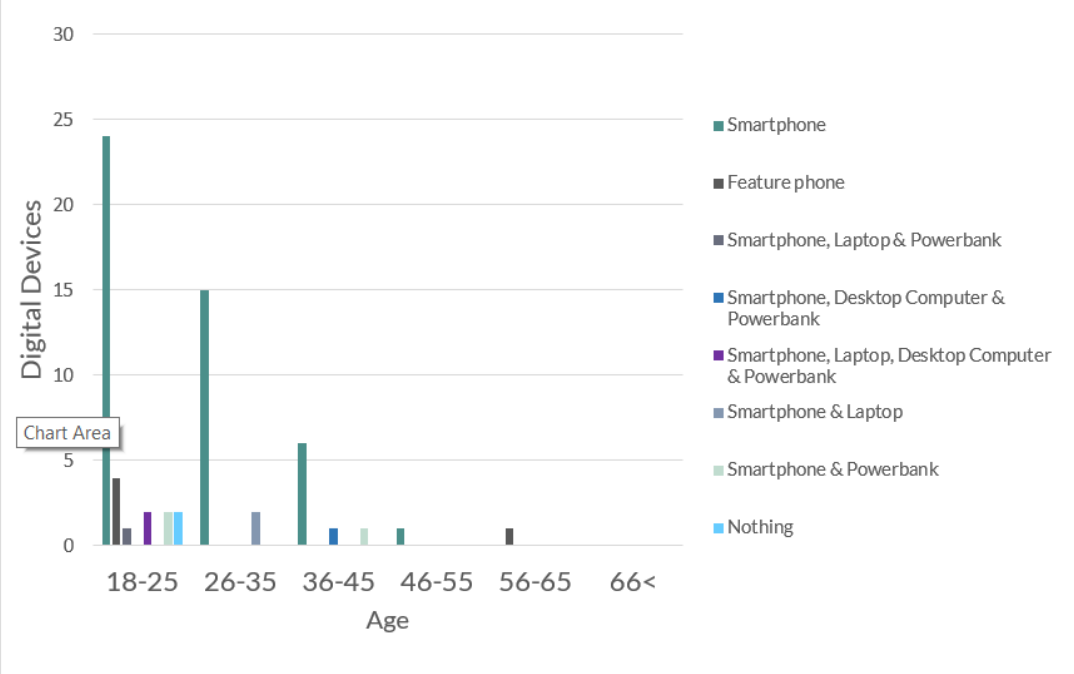

Figure 15. Use of digital devices divided by age groups

4.5.4.3 Use of applications from the respondents in the host country

WhatsApp prevails as the first choice for communication. Messenger is second with 46 participants that have stated that they use it, followed by Facebook, Email (usually Gmail), IMO, Instagram and

Telegram. Two of the respondents do not use anything. Respondent 26 mentioned that Telegram is more prevalent in Iran, so when they were crossing Iran, they were using it more.

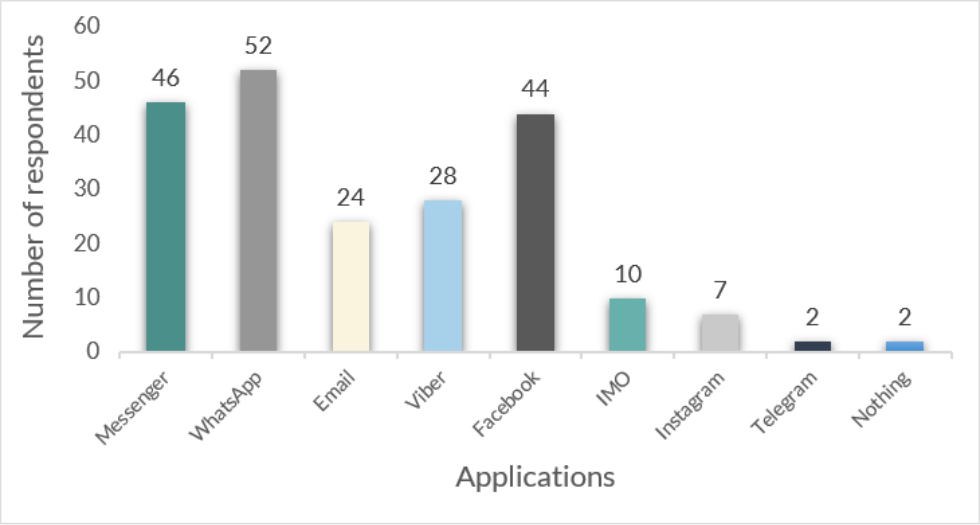

Figure 16.Use of applications from the respondents in the host country

4.5.4.4 Internet use incentives

Refugees in Greece use the internet for many different reasons. The most common is for communication. They want to be in touch with their families and their friends back home but also inside the camps.

Furthermore, it is vital for them to communicate with local authorities to make arrangements regarding their legal documents and asylum services. Respondent 48 is an artist, so he uses the Internet to keep his art alive, and he aims to sell his paintings via online platforms. The respondents also use the internet for entertainment, taking photos or listening to music. Additional usage includes searching for local information such as pharmacies or local supermarkets, as well as visiting Greek websites to learn the language or to find vacancies.

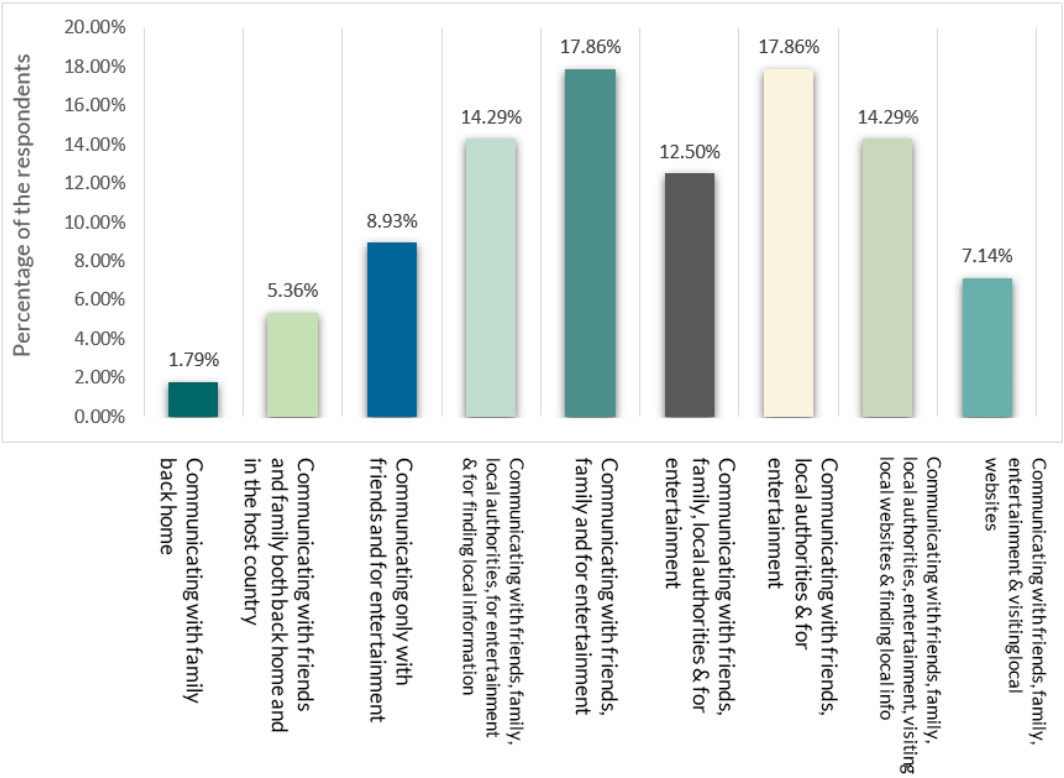

Figure 17. Internet use incentives from respondents

4.5.5 ICT and Trustworthiness

This category refers to the trustworthiness of the refugees regarding ICT. Two-thirds of the respondents replied positively when asked if they trust the internet for activities such as their purchases, communication, and making friends.

Respondent 38 believes that sometimes the internet is unsafe because of security issues such as hacking of accounts or because of fake news. "*I don't want to share my personal data because if someone has some basic information of a person can easily find everything about this person*", stated Respondent 5 and added that he avoids any online financial transactions.

Although most of the participants trust the internet in general, only 22,96 % navigated through the internet to search for information about Greece before the journey. Out of those, 50% found the information trustworthy, while 43% were neutral, and 7% did not find the information reliable. Most of the respondents preferred to ask other refugees (32,79 %) or relatives (22,95%). Finally, 15 % did not search for any information about the host country.

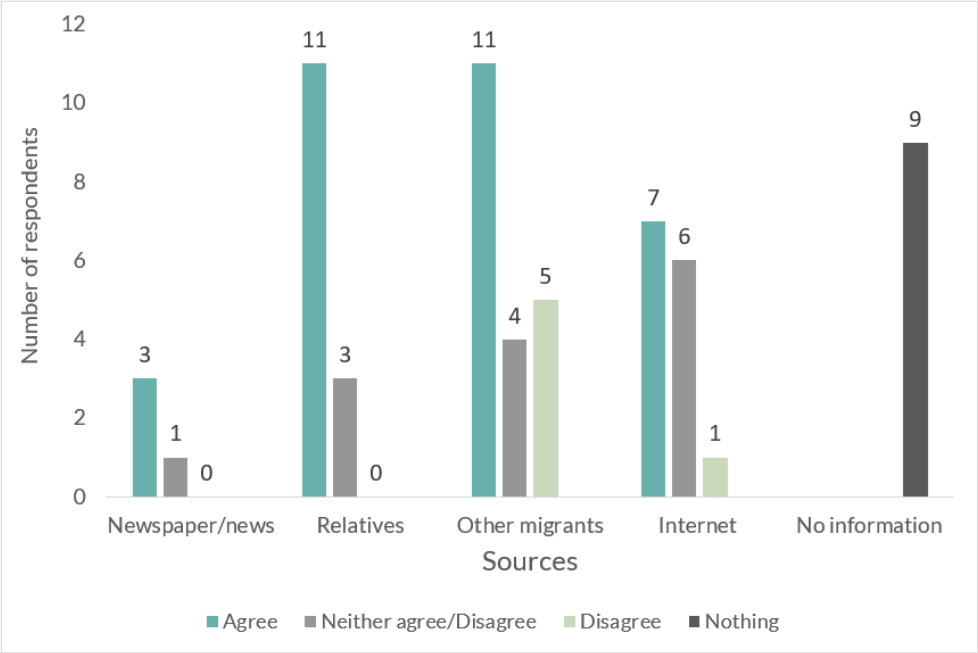

Figure 18. Individual sources of information collection by refugees

Figure 18 shows that respondents that are highly educated seem to trust the internet and ICTs less compared to the lower educated refugees. According to the Chi-Square test (x^2=15.216, df= 4, p=0.004), these two variables are dependents as the p=0.004 is smaller than the price 0.05. The individuals with high education stated that they are more aware of digital fraud and other possible dangers on the web.

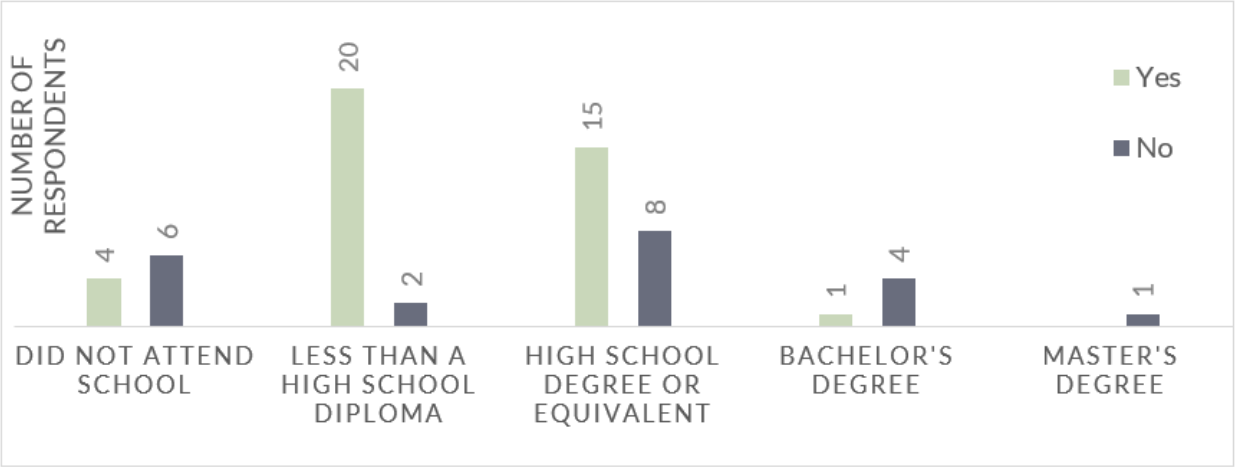

Figure 19. Internet trustworthiness according to the education level of the respondents

4.5.6 Digital forensics

Many EU countries have passed legislation that enables the police to check the refugees' phones and extract information from their devices. More than half of the respondents (59%) are not aware of these new measures.

The awareness regarding digital legislations from refugees from Africa is higher compared to the refugees from Afghanistan, as displayed in Figure 18. According to the Chi-Square test, these two variables are dependents as the p=0.012 is smaller than the price 0.05. This happens because Africans arrived in Greece last year in contrast to Afghans that have more than three years in Greece.

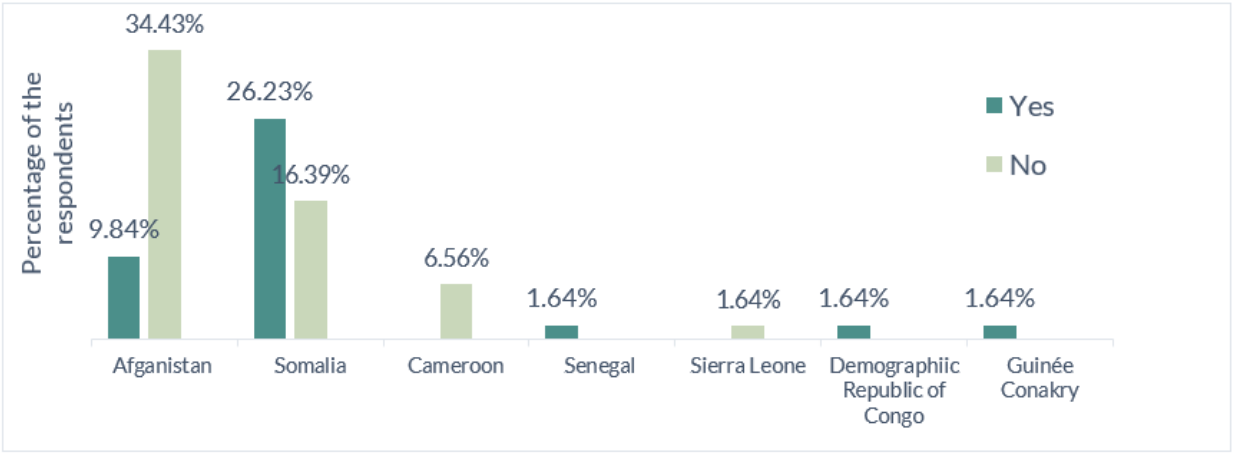

Figure 20. Awareness of digital legislation by country

Out of the 61, 25 participants have awareness, with 19 stating that they heard about these measures from other refugees while the rest have been informed from the news. The majority of them heard about these measures in Turkey from other refugees before they crossed the borders. The 25 respondents agreed that they were afraid that someone would check their phones but did not have any other choice. In general, this new legislation did not affect their decision to reach Greece. Respondent 47 said that during her first attempt to reach Greece the police took her phone and sent her back, so during her second attempt she left her phone before she arrived in Turkey and she bought a new one in Greece.

In total, 13 devices have been checked in the borders. Among these devices, 6 have been checked from the asylum services, 5 from the authorities and 2 from the Greek police. Respondents were not always confident whether the persons who searched their device were police officers, from

authorities or from asylum services. *"In Chios, a lady from the authorities took my phone to check the messenger and my number contacts"*, stated respondent 37.

4.5.7 Improving the migration process through ICT

This section composes the answer to the final sub-question of this project. As displayed in Figure 21, the vast majority of the respondents indicated that technology could be of assistance to their journey, especially during their settlement (post-migratory phase).

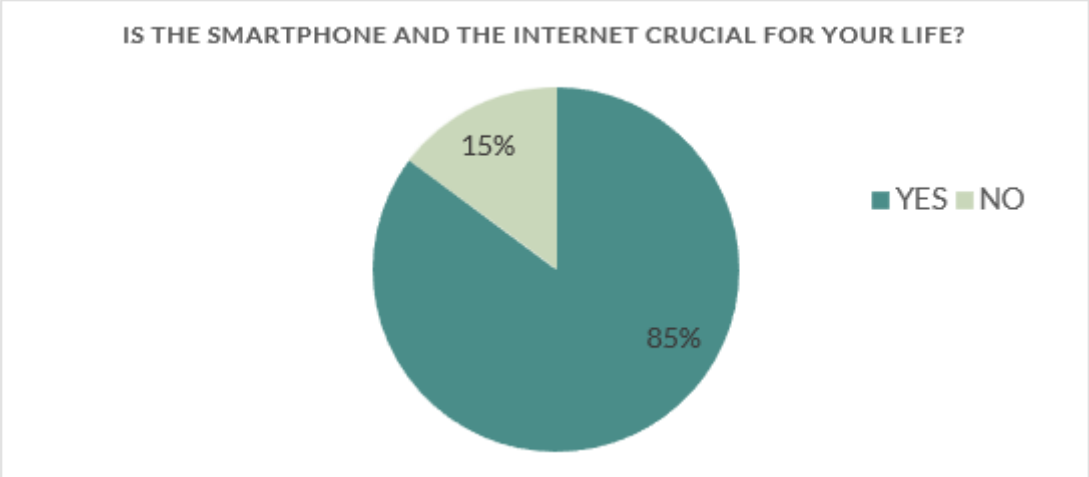

Figure 21. Importance of internet and smartphones

Out of the 58 positive replies, 47 recommended an application that includes information with refugee rights and the respective legislation of each country in different languages. Nine recommended a forum that can facilitate communication with other refugees. Finally, one recommended an application that assists refugees to find their lost relatives while the last one mentioned an app that supports refugees to share their story through social media to raise awareness.

Figure 22. Suggestions for improving the migration process through ICT

5 Discussion

After the background research and carrying out the questionnaires, the results from the previous chapters and the findings from the interviews will be discussed here.

The study analyses the extent of the role of ICT during migration. The interviews consisted of 61 respondents from two different main areas, Africa and Afghanistan. Africans arrived in Greece a year before, while respondents from Afghanistan have lived in Greece for more than three years. All the interviewees intended to move to a country in the Central or Northern Europe.

Pre-Migratory Phase

Most of the respondents agreed that they were not influenced by social media to migrate. They argued that the reasons behind their decision to migrate were more crucial, such as internal conflicts or war. Actually, most of the respondents stated that they do not use the internet in order to plan their journey either, a fact that comes into contrast with previous research on the topic. In particular, it has been indicated that refugees use ICT heavily to plan and execute their journey, as well as finding a smuggler. In the present research, only two respondents indicated that they were influenced by social media in their decision to migrate. Afghans used the internet more compared to the respondents from Africa in their host country which demonstrates that the use of internet has fluctuation depending on the area of origin. The findings of this study confirm that the educational level of the refugee has a positive correlation with their ICT skills.

Migratory Phase

During the journey, most of the respondents carried a smartphone. Out of those, most did not utilise their device throughout the migration process. For those who did, navigation applications were the most common and important in order to ensure that they were on the right route. At times, Messenger was used to communicate. According to the literature review they used the smartphones to celebrate the arrival to safe land, in addition to communicating with smugglers.

Post-Migratory Phase

The findings from the interviews as well as displayed in Figure 13, lead to the hypothesis that refugees use the internet more during their settlement in the new country. Prior studies have focused on ICT use during the migration, but the findings of the present interviews proved that internet and smartphones are more important during the post-migratory phase. Refugees use the

internet in the host countries for various reasons with the most crucial being communication with friends and family, in addition to the authorities. The respondents from African countries, who were new arrivals in comparison to the respondents from Afghanistan, stated that they utilise their phones to communicate with the authorities to arrange the asylum process. Primarily, this communication occurs via e-mail, usually through Gmail accounts. This finding is in conflict with previous findings stating that refugees do not use e-mail [28]. Furthermore, the majority of the respondents owned a smartphone, and especially the younger groups. The most common applications for this phase are WhatsApp, Messenger and Facebook. Human rights conditions and job opportunities are the factors that they usually look up on the internet. The respondents who stated that they visit refugee-related websites referred to "InfoMigrant", the Facebook page "Refugee Info", as well as the online Greek Asylum services. These findings are consistent with previous research [28].

Finally, a notable conclusion in regard to the post-migratory phase is the mass answer of the respondents on whether they believe that the internet is important or not. The majority, as Figure 21 shows, strongly agree that smartphones and access to the internet are crucial for a refugee's life. The refugees that do not find the internet so important were those that were not familiar with technology and the elderly. Respondent 1 stated that for younger people, the internet is useful for their settlement, but that is not the case for the elderly. The rest agreed that without the internet, there is no life in the hot spots.

"Without the internet, there is no life here for us! We use internet every day, and I have seen people that they get angry when the connection is not so strong. For me is more important because I want to continue working as an artist", respondent 48 stated.

Additional Findings

In general, the respondents trust the internet for their activities. An interesting finding is that the most educated respondents tend to trust the internet less as they are aware about potential cyber challenges.

An interesting finding is that Africans are more aware of the new measures and the legislation about the digital forensics, comparing to the refugees that arrived in Greece years ago.

The interview results have implications for industry, research and governments alike. Regarding the world of industry, according to the literature review, many phone applications have been developed

to help refugees in all the phases of the migration. However, the present findings show that participants do not use any of these applications, either because they are not aware of them or they do not seem to be useful for them. As a result, the businesses should concentrate their efforts somewhere else or promote their applications more effectively.

Furthermore, authorities and police officers check the refugee's smartphones in the borders. The findings show that the majority of the newcomers are aware of the new legislation, so some decide to throw their phones before they reach the new country. It is also possible that the smugglers confiscate the devices. Thus, the authorities should focus on different approaches to find information such as smuggler contact information and more. According to the literature review, smugglers promote themselves as travel agencies on Facebook pages [38], thus an alternative point of focus would be this domain.

5.1 Research questions

The main research questions were decomposed into five subquestions, and their answers will be discussed as well.

1. *What types of Information and Communication Technology do refugees use during the three phases of migration?*

   Throughout the three phases of migration I distinguish hardware and software applications. As hardware equipment, the most used is a smartphone. A power bank is also very common during the journey. Some of the refugees use feature phones, while fewer own a laptop or a desktop in the host country.

   Regarding the software applications, the majority use GPS navigation and WhatsApp during the journey. Sometimes they use Messenger, Viber or IMO and in fewer instances, Instagram, Telegram or Email. WhatsApp is the most widely used app throughout all the phases.

2. *How and for what purposes do the refugees use ICT?*

   Refugees use ICT for different reasons and in different ways. They use the internet for communication, to be connected with friends, family and sometimes even with their smugglers. Smartphones are crucial during their settlement for communicating with the authorities, for visiting local websites and for finding local information. Some of the

respondents stated that there are looking for vacancies, for facilities in the area like a pharmacy or that they are trying to learn the local language online. A smartphone is also necessary for entertainment purposes since refugees in the host country do not have any other way to spend their time. According to the literature review, they also use ICT for celebrating when they safely reach a new land, for taking photos to inform other potential refugees about the safety of the routes but they also use their phones as beacons to inform the border guards for their arrival.

3. *What kind of fraud and victimisation do the refugees face during the journey?*

   Refugees face different kinds of fraud and challenges in regard to ICT during the three migration phases, with some challenges being from the perspective of the host country. The most important challenges are refugee smuggling and trafficking in the digital word. It is being reported that smugglers nowadays promote their "services" and find their victims through Facebook pages and illegal travel agencies online. The digital divide is another challenge. According to the literature, the technological distance between the newcomers and the citizens is an issue that concerns the host governments.

   Moreover, online identity theft is another issue. It is not common according to the research, but there are stories from people that have been presented on social media as refugees, seeking to attract attention for disinformation reasons. Social media use in the EU has created a misinformative picture of refugees, by portraying them as "bad". Finally, refugees usually ask for electricity and chargers for their phones, and it is possible that the host country cannot afford all these facilities.

4. *How do EU nations contribute to the minimisation of the refugee crisis?*

   EU nations attempted to minimise some challenges coming out from the refugee crisis by adopting new legislation in April 2019. The legislation includes a framework using information systems for more efficient, effective information management and border security.

5. *How can technology help to make the process of migration better?*

   The answer to this question was answered by the respondents themselves, as it is analysed in section 6.2. An artefact that they considered to be most useful is an application that provides information regarding the human rights conditions for refugees. Having in mind the limitations of this study, described in section 6.1, the first two tasks of the Engineering Cycle are conceptualized for this artefact.

6 Conclusion

In this thesis, the ICT use by refugees during the migration process was examined. After background research on the refugee crisis, the different kinds of ICTs, and how these two fields can be combined, interviews were conducted with refugees in order to assess the use of technology. In conclusion, the research questions and how they were answered are described. Furthermore, the limitations of the study and directions for future research will be presented.

6.1 Limitations

The primary goal of this research is the investigation of ICT use by refugee flows and to give a better understanding of how technology affects and disrupts the long journey of refugees. However, caution must be exercised when making generalisations [61] based on the findings of this study, as delimitations and limitations apply.

The researcher noted the following limitations:

a) Participants' responses were self-reported, and it is assumed that the respondents gave honest answers and insights. However, there is always the risk of a lack of trust between the researcher and the participant. Some of the respondents were still in shock from the challenges they faced; they had difficulty trusting the researcher and could not be convinced that the research was for academic purposes and not for the asylum services. Moreover, when dealing with open and qualitative questions, it is possible that the respondents were not completely honest, and at times, even bored. Also, there is a risk of bias or wrongful interpretation of the questions by the respondents.
b) The age of those who participated in the survey was limited. Only adults could participate in the research since the process is different for interviewing underage participants.
c) The hotspots did not provide the researcher with a translator to facilitate the interviewing process. Thus, refugees that could not speak English could not participate, and the researcher had to find participants to volunteer and translate the questionnaire in their native languages.
d) As this study was conducted in hot spots that are under the auspices of the Hellenic Ministry of Migration Policy, the questionnaires had to be checked from the ministry authorities. As a consequence, many questions regarding the challenges and cyber fraud have been removed from the final version of the questionnaire. That led to a diversification of the initial goal of the research that included an investigation on the challenges the refugees faced.

e) During the planning phase of this research, it was observed that many NGOs were negative in allowing the researcher to conduct interviews with refugees that were under their care. Their reason was typically the avoidance of information overload of the refugees.
f) As the demographic characteristics show, there was a limitation of female respondents. The researcher noticed an unwillingness of the women to participate.
g) Due to the nature of the study, the respondents had to sign an informed consent form in order to participate, and many of the respondents were not satisfied and happy with signing a form.
h) During the interviews, the participants referred with uncertainty to terms like Greek police, authorities, and asylum services as they were not sure if they could understand the differences.
i) The sample of the population is another issue to acknowledge as this study focused on a single geographical area, in two hot spots, with a sample of 61 participants, when Greece hosts more than 60.000 refugees. Thus, the quality of the gathered qualitative data can be subjective.
j) In general, during the illegal mobility, only estimations regarding the numbers can be given. As a result of the aforementioned, the findings from the research must be considered in the context of the limitations of this study.

6.2 Strong points

There are many things that contribute to the quality of this research and the findings. The size of the sample is significant. More specifically, to the knowledge of the author, there are not many publicised surveys that have been conducted in hot spots in Greece with such a remarkable number of participants. Gaining approval from the Hellenic Ministry of Migration Policy in order to visit hot spots and interview refugees is a complicated and time-consuming process. For this reason, some researchers have not succeeded to conduct their research.

Even though the internet and smartphones are important in a refugee's daily life, not a lot of focus has been given on how ICT helps refugees. However, the present research is heavily focused on this discipline and its reference disciplines, trying to enrich the field. Concurrently, the questionnaire of this project has been approved from the ethical committee of the University of Twente and the Hellenic Ministry of Migration Policy, as well as tested and enhanced by conducting pilot interviews before the main segment of the research. Finally, the nature of this qualitatively oriented research facilitates the retrieval of in-depth information on individual cases.

6.3 Future work recommendations

There are still several gaps in our knowledge around the ICT use by refugees, and the area would benefit from further research. Further empirical research might explore a more significant sample of refugees, immigrants and asylum seekers, more nationalities and could be conducted in more host countries. It would also be interesting to explore the migration flows and the use of technology out of the European and Mediterranean borders, such as in Latin and Central America, and compare the outputs.

Additional methodological work is needed on how subpopulations such as LGBTQIA+ refugees diverge from the standard use of technology for their settlement. It would also be benefitial to capture qualitatively the experiences of refugees that had negative experiences, since they may have faced challenges and fraud in regard to technology, during their journey. Although ICT can be considered useful for potential refugees to plan and execute their journey, sometimes fraud is being reported. However, the researcher was not able to capture data in this aspect due to the constraints from the Greek ministry.

6.3.1 A practical recommendation

Many different kinds of phone applications have been developed concerning the refugee crisis. Many of them aim to help the asylum seekers through every step of the asylum-seeking process, others to spread awareness about to the public, or to help them find their lost relatives. Some applications provide refugees with online courses to learn the native language of the host country. UNHCR launched an e-learning platform to bring training opportunities to staff members and partners worldwide, or applications that try to help refugees to find shelter and routes in Europe.

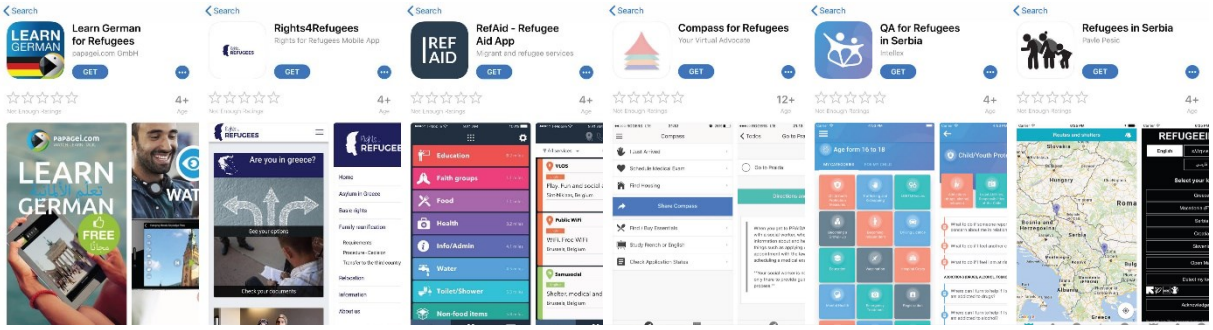

Figure 23. Sample of apps for refugees

According to the findings and the last research question of the study, the majority of the respondents agreed that they need a smartphone app, that will provide them with reliable legal and other essential information in order to inform refugees and newcomers on their rights in each European country but also in the transition countries like Turkey, Lebanon or Iran. A central app with all the useful information for asylum seekers, immigrants and refugees in different languages. According to the literature review, similar applications have already been developed but for specific countries. “QA for Refugees in Serbia” is a phone app that tries to find out answers to all the issues that refugees may have when they arrive in Serbia. Hellenic League for Human Rights created the application "Rights4Refugees" to provide reliable legal information to refugees who are in Greece. However, none of these apps refers to the digital forensics’ legislation.

Authorised institutions (NGOs, official authorities, specialists) are able to get reliable information about legal aspects regarding refugees, immigrants and asylum seekers. Their official websites are usually available in multiple languages and provide directions that may help by offering useful guidance.

Examples of sources where the refugees can find the respective information include portals from the immigration authorities and international organisations such as the UNHCR, the International Organization for Migration (IOM), Médecins sans Frontières and additional NGOs working in this field, national humanitarian organisations, such as the Red Cross and the International Justice Resource Center, among others.

For these reasons, the development of a phone app is suggested for future work, containing all the relevant legislation and laws regarding refugee rights.

6.3.1.1 Theoretical Framework

Design Science is the development, implementation, evaluation and adaption of artefacts for problem-solving and the design and construction of artefacts that have utility for mobile apps [62]. Design activities can be implemented to most applied disciplines, including law and human rights aspects, and are particularly relevant and necessary for the development of the current application that is safe, useful and effective for end-users [63]. A design science project iterates over the activities of designing and investigating and supports the creation of innovative artefacts to solve real-world problems. The design task itself is decomposed into three tasks, namely, problem investigation, treatment design, and treatment validation [64]. These three tasks are called the design cycle because researchers iterate over these tasks many times in a design science research project. The design cycle is part of a larger cycle, in which the result of the design cycle—a validated treatment—is transferred to the real world, used, and evaluated. This larger cycle is called the engineering cycle.

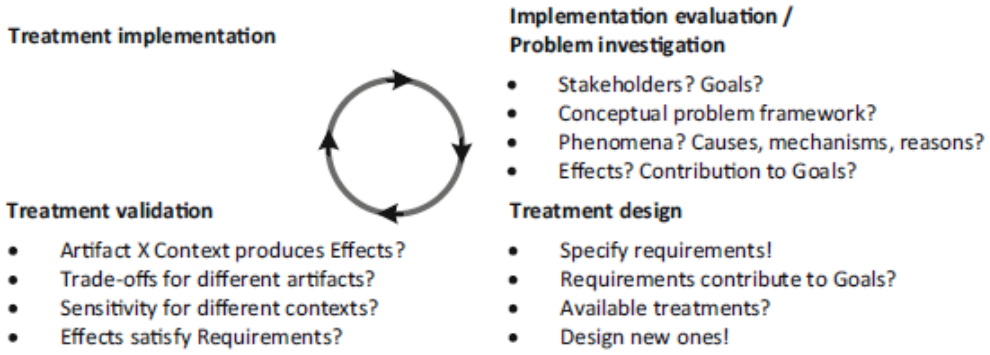

Figure 24. The engineering cycle

The Engineering Cycle can guide the current study activities, that is a rational problem-solving process with the structure in Figure 24. It consists of five tasks:

- Problem investigation: What phenomena must be improved? Why?
- Treatment design: Design one or more artefacts that could treat the problem.
- Treatment validation: Would these designs treat the problem?
- Treatment implementation: Treat the problem with one of the designed artefacts.
- Implementation evaluation: How successful has the treatment been? This may be the start of a new iteration through the engineering cycle.

Up to the extent of this research, the first two tasks are conceptualised.

6.3.1.2 Problem Investigation

In this task, the stakeholders and the goals of each stakeholder will be analysed. The stakeholders include any individual or groups of people that affect or are affected by the operation. The stakeholders related to the project can be categorised in internal and external stakeholders [64].

Internal stakeholders are directly involved in the operational process. On the other hand, external stakeholders are people or groups of people that are indirectly influenced by app development. The identified stakeholders are displayed in the figure below, a visual representation of Ian Alexander's onion diagram [65] that helps to visualize the relationship of the stakeholders to the project goal. The following stakeholders involved in the project are identified:

Internal Stakeholders:

1. **Refugees**, **immigrants** and **asylum seekers** are the individuals that the application will focus on. They are considered as internal stakeholders, impacted by the current development.
2. The **management team** plays a crucial role and includes all the administrators of the app. This project suggests NGOs which have specialized staff with legal backgrounds as admins, as well as national humanitarian organisations, such as the Red Cross. Ideally, these organisations will fund the project.
3. The **IT development team** can be seen as one of the most important stakeholders of the whole development and maintenance process. The team includes software engineers, system designers, programmers and operators that will be responsible for operating and updating the phone application work, and collecting, processing and setting up the whole data process.

External Stakeholders:

4. **Specialised Lawyers** working on this field will have an impact on the creation of the application, and they will have to keep up to date the laws and the legislation about refugee rights.
5. **Governments** are direct stakeholders since they are directly associated with the phenomenon. European governments, along with governments from transition countries, will be affected by the application. Policy makers will also be affected.
6. **International NGOs**, the European Council and Organizations are working in this field. UNHCR, IOM, National humanitarian organisations, such as the Red Cross, International

Justice Resource Centre, will be benefited by the application. This category includes all the organisations that are working with refugees and trying to help them.

7. **Authorities**, police, asylum services and borders guards are some of the stakeholders who are directly connected with the refugee crisis
8. **Global**. The application that this thesis provides has a globally beneficial effect. People worldwide will be informed about the refugee's legislation, and they will be aware of refugee's rights.

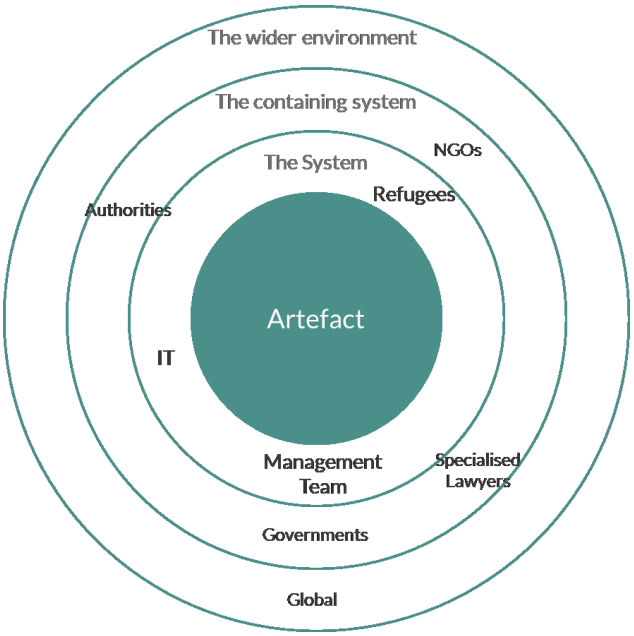

Figure 25. Ian Alexander's onion diagram

6.3.1.3 Goals and Desires

A stakeholder goal is a desire for the achievement of which the stakeholder has committed their time, money, or other resources. Stakeholders may have different levels of awareness of a problem and its possible treatments [64]. The stakeholders' goals of this study may vary and, in many cases, they will conflict. However, the prioritised goal is the desire of the refugees.

The table below summarises some of the possible stakeholders and their desired goals for the system, as they emerge from the literature review and the interviews.

Table 2. Stakeholder goals

Roles	*Desired Goals*
Refugee	Want to be informed about refugees' rights
Management team	Want a powerful administrative function
IT development team	Want usability, security and a system simple and easy to use
Specialised lawyer	Want a system where the content is easy to update
Governments	Want refugees to adhere to the law
International NGOs, European Council and Organizations working in this field	Want the app to be used and help refugees
Authorities	Want refugees to adhere to the laws
Global	Want an aware environment

6.3.1.4 Requirements

It is important before the design of the treatment starts to specify the desired requirements. The requirements should provide useful guidelines. The desirability of a requirement should be motivated in terms of stakeholder goals [64]. The table below shows the requirements derived from the stakeholder's goals.

Table 3. Requirements

Requirements	
R1	Verified by European Union
R2	Verified by specialised lawyers
R3	Installation is free of charge
R4	Use is free of charge
R5	Internet connection is needed only for downloading, not for use
R6	Accuracy
R7	Effectiveness
R8	Usability
R9	Information Security
R10	Should run in Android and IOS
R11	Provide information in different languages
R12	Context should be updated

6.3.1.4 Mobile app interface

For illustrating the user interface of the mobile application, the moqups.com website was used. It is an online design platform that helps users design the interface that shows how the app will look like when it is complete. The goal of this application is to provide refugees with all the useful information and everything they need to know when entering an EU or a transition country, in a simple and effective interface. The figure below presents a sample of the proposed application.

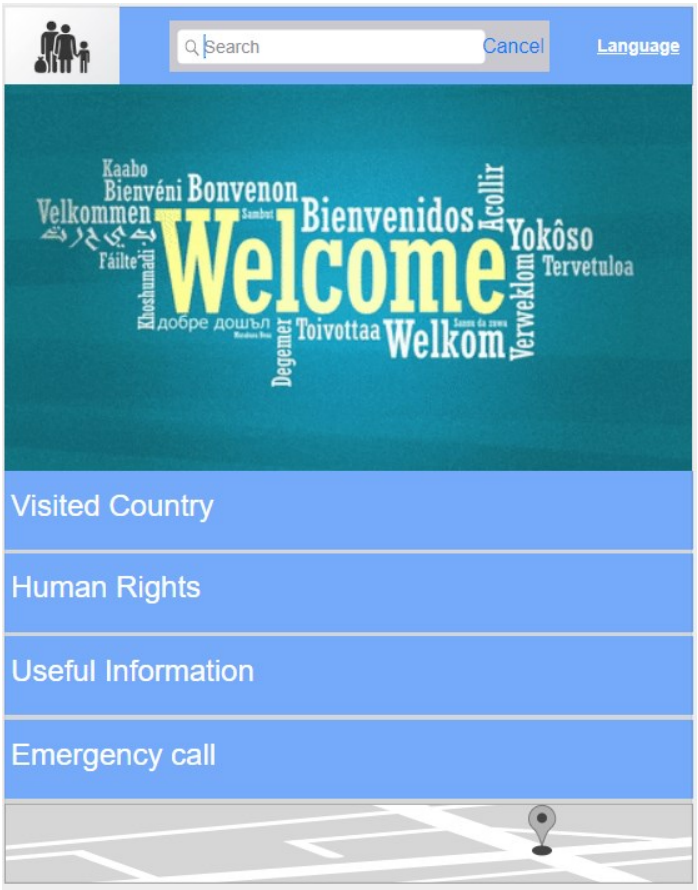

Figure 26. Proposed interface

On the top left corner of the home screen, there is the main button and the logo of the app. By clicking on it, the user can return to the home screen anytime. Next, to it, there is a search bar and the language button from where someone can choose their language of preference to use the app. Below this, the word "welcome" is displayed in many languages, for making the app friendlier to all the users.

The main body of the app consists of four tabs. The first one labelled as "Visited Country". The users can choose the country they want to learn about. Under the second tab "Human Rights", the users can read about their rights and their obligations when entering a specific country. The last two tabs contain useful information and all the emergency call numbers. There the users have the option to redirect to any other local app that contains information about refugees, asylum seekers and immigrants. Last but not least, at the bottom of the home screen, there is a map illustration. By clicking it, it redirects the users to Google Maps so that they can find their location at any moment during their journey.

7 References

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Appendix A

Interview questions

1. Please circle your age group: <18, 18-25, 26-35, 36-45, 46-55, 56-65, 66-75, 76<

2. Please choose your gender:
   Male ☐
   Female ☐
   Other ☐

3. What is your country of origin?.....

4. What is the highest level of education you have completed? Circle the correct answer.
   a) Did not attend school
   b) Less than a high school diploma
   c) High school degree or equivalent
   d) Bachelor's degree
   e) Master's degree
   f) Doctorate (e.g. PhD)
   g) Other: .....

5. Did the internet and social media play a core role in your decision to migrate?.....
   .....

6. How long have you lived in the host country (Greece)?.....

7. Did the internet affect your decision to choose the host country?
   .....
   .....

8. Did you also stay in other countries before you arrived in the host country? What was your travel route?
   .....
   .....

9. What types of transportation did you use?
   .....
   .....

10. Did you use the internet in your home country?
    YES ☐
    NO ☐

11. If **YES**, how much time did you spend on the internet approximately? Circle the correct answer.
    a) 0 – 5 hours a week
    b) 6 – 12 hours a week
    c) 13 – 20 hours a week
    d) 21 – 27 hours a week
    e) 28 – 35 hours a week
    f) 35 hours + a week

12. How would you rate your computer skills on a scale of 1 – 5 (with 1 being low and 5 being high): 1 2 3 4 5

13. What kind of digital devices do you own? Circle the correct answer(s).
    a) Feature phone
    b) Smartphone
    c) Laptop
    d) Desktop computer
    e) Powerbank
    f) Other: ……

14. Where did you find information about the host country (main sources of information)? Was this information trustworthy? Please fill the table.

Sources	Trustworthiness		
	Disagree	Neither agree or disagree	Agree
Newspaper/news	○	○	○
From relatives	○	○	○
From other migrants	○	○	○
On the internet	○	○	○
Other	○	○	○

The following questions are related to the internet use in the three phases of migration (before, during and after).

BEFORE

15. Did you use internet to plan your journey?
    YES ☐
    NO ☐

16. If **YES**, how did you plan your journey by using digital devices and applications (e.g. tickets, route etc.)?
    ……
    ……

17. If **NO**, how did you plan your journey?
    ……
    ……
    ……

DURING

18. **DURING** the journey what type of devices did you use (e.g. smartphone, laptop, powerbank etc.)?
    ……
    ……

19. **DURING** the journey what kind of apps did you use? (Google Maps, messenger etc.)?
    ……
    ……

20. Did you travel alone?
    YES ☐
    NO ☐

21. If **NO**, with how many people did you travel with?……

22. How many devices did you all have? ……

NOW

23. Did you buy a local SIM card in the host country?
    YES ☐
    NO ☐

24. Do you have access to the internet in the host country?
    YES ☐
    NO ☐

25. What do you use internet for (please tick all the relevant options)? Circle the correct answer(s).
    a) Communicating with friends back home
    b) Communicating with family back home

c) Visiting homeland websites (e.g.: newspapers)
d) Communicating with friends and people in the host country
e) Finding local information
What type?: ……
f) Entertainment
g) Communicating with the local authorities (e.g. NGOs, Governance, Police)
h) Other: ……

26. What applications do you use for communication? Circle the correct answer.
a) E-mail application (e.g.: Gmail, Yahoo mail)
b) Messenger
c) Facebook
d) Skype
e) WhatsApp
f) Viber
g) Websites
What type?: ……
h) Other: ……

27. Have you faced any problems by using these applications? (e.g. language):
……
……

28. For around how many hours a week are you accessing the internet in the host country? Circle the correct answer.
a) 0 – 5 hours a week
b) 6 – 12 hours a week
c) 13 – 20 hours a week
d) 21 – 27 hours a week
e) 28 – 35 hours a week
f) 35 hours + a week

29. If you don't use the internet, what prevents you from using it?
……
……
……

30. Do you trust the internet for your purchases, for communication and to make friends?:……
……

31. Are there any websites that are helpful for someone that plans to migrate?
YES ☐
NO ☐

32. Please list any useful websites you have used:
    .....
    .....
    .....

33. Are you aware about the new measures concerning refugee digital forensics?
    YES ☐
    NO ☐

34. If **YES**, where did you hear about these measurements?
    .....
    .....

35. If **YES**, did these measurements influence your choices?
    YES ☐
    NO ☐
    How?:.....

36. Did the authorities check your phone during and after the migration?
    YES ☐
    NO ☐

37. If **YES** from whom?.....

38. Is there something that people can do to make the process of migration better? (e.g.: an application, a forum to share your experiences)
    .....
    .....
    .....

39. Is there anything else you'd like to say about your use of the internet for helping you become settled in the host country?
    .....
    .....
    .....

Appendix B

Informed Consent

'I hereby declare that I have been informed in a manner which is clear to me about the nature and method of the research as described from the researcher. My questions have been answered to my satisfaction. I agree of my own free will to participate in this research.

I reserve the right to withdraw this consent without the need to give any reason and I am aware that I may withdraw from the experiment at any time. If the research results are to be used in scientific publications or made public in any other manner, then they will be made completely anonymous. My personal data will not be disclosed to third parties without my express permission.

If I request further information about the research, now or in the future, I may contact Agathi Merdi (a.merdi@student.utwente.nl).'

If you have any complaints about this research, please direct them to the secretary of the FACULTY OF BEHAVIOURAL, MANAGEMENT AND SOCIAL SCIENCES at the University of Twente, Prof.dr. M. Junger, telephone: [redacted] email: [redacted]

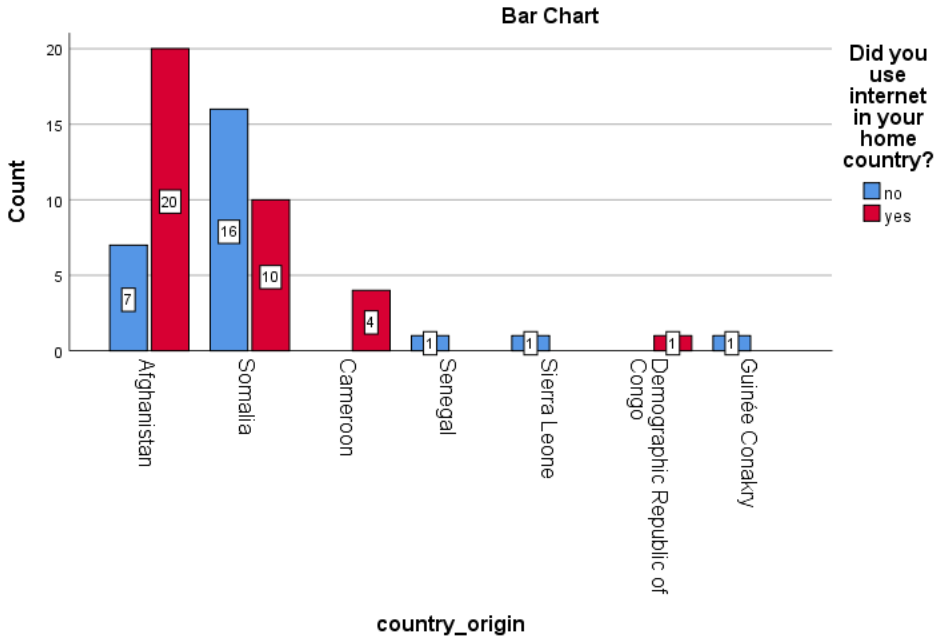
……
Signature

I have provided explanatory notes about the research. I declare myself willing to answer to the best of my ability any questions which may still arise about the research.

Agathi Merdi
University of Twente
a.merdi@student.utwente.nl

Appendix C

C.1 Country of origin-internet use



C.2 Use of internet in the home countries of the respondents

country_origin * internet_hc Did you use internet in your home country? Crosstabulation

			internet_hc Did you use internet in your home country?		
			no no	yes yes	Total
country_origin	1 Afghanistan	Count	7	20	27
		Expected Count	11.5	15.5	27.0
		% within country_origin	25.9%	74.1%	100.0%
	2 Somalia	Count	16	10	26
		Expected Count	11.1	14.9	26.0
		% within country_origin	61.5%	38.5%	100.0%
	3 Cameroon	Count	0	4	4
		Expected Count	1.7	2.3	4.0
		% within country_origin	0.0%	100.0%	100.0%
	4 Senegal	Count	1	0	1
		Expected Count	.4	.6	1.0
		% within country_origin	100.0%	0.0%	100.0%

	5 Sierra Leone	Count	1	0	1
		Expected Count	.4	.6	1.0
		% within country_origin	100.0%	0.0%	100.0%
	6 Demographic Republic of Congo	Count	0	1	1
		Expected Count	.4	.6	1.0
		% within country_origin	0.0%	100.0%	100.0%
	7 Guinée Conakry	Count	1	0	1
		Expected Count	.4	.6	1.0
		% within country_origin	100.0%	0.0%	100.0%
Total		Count	26	35	61
		Expected Count	26.0	35.0	61.0
		% within country_origin	42.6%	57.4%	100.0%

Chi-Square Tests

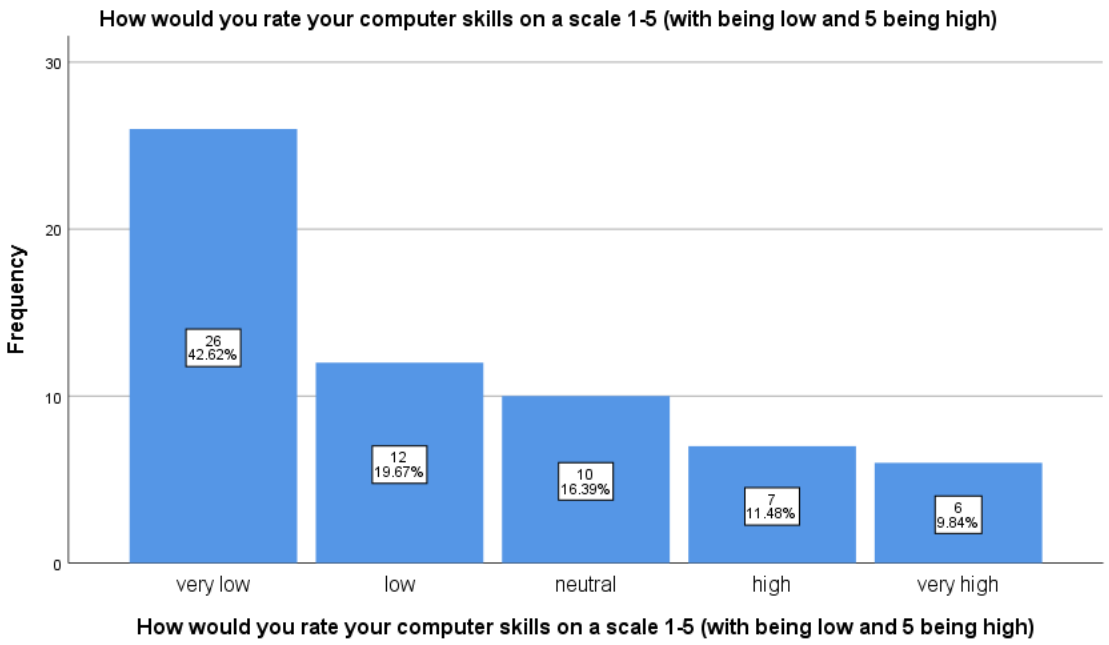
	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	14.635[a]	6	.023
Likelihood Ratio	17.682	6	.007
N of Valid Cases	61		

a. 10 cells (71.4%) have expected count less than 5. The minimum expected count is .43.

C.3 Computer Skills

computer_skills How would you rate your computer skills on a scale 1-5 (with being low and 5 being high)

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1 very low	26	42.6	42.6	42.6
	2 low	12	19.7	19.7	62.3
	3 neutral	10	16.4	16.4	78.7
	4 high	7	11.5	11.5	90.2
	5 very high	6	9.8	9.8	100.0
	Total	61	100.0	100.0	



C.4 Age-digital devices

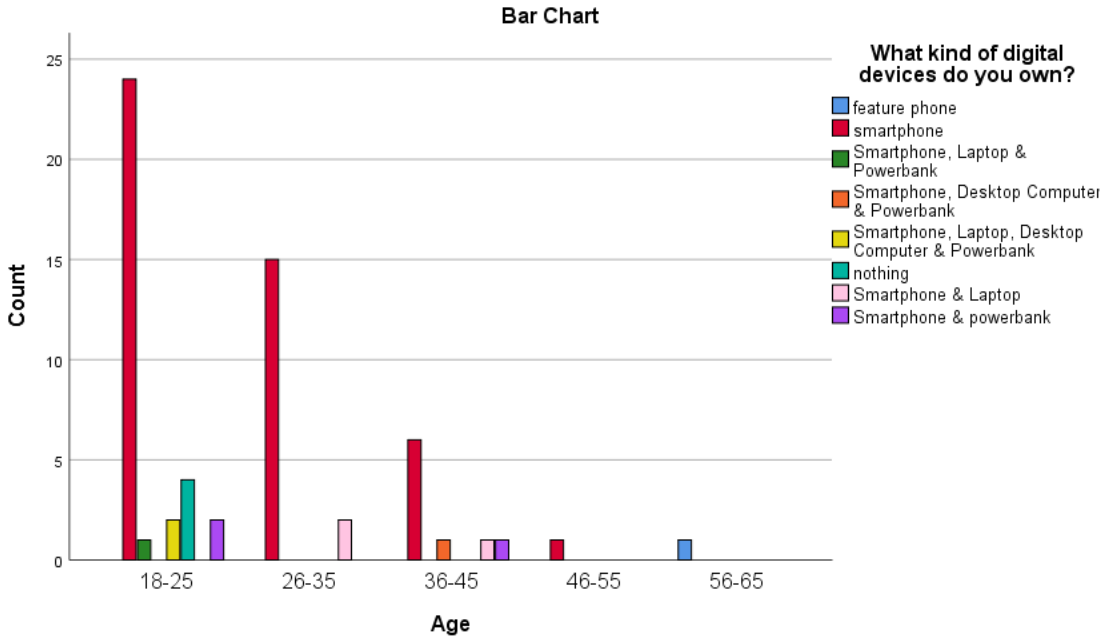
Age * digital_devices What kind of digital devices do you own? Crosstabulation

			digital_devices What kind of digital devices do you own?								
			1 feature phone	2 smartphone	7 Smartphone, Laptop & Powerbank	8 Smartphone, Desktop Computer & Powerbank	9 Smartphone, Laptop, Desktop Computer & Powerbank	10 nothing	11 Smartphone & Laptop	12 Smartphone & powerbank	Total
Age	2 18-25	Count	0	24	1	0	2	4	0	2	33
		Expected Count	.5	24.9	.5	.5	1.1	2.2	1.6	1.6	33.0
	3 26-35	Count	0	15	0	0	0	0	2	0	17
		Expected Count	.3	12.8	.3	.3	.6	1.1	.8	.8	17.0
	4 36-45	Count	0	6	0	1	0	0	1	1	9
		Expected Count	.1	6.8	.1	.1	.3	.6	.4	.4	9.0
	5 46-55	Count	0	1	0	0	0	0	0	0	1
		Expected Count	.0	.8	.0	.0	.0	.1	.0	.0	1.0
	6 56-65	Count	1	0	0	0	0	0	0	0	1
		Expected Count	.0	.8	.0	.0	.0	.1	.0	.0	1.0
Total		Count	1	46	1	1	2	4	3	3	61
		Expected Count	1.0	46.0	1.0	1.0	2.0	4.0	3.0	3.0	61.0

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	78.812[a]	28	.000
Likelihood Ratio	30.294	28	.349
Linear-by-Linear Association	.311	1	.577
N of Valid Cases	61		

a. 37 cells (92.5%) have expected count less than 5. The minimum expected count is .02.



C.5 Education level- Trustworthiness

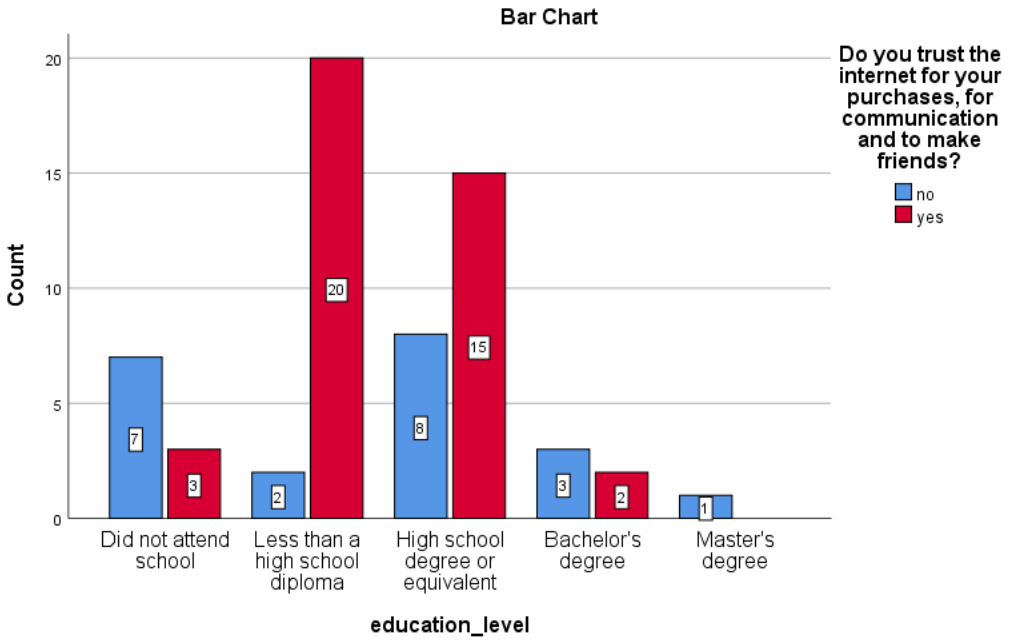
Case Processing Summary

	Cases					
	Valid		Missing		Total	
	N	Percent	N	Percent	N	Percent
education_level * internet_trust Do you trust the internet for your purchases, for communication and to make friends?	61	100.0%	0	0.0%	61	100.0%

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	15.216[a]	4	.004
Likelihood Ratio	16.475	4	.002
N of Valid Cases	61		

a. 5 cells (50.0%) have expected count less than 5. The minimum expected count is .34.



C.6 Country of Origin & Digital forensics

country_origin * digital_forensics_awareness Are you aware about the new measures concerning refugee digital forensics? Crosstabulation

			digital_forensics_awareness Are you aware about the new measures concerning refugee digital forensics?		
			no no	yes yes	Total
country_origin	1 Afganistan	Count	21	6	27
		Expected Count	15.9	11.1	27.0
	2 Somalia	Count	10	16	26
		Expected Count	15.3	10.7	26.0
	3 Cameroon	Count	4	0	4
		Expected Count	2.4	1.6	4.0
	4 Senegal	Count	0	1	1
		Expected Count	.6	.4	1.0
	5 Sierra Leone	Count	1	0	1
		Expected Count	.6	.4	1.0
	6 Demographic Republic of Congo	Count	0	1	1
		Expected Count	.6	.4	1.0
	7 Guinée Conakry	Count	0	1	1
		Expected Count	.6	.4	1.0
Total		Count	36	25	61
		Expected Count	36.0	25.0	61.0

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	16.263[a]	6	.012
Likelihood Ratio	19.319	6	.004
N of Valid Cases	61		

a. 10 cells (71.4%) have expected count less than 5. The minimum expected count is .41.