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Evaluation of willingness for sharing personal mobile data according to benefits

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by

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Abstract

Currently, we live in a pandemic context, caused by the SARS-CoV-2 virus. If technology was already part of the daily life of a large part of the population, in this context, it came to be accentuated and to identify itself as a possible tool to help control and combat this virus.

Mobile applications have been positioning themselves more sharply in the market and a range of them require the user to share their personal geolocation data. This type of personal data is associated with benefits and risks, and the motivation to share them in different areas of activity is an innovative investigation.

Being the objective of this research to evaluate the acceptance of sharing of personal geolocation data, according to benefits perceived by mobile application users; a qualitative study using multi-methods was designed to obtain more consistent results.

Initially, an exploratory study was conducted, and an online questionnaire was subsequently launched. The sample made it possible to analyse the responses of residents in Portugal.

Through the results of the research, we can conclude that the motivation to share personal geolocation data changed depending on the proposed area, and the health area was the one that was evaluated with greater willingness to share, followed by the transport area and leisure area. Additionally, when a specific benefit is proposed to the user, in all areas there is an increase in the willingness to share their personal geolocation data.

The current context of Covid-19 impacted the willingness to share, given that a significant part of the sample claims to have more desire to share geolocation data in the current context than before it.

Keywords: Personal mobile data; Geolocation; Willingness to share; Benefits Perceived; Covid-19 Context

Resumo

Atualmente vivemos num contexto de pandemia, causada pelo vírus SARS-CoV-2. Se a tecnologia já fazia parte do quotidiano de grande parte da população, neste contexto, veio a acentuar-se e, identificar-se como uma possível ferramenta de ajuda ao controlo e combate deste vírus.

As aplicações móveis têm vindo a posicionar-se mais acentuadamente no mercado e, um leque delas requerem que o usuário partilhe os seus dados pessoais de geolocalização. A este tipo de dados pessoais associam-se benefícios e riscos e, a motivação à partilha dos mesmos em diferentes áreas de atividade constitui uma investigação inovadora.

Sendo o objetivo desta investigação avaliar a aceitação de partilha de dados pessoais de geolocalização, de acordo com benefícios percebidos pelos utilizadores de aplicações móveis; foi desenhado um estudo qualitativo com recurso a multi-métodos para obter resultados mais consistentes.

Numa primeira instância foi realizado um estudo exploratório e, posteriormente lançado um questionário online. A amostra permitiu analisar as respostas de residentes em Portugal.

Através dos resultados da investigação podemos concluir que a motivação a partilhar dados pessoais de geolocalização alterou dependendo da área proposta, sendo que a área da saúde foi a que foi avaliada com maior predisposição à partilha, seguida da área de transportes e área de lazer. Adicionalmente, quando proposto um benefício específico ao usuário, todas as áreas contaram com uma maior predisposição à partilha.

O atual contexto de Covid-19 impactou a vontade de partilha dado que uma parte significativa da amostra afirma ter mais disposição em partilhar dados de geolocalização no atual contexto do que antes do mesmo.

Palavras-chave: Dados pessoais móveis; Geolocalização; Vontade de partilhar; Benefícios percebidos; Contexto Covid-19

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List of Abbreviations

`Applications´- Apps

`Directorate-General for Health ´ - DGS

`General Data Protection Regulation´ - GDPR

`Internet-of-Things´- IoT

`Location-Based Services´ - LBSs

`Null Hypothesis´- NH

`Statistical Package for Social Sciences´ - SPSS

1. Introduction

1.1.Problem Situation and Motivation

We live, indisputably, in a technological era. Advances in technology, make terms like “mobile devices” and “sharing personal data”, part of our day-to-day routine.

Due to technology, the firm´s tactics and strategies implementations changed and increased the ability to collect information about customers as well as supporting the development of relationships (Rust & Espinoza, 2006).

From the consumer perspective, the willingness of personal data sharing varies across industries (Milne & Boza, 1999). Because of that, different areas of activity (Health, Transports, Leisure, and Marketing) were considered to explore in this innovative research.

Personal data sharing aligns with perceived risks and benefits from the consumer's point of view. Perceived risks result from the possible negative outcome before a decision-making (Havlena & DeSarbo, 1991).

Regarding the benefits perceived, transpose a gap in the literature to the extent that there are no studies that analyse the motivation of sharing according to the benefits for mobile application users, in the current context lived. As the concept of personal data is very wide, a specific type, geolocation data, will be discussed and analysed in more detail.

In December of 2019, an epidemic of acute respiratory syndrome (Covid-19) emerged on the human scale, starting in Wuhan, China (Zhou et al., 2020). Covid-19 made an impact all over the world, causing a total of 805 647 cases and 16 389 deaths in Portugal, until March 1st , 2021 (DGS, 2021). Due to the state of

the pandemic, changes in attitudes and behaviours were accentuated, thus wanting to assess whether the motivation of users of mobile devices to the sharing of personal data was modified.

1.2.Research Definition

This study aims to evaluate the willingness for sharing personal mobile data according to benefits.

In sequence, the objective of the research is to answer the following research questions:

- Do mobile applications users share personal geolocation data?

- Do users of mobile applications, when sharing personal geolocation data, perceive benefits?

- Do users of mobile applications, when sharing personal geolocation data, perceive risks?

- Does the predisposition to share personal geolocation data vary according to the proposed area of activity?

- Are mobile app users more motivated to share personal geolocation data when a counterpart benefit is presented to them?

- Has the current context of Covid-19 changed the motivation for sharing personal geolocation data?

1.3.Methodology

The objectives were achieved through a qualitative research methodology, with exploratory nature. Two different methods were chosen, so this qualifies as

a multi-method qualitative study. The first method used to collect data was in-depth interviews and the second method was a questionnaire.

In-depth interviews collected data from a small sample (8 interviewees) whose aim was to draw conclusions about the direction of the investigation. The questionnaire collected information from a larger sample (305 respondents) and made it possible to answer the research questions more reliably.

Throughout this process three software programs were essential to analyse the data. NVivo and Microsoft Excel in the analysis of in-depth interviews, where NVivo allowed the analysis of qualitative data, and Excel allowed the analysis of quantitative responses drawn at scale. Lastly, the Statistical Package for the Social Sciences (SPSS), which, through descriptive statistics, facilitated the quantitative analysis of the questionnaire results.

1.4.Thesis Outline

The next, and second chapter, introduces the literature review. It is divided into three subchapters that introduce the main themes covered by the research. The first presents the technological era that we live in, as well as a generational context in relation to it. The second subchapter explores the sharing of personal data, emphasizing the theme of perceived benefits and risks, as well as focusing on geolocation data and its relationship with the areas under investigation. The last sub-chapter talks about the current context of Covid-19, as well as changes in behaviour and attitudes resulting from this situation.

The third chapter refers to the methodology and is divided into two main subchapters: Research Methodology and, Research Design and Data Analysis. The research methodology identified the nature of the investigation, as well as its strategy and methods. Research design and data analysis presented the plan

that made possible to answer the research questions, as well as the methods of analysis.

Following the methodology, forth chapter presents and analysis the results obtained in the two different methods chosen.

The last chapter refers to the discussion of the research objectives and research conclusion. In this chapter we can also find the limitations to the investigation as well as recommendations for future research.

2. Literature Review

2.1.Technological Era

We live in a technological era, where digitalization is felt all over the world.

The growth of technology has reinvented how research is done and, through this, new tools to analyse data have emerged since then (Rust & Espinoza, 2006).

Rust and Espinoza (2006) claim that aligned with the advancement of technology, companies have increased their capacity to collect information about customers and develop their relationships with them.

These new emerging capabilities have become crucial for companies to keep up with the markets in which they operate. As a result, companies process the addition, management, and treatment of customer data as an essential asset to have a competitive advantage (Hogan, Lemon & Rust, 2002).

Companies, through the use of information technologies, practice strategies not only market-centric but also customer-centric (Rust & Espinoza, 2006). Technological information also allows the customer an opportunity to personalize services, adapted to their dynamic needs (Vargo & Lusch, 2004).

However, it is believed that the digital environment is not perceived in the same way by different generations.

Kupperschmidt (2000) defines the term generation as being a group of people who share substantial life events at critical stages of development, derived from sharing birth years. Within the same line of reasoning, Wootton (1953) and Ryder (1965) claim that a generation is made up of a cohort of individuals who

have experienced the same historical events within the same period of time and space. Elements of the same generation share characteristics, such as values, preferences, attitudes, and behaviours, due to their experiences throughout life (Kupperschmidt, 2000).

Generations	Timeline
GIs	1901 -1924
Silents	1925 - 1945
Baby Boomers	1946 - 1964
Generation X	1965 - 1980
Generation Y / Millennials	1981 - 1996
Generation Z	1997 - 2010
Generation Alpha	2010 - 2025

Table 1: Timeline of generations according to the work of Strauss and Howe (1991); Howe and Strauss (2000); McCrindle and Wolfinger (2010)

When observing technology usage patterns, age tends to be one of the strongest variables for predicting consumers' technology usage behaviours (Jai & King, 2016).

At the beginning of the digital age, users were usually considered to be younger (Teo, 2001). Due to this, a stigma about the behaviour of older generations has emerged. However, older consumers are now digital users and behave similarly to some of the younger consumers (Teo, 2001). Since we live in societies characterized by an increasingly aging population, it is very important to also learn in detail the needs and demands of the human-machine interface in older adults (Ziefle & Bay, 2005).

Subsequently, the attitudes of consumers of different generations will later be reflected, since their impact is an important part of the research analysis. This

theme relates to the current context of a pandemic, where there is a need to explore technology and how it can be beneficial and inclusive to all generations (Sheerman, Marston, Musselwhite & Morgan, 2020).

Therefore, consumers' behaviours may be similar in the use of technology to help overcome the difficulties resulting from Covid-19.

One of the places where the advancement of technology is very accentuated is in mobile devices. They are present and rooted in the world population. As a result of this increase in mobile devices, the emergence of mobile applications (apps) has come to enhance this digital channel.

These software programs were developed to fulfil a particular purpose on a computer or mobile device (Wallace, Clark & White, 2012). Since then, there has been a significant expansion with the prospect of continuing to grow (Donker et al., 2013). Cousineau, Oakes and Johnson (2018) believe we are facing an "apps culture" that is growing in such a way that members will naturally and expectably join and where it is a matter of time before everyone is a user of this type of software.

An important theme that is interrelated here is the concept of Internet-of-Things (IoT), since mobile apps are apps that require the use of the internet, which allows for a possible exchange of information between who uses them and other devices.

A significant growth in IoT and apps is being seen in several domains, both of which are based on "predictive analytics using time series data collected from various types of sensors and wearable devices" (Belkhouja & Doppa, 2020).

The term IoT, is divided into two literal concepts, which are "internet" and, additionally, "things". Through the "internet", communication is made possible for a network of "things", relating to devices and physical objects (Khanna & Anand, 2016). This network collects, processes and analyses all the information that is obtained through the connection (Zeadally, Das & Sklavos, 2019). The main objective of IoT is to facilitate the automation of the connection and

information shared between devices (Alvarez Mendoza, Londoño Gomez & Leguizamón Páez, 2020).

2.2.Personal Data Sharing

2.2.1. Concept of personal data sharing

There are mobile applications that require the user to share their personal data.

Since personal data is very sensitive information, it is regulated in the European Union by the General Data Protection Regulation (GDPR).

According to GDPR, personal data is defined in article 4 paragraph 1 as "any information relating to an identified or identifiable natural person; an identifiable natural person is one who can be identified, directly or indirectly, in particular by reference to an identifier such as a name, an identification number, location data, an online identifier or to one or more factors specific to the physical, physiological, genetic, mental, economic, cultural or social identity of that natural person" (GDPR, 2016).

Additionally, paragraph 2 of article 4, describes that the processing of personal data represents, "any operation or set of operations which is performed on personal data or on sets of personal data, whether or not by automated means, such as collection, recording, organization, structuring, storage, adaptation or alteration, retrieval, consultation, use, disclosure by transmission, dissemination or otherwise making available, alignment or combination, restriction, erasure or destruction" (GDPR, 2016).

These definitions are seen as relevant as we will later analyse the willingness of mobile apps users to share personal data, as in regard to the software that will collect this information.

2.2.2. Consumer behaviour

Consumers when faced with the option of sharing their personal data have different behaviours. Bauer (1960) interrelated consumer behaviour with taking a risk. Consumer behaviour is paired with making a choice, the results of which will only be known in the future, so the consumer is obliged to deal with uncertainty or risk (Taylor, 1974). Therefore, the concept of sharing information has an intrinsic notion of "willingness to share" (Jarvenpaaa & Staplesb, 2000). And predictably, the perception of risk and the resulting willingness to share may vary between consumers.

2.2.3. Willingness to share

Faced with a decision to share personal data, the consumer makes mental trade-offs between perceived benefits and risks (Pentina, Zhang, Bata & Chen, 2016). Thus, the outcome of the decision depends on the balance of benefits versus concerns (Dinev & Hart, 2004).

Consumers being willing to share their personal data for benefits is an existing reality (Norberg, Horne & Horne, 2007).

The beneficiaries can not only be consumers but also other elements of society (Schudy & Utikal, 2017). Jarvenpaaa and Staplesb (2000), believe that providing information can be related to the organizational benefit but can also be related to personal benefit and self-esteem.

For these authors (Jarvenpaaa & Staplesb, 2000) the key is that consumers perceive information as being their own, which facilitates their willingness to share, as sharing positively reflects their identity and their own value. Derived from this line of thought, when consumers believe that the information belongs to the organization, there is less willingness to share (Jarvenpaaa & Staplesb, 2000).

A benefit that will be analysed in detail is a perceived counterpart, since a compensation in the form of a reward plays an active role in consumer behaviour towards data sharing (Park, Campbell & Kwak, 2012).

For many consumers, the fact that there is an immediate reward or gratification makes them more willing to provide their personal data (Acquisti, 2004; Acquisti & Grosslags, 2005).

Regarding perceived risks, consumers interpret them as facing a possible negative outcome (Schudy & Utikal, 2017). Milne, Pettinico, Hajjat and Markos (2016), suggested four core risks that are more common between consumers categorizing them as: monetary, psychological, physical, and social. The more sensitive the information shared; the more risks will naturally be perceived.

2.2.4. Privacy

Aligned with the risks perceived is the concept of privacy since the data provides sensitive information about the consumer and his private sphere. Andrade (2011), states that privacy happens when there is a protection of third-party personal data. And the perception of privacy varies not only between populations but even within specific segments (Nowak and Phelps 1992).

Studies have found that younger digital users are more likely to share their personal data (Taraszow, Aristodemou, Shitta, Laouris & Arsoy, 2010) rather

than older adults. With regard to gender, women were more concerned with privacy than men (Sheehan & Hoy, 1999).

For data protection, privacy policies are developed in order to ensure that the legislation is being complied with (Nichols Hess, LaPorte-Fiori & Engwall, 2015), and so that consumers feel more protected.

It exists a dichotomy between the statements of concern regarding privacy and the disclosure of data and the actual sharing behaviour, dubbed as the "Privacy Paradox" (Norberg, Horne & Horne, 2007).

There are several factors that act in this discrepancy experienced in the "Privacy Paradox" (Aguirre, Roggeveen, Grewal & Wetzels, 2016; Norberg, Horne & Horne, 2007). However, Schudy & Utikal (2017), believe that very little is known about the factors that shape the willingness to share personal data.

To achieve the objectives of this study, the focus is not just only on the factors that influence or not consumers to share personal data, but also their predisposition to share personal data in different areas of activity and, whether a reward makes the same motivation change or not.

As the motivation to share personal data varies according to the context experienced, different areas of activity should suggest different types of consumer behaviour and of willingness to share personal data.

The different activities chosen from the many sectors were the health, transport, leisure, and marketing.

2.2.5. Geolocation data

Nowadays, more and more mobile devices are equipped to perceive the geolocation of users through mobile apps. The tools to predict location are built-in characteristics of mobile devices (Li, Byung Hyung Kim & Mourikis, 2013).

Thus, mobile apps are able to determine the location of users and provide geolocation services, known as Location-Based Services (LBSs) (Boutet & Cunche, 2021). These services, as they depend on the user's current location, provide contextual and personalized information (Boutet & Cunche, 2021). The geolocation data reveals a type of sensitive information and, therefore, is very connected to privacy concerns (Stephanie, Chamikara, Khalil & Atiquzzaman, 2021).

There are two ways to obtain geolocation on mobile devices: either via GPS or via accesses facilitated by the surrounding network, such as via Wi-Fi (Boutet & Cunche, 2021). When geolocation is network-based, there is an interaction with a location placement that will resolve a list of Wi-Fi access points visible in a position (Boutet & Cunche, 2021).

In the current context of Covid-19 (which will be further explored in the next subchapter), several countries have adopted measures to control and combat the pandemic through monitoring by geolocation data, obtained by mobile apps (Barriga, Martins, Simões & Faustino, 2020).

As such, several organizations are now developing apps that specifically help to control this pandemic and make better use of it at this stage (Barriga, Martins, Simões & Faustino, 2020).

This specific type of personal data is used in different areas of activity, including health, transports, leisure and marketing.

As the perception of willingness to share combined with perceived benefits is innovative, there is not much literature to complement this theme. However, contextualization will be done using examples of mobile apps within each activity that ask the user to share their geolocation data.

2.2.5.1. Geolocation in Health

The interconnection between health and consumer mobility is being revolutionary, as through mobile devices, minute details can be analysed (Hardy et al., 2018). With the current pandemic context, there is an increase in mobile health apps, however, there are several obstacles that potentiate that there is no mass adoption, among them their design, usability, functionality and security features (Chidambaram, Erridge, Kinross & Purkayastha, 2020).

Through the collection and analysis of this personal data, there was a strengthening of concerns regarding the balance of freedom and, security and privacy (Büscher, Perng & Liegl, 2014).

In Portugal an application has been launched to track the infection, named "Stayaway Covid". General Health Directorate of Portugal (DGS) characterizes this application as being a quick and anonymous way to verify if the users of the app have been in the last 14 days in the same place as someone infected by Covid-19 (DGS, 2021). This application has generated much controversy derived from the fear of sharing sensitive data with the state. However, as of September 20, 2020 it had more than 1 million downloads (and was released on September 1, 2020) (DGS, 2020).

2.2.5.2. Geolocation in Transports

The sharing of geolocation data already has a relationship with the transport sector and this data is a source of information about their behaviour (Ribeiro, Fontes, Soares & Borges, 2020).

Usually, this information is used for the analysis of routes, vehicles and drivers (Ribeiro, Fontes, Soares & Borges, 2020).

One example that uses this type of data for better public transport upgrades during the pandemic season is through Google maps. That's one of the reasons Google has launched a new Maps tool to help you assess in real time how crowded your train and bus are. Through a tool of this application, it is possible to see in real time the occupation of public transport such as buses and trains. This is possible derived from counting the phones with the app at the precise moment. However, this tool is not available worldwide yet (and Portugal still can't access this option).

2.2.5.3. Geolocation in Leisure

As there is no concrete definition for the leisure area, activities such as trips to catering establishments, to commerce stores, culture establishments and hotels were considered for this study.

All these sectors have been highly pre-jewish by the pandemic as people cannot enjoy them in the same way. Therefore, a study of the motivation for the sharing of personal data was determined to evaluate the willingness of consumers.

2.2.5.4. Geolocation in Marketing

As for this topic, there is a gap in the literature regarding the sharing predisposition only for the marketing area. However, this area was mentioned in a promotional point of view, and, as the interviewees felt about sharing personal geolocation data for this purpose.

Subsequently, this area was excluded from the analysis and in the exploratory interviews the results were not favorable to its investigation.

2.3.Covid-19

We belong to a global community, where repercussions are impactful due to a major event elsewhere (Bobdey & Ray, 2020). In this case, the major event started in Wuhan, China, and has spread to the rest of the world.

A pandemic state has been reached, due to a respiratory disease caused by the new coronavirus (SARS-CoV-2), Covid-19 (Butler & Barrientos, 2020). The official name, Covid-19, was given by the World Health Organization (WHO) on February 12, 2020 (World Health Organization, 2020).

According to an official public dataset provided by DGS as of March 1st, 2021, a total of 805 647 confirmed cases of Covid-19 were recorded, and a total of 16 389 died (DGS, 2021).

Significant consequences for the world economy are being felt and the whole of society is being affected, which will lead to future changes in how companies operate and in how consumers behave (Donthu & Gustafsson, 2020).

According to Sheth (2020), "the lockdown and social distancing to combat the Covid-19 virus has generated significant disruptions on consumer behaviour."

With the greater amount of time spent at home, to protect against this virus, the adoption of digital technology has increased in order to facilitate working, studying, and consumption in a more convenient way (Sheth, 2020).

With the increase of the use of technology, there may be a change in attitudes and motivations in relation to the sharing of personal data, allied to this specific context.

In addition, the growth of the use of technology, which emerged as a way that helps in the fight against Covid-19, more specifically through the collection of personal geolocation data through IoT devices (Allam & Jones, 2020). Budd et al. (2020) explain that the use of location data regards mainly to a public-health need for interruption of community transmission.

Pineda and Corburn (2020) believe that to achieve healthier cities, more information should be made public in order to contribute to smart cities. Where these devices can monitor individuals and because of that control, their movement is limited and helps to reduce infectious diseases like the one we are living (Min-Allah & Alrashed, 2020).

3. Methodology

3.1.Research Methodology

The process of collecting, analysing, and interpreting data in order to comprehend a phenomenon is called research (Leedy & Ormrod, 2001). The aim of this research is to analyse whether users of mobile apps perceive, or not, benefits in sharing personal data.

This study is innovative, and complex derived from its specificities and context, therefore, there is not much information about it.

Qualitative research methodology is considered to be suitable when the researcher or the investigator either investigates a new field of study or intends to ascertain and theorize prominent issues (Creswell, 2007).

A multi-method qualitative study was chosen, combining two different methods, among which: in-depth interviews and, a questionnaire that was firstly pilot studied.

Through the use of multiple methods, it's more likely to overcome weaknesses associated with using only a single or mono method, as well as providing scope for a richer approach to data collection, analysis and interpretation (Bryman 2006).

The in-depth interviews, case study strategy, were the foundation to determine which areas of study to deepen and which are the most perceptible benefits and risks of personal data sharing. They also served to confirm that there was an interest in analysing consumer motivation before and after Covid-19.

A pilot study is sometimes conducted first to pre-test a particular research instrument (Baker, 1994). In this case, to test if the questionnaire was valid and prepared to be sent to a wider sample.

For the questionnaire, survey research strategy, the data collected was analysed quantitatively using descriptive statistics.

3.2.Research Design and Data Analysis

3.2.1. In-depth interviews

The primary instrument of data collection used was in-depth interviews. Through this exploratory study of qualitative nature, information was collected from 8 interviewees. In a general study, it is expected to perform between 5 and 30 interviews (Creswell, 2013).

The most common method for collecting a sample in a qualitative study is by purposeful sampling, since the objective of the study is to obtain information from a specific subject using elements that can justify it (Onwuegbuzie & Leech, 2007). Because of that, 8 interviewees were chosen so that each generation intended for analysis was represented in the same way, in this case, each generation represented 25% of the sample.

The interviews were conducted through videoconference to residents in Portugal and took between 17 to 30 minutes. These interviews tend to take longer to allow respondents to freely express their experiences (Granot, Brashear & Cesar Motta, 2012). Through the use of open-ended questions, participants are allowed to follow their own line of thought and are freer to share in more detail (Granot, Brashear & Cesar Motta, 2012).

The interviews followed a list of questions and, therefore, their structure is present in *appendix I*. This structure is divided into 5 parts.

The first step was to draw conclusions about the demographics of the interviewees, possible through questions 1, 2 and 3.

Then, to make sure that the sample was within the theme under study, questions 4 and 5 were asked.

The third part of the interview aimed to assess the perceived benefits and risks associated with sharing geolocation data, enabled by questions 5 and 6. Through these questions, keywords were identified and later then was created a list of benefits and risks to put in the questionnaire as a list question instead of an open question, to increase the viability of the study.

The fourth part consists of the use of rating scale questions (questions 7 and 9) to assess likelihood in view of the sharing willingness in different areas and when a person is presented with a counterpart, whether the motivation changes or not.

The last part, to evaluate whether the motivation was the same before and, after the current situation of Covid-19, through question 8.

To further analyse the data collected, the interviews were transcribed, and two different software programs were used to analyse the results.

On the one hand, a spreadsheet software, Microsoft Excel. Microsoft Excel mostly allowed to quantify scale questions.

On the other hand, a software program named NVivo. NVivo is usually used to analyse qualitative data. With the help of this tool, the rigor of a qualitative study can be increased (Onwuegbuzie & Leech, 2007). This program made it possible to account for and analyse keywords spoken during the interviews. Thus, generating codes covering keywords related to the same topic.

3.2.2. Questionnaire and Pilot Study

The data collection instrument used after the interviews was a questionnaire. This questionnaire was formulated as an online survey. As an advantage of this method, it can be highlighted that through the internet, interviewers can reach a wider group of individuals, that could be seemed as difficult, if not impossible, to reach through other channels (Garton, Haythornthwaite & Wellman, 2006).

The questionnaire was structured into 5 parts, and its structure is present in the appendix II. Before each part, a brief explanation of the concepts was presented to contextualize who was filling out the questionnaire (information also present in appendix II).

The first part, including questions 1 to 3, were meant to assess the sample's demographic characteristics.

The second, from question 4 to 7, presents 2 different types of questions. Question 4 and 5 are dichotomous questions, in order to take conclusions whether the interviewee had any mobile devices and if they would share personal geolocation data or not. Question 6 and 7 are list questions, to assess what the most perceived benefits and risks of personal data sharing are.

The third and fourth part are related to question 8 and 9, where rating scale questions are asked to analyse the interviewee's motivation regarding the three chosen areas before and after a benefit has been associated respectively. Here the type of question was to assess the willingness to provide information was made on a scale based on the work of Milne, Pettinico, Hajjat and Markos (2016).

Lastly, the fifth part, that is related to question 10, which aims to understand whether there is a change in motivation or not related to the current context of Covid-19.

When the questionnaire was prepared, a pilot study was conducted to test its reliability. The sample of the pre-test included 20 interviewees and it served to

realize that the interviewees were not having doubts or hesitating while answering the questionnaire.

The questionnaire counted a total of 320 responses, 15 of which were not considered due to not meeting the necessary requirements.

To evaluate the answers, the specialist software used was Statistical Package for Social Sciences (SPSS). SPSS allowed to summarize the findings and, to quantify the results.

As the main objective of the investigation, is to measure the acceptance of the sharing of personal data according to the benefits for users of mobile apps and, since the corresponding questions were evaluated on a scale, a test of their reliability was conducted to measure internal consistency. To measure internal consistency, the most common way to test is to analyse the Cronbach's alpha coefficient. (Taherdoost, 2016). When this coefficient was measured, it revealed a value of 0.714. This result is characterized by having a high reliability since its value is between 0.70 and 0.90, according to Hinton et al. (2004).

After determining the Cronbach's alpha coefficient, the normality of the distribution was calculated to understand what kind of tests could be performed afterwards: parametric or non-parametric. The normality of the distributions was assessed by the Shapiro-Wilk test. The values obtained concluded that the study population does not follow a normal distribution.

Because the distribution is not normal, non-parametric tests were performed to assess the hypotheses. These tests tend to have a higher statistical power when the distribution is thus characterized (Nahm, 2016).

Subsequently, it was necessary to analyze the impact of the 2 independent variables that express the demographic data, which are constituted by the gender of the respondents and their generation. The responses corresponding to gender were only 2, so the test applied to measure the impact was the Mann-Whitney test. Since they constitute two independent samples to analyse (Hart, 2001).

As the responses to the generation varied in 4 possible responses, a Kruskal-Wallis H test was applied. This test is applied when there are 3 or more independent samples (Nahm, 2016).

4. Results

This chapter aims to present and analyse the results obtained through the chosen research methods. Thus, there will be a subchapter referring to the in-depth interviews and, another one referring to the questionnaire since the way of analysing differs between the two methods.

On one hand, in the analysis of in-depth interviews, since deals with qualitative data analysis, the use of NVivo software allowed the development of codes that covered keywords of the same theme. Thus, in each variable under study, answers were grouped into categories. Accordingly, it allowed counting the number of references made in each category of code created. To add value to the analysis, Microsoft Excel was also used to analyse responses at scale by calculating the media.

On the other hand, in the questionnaire the analysis was possible using SPSS software tools, through the creation of descriptive statistics and non-parametric tests to obtain consistent information from a large sample.

4.1.In-depth interviews Results

This exploratory study had 8 interviewees, where half of the sample is female and the other half male.

Being resident in Portugal and, that the sample had representative elements of each of the generations intended for analysis, constituted the criteria of choice for the interviewees. According to Table 1, there are seven different generations and, this study intended representativeness of 4 of them (shown at Table 2).

As the aim of the study is to draw conclusions about the population that uses mobile apps that require sharing of geolocation data, the GIs and Silents generations were not considered as central to representativeness in the interviews due to the older age of the elements and, as they probably would not be so within the theme.

As for the alpha generation, it was not considered due to all the elements being minors and did not belong to the intended sample of the population. Since the sharing of personal data is a piece of sensitive and regulated information.

Interviewees	**Gender**	**Age**	**Generation**	**City of Residence**
1	Female	74	Baby Boomers (1946-1964)	Portugal
2	Female	70		
3	Female	55	Generation X (1965-1980)	
4	Male	50		
5	Male	36	Generation Y (1981-1996)	
6	Female	27		
7	Male	24	Generation Z (1997-2010)	
8	Male	19		

Table 2: Demographic profile of interviewees

First, it was intended to assess whether the interviewees were mobile users and if they used mobile apps that require the sharing of geolocation data. As we can see in Table 3 and Table 4, all respondents answered that are mobile device users and use the apps described in advance. For example, interviewee 1 stated that has a "smartphone to be able to communicate more efficiently" with her family and "whenever I go out alone, I share my location with them through

WhatsApp" and interviewee 8 responded that he uses "different mobile devices depending on the situation " and that uses “many apps that ask me for my location but the one I enjoy most is Uber to move me when I don't feel like driving.”

Variable	Code	References
Mobile Devices Usage	User of mobile devices	8
	Non-user of mobile devices	0

Table 3: Variable `Mobile Devices Usage´ answers

Variable	Code	References
Mobile Apps that require sharing geolocation data	User of this type of mobile apps	8
	Non-user of this type of mobile apps	0

Table 4: Variable `Mobile Apps that require sharing geolocation data´ answers

When asked about benefits and risks associated with the sharing of personal geolocation data, the interviewees answered according to Table 5 and 6.

Focusing first on perceived benefits, there was a high level of agreement among respondents. When analysing the answers to this question, 5 codes that identify specific benefits were created.

The first code to be generated was "use of the service" with 87.5% of the sample mentioning this topic. Examples include respondent responses 3 and 4 respectively, in which they state, "primarily the biggest benefit is being able to use the app I want" and "if I can only use the app if I share my data, then I share".

The second code refers to "speed and efficiency in the experiment", with 75% of the sample touching this point. Interviewee 6 mentions that "when I share my geolocation data, I feel that everything is faster and more effective because I give the app the information that allows them to know more about me".

The third code is related to the customization of the service, also with 75% of the sample to agree on this benefit. Interviewees 3, 5, 6, 7 and 8 even use the expression "customized service" while interviewee 4 mentions that "the experience is done in a way more adapted to me".

The fourth code is “location information near me”, this benefit was reported by half of the sample and, whenever referenced, it was using examples of apps. The apps that illustrated this benefit were Too Good to Go and Google Maps.

The last benefit perceived was “convenience”, by 37,5% of the sample. Interviewee 3 stated that "I like being in the comfort of my home and being able to enjoy certain apps that ask me for my geolocation".

Variable	Code	References
Perceived Benefits	Use the service	7
	Speed and effectiveness in experience	6
	Personalized Service	6
	Location information near me	4
	Convenience	3

Table 5: Variable `Perceived Benefits´ answers

Moving on to the perceived risks, 4 codes were created.

The codes "fraud" and that "data were used for other purposes" were reported by 87.5% of the sample. In the first code mentioned, the associated keywords were “fraud” (interviewees 3, 5, 7), “swindling” (interviewees 2, 6, 8)

and “deception” (interviewee 1). For the second code, we have the example of interviewee 6 who says, “they can save my data to do other things”, or the example of interviewee 8 “I am afraid they can use my location for another purpose”.

The fourth and fifth codes formed, account for 62.5% and 37.5% of the sample, respectively. The fourth code is related to “control by other companies”, where we have interviewee 4 referring to “I am afraid that my information will be made available to other companies”. The fifth and last code refers to “control by the state”. Interviewee 5 mentions “I am afraid that we are living in a kind of government Big Brother, where they watch and control us”.

Variable	Code	References
Perceived Risks	Fraud	7
	Data used for other purposes	7
	Control by other companies	5
	Government control	4

Table 6: Variable `Perceived Risks´ answers

Questions 7 and 8 were obtained using Microsoft Excel software, which quantified the responses given from 1 to 5 by the interviewees.

It was thus possible to analyse a predisposition to share personal geolocation data before and after an associated benefit. In all areas except marketing (where no difference was shown), there was an increase in the desire to share. The increase was more accentuated in the health area (30%) followed by the leisure area (20%) and, finally, the transports area (10%). These answers were presented through the calculation of their means and, later, the calculation of the percentage difference between the mean of question 7 and 8.

Areas	Question 7 Mean	Question 8 Mean	Difference Between 7 and 8
Health	3	4,5	30%
Transports	4	4,5	10%
Leisure	4	5	20%
Marketing	1,5	1,5	0

Table 7: Variables `Willingness to share personal geolocation data before and after a benefit was presented´ answers

Lastly, when asked if respondents were more willing to share their personal geolocation data before or, in the current context of Covid-19, 75% said currently and 25% said before.

Variable	Code	References
Willingness to share according to the current context	Before Covid-19	2
	Currently	6

Table 8: Variable `Willingness to share according to the current context´ answers

4.2.Questionnaire Results

The questionnaire obtained 320 responses of which 305 were considered valid for meeting the desired requirements.

A requirement that gave rise to the exclusion of responses was the country of residence, and it is intended to analyse data from residents in Portugal to obtain more significant results (derived from the current context of Covid-19).

Of these 305 respondents, 176 are women and 129 men. As for their age, they are divided by generation and there are 75 elements belonging to generation Z; 97 elements belonging to generation Y; 79 elements belonging to generation X; and 54 elements belonging to the Baby Boomers generation. Table 9 shows the demographic information of questionnaire respondents.

	Frequency	**Valid Percent (%)**
Gender		
Female	176	57,7
Male	129	42,3
Total	305	100
Generation		
Gen Z	75	24,6
Gen Y	97	31,8
Gen X	79	25,9
Baby Boomers	54	17,7
Total	305	100
City of Residence		
Portugal	305	100
Total	305	100

Table 9: Demographic profile of questionnaire respondents

Subsequently, Table 10, allows analysing the frequency of responses to questions 4 and 5. Where we can see that the total number of respondents claims

to use mobile devices, and additionally verify that only 4.9% of the sample does not usually install applications that request the use of data geolocation data.

	Frequency	Valid Percent (%)
Mobile devices usage		
Yes	305	100
No	0	0
Total	305	100
Apps that require sharing geolocation data		
Yes	290	95,1
No	15	4,9
Total	305	100

Table 10: Frequency of variables "Mobile Devices usage" and "Mobile Apps that require sharing geolocation data"

The data of the list questions 6 and 7, was described through a multiple answer analysis, due to the fact that the interviewees could choose more than one option. Table 11 expresses the frequencies of responses to this topic and, it sharply shows that there are more people mentioning benefits than risks. The "none" benefit is the only answer written in the "other" field that was available in both question 6 and question 7. The perceived benefits and risks are placed from the most mentioned to the least.

		Responses	
		N	**Percent**
Perceived Benefits	Use the Service	239	34,1
	Location near	158	22,6
	Speed and Effectiveness in experience	130	18,6
	Service Customization	109	15,6
	Convenience	63	9
	None	1	0,1
	Total	700	100
		Responses	
		N	**Percent**
Perceived Risks	Data used for other purposes	266	45,8
	Fraud	151	26
	Control by other Companies	111	19,1
	Government Control	53	9,1
	Total	581	100

Table 11: Multiple Answers Analysis of Perceived Benefits and Risks

As for questions 8 and 9, a ranking of areas was built before and after the benefit presented, using their means since the answers were obtained on a scale. There was an overall increase in all averages of each area. And as we can see in Table 12, the health area is characterized by obtaining the greatest willingness to share personal geolocation data from the questionnaire respondents before and after the benefit associated; followed by the transport area in second place, both before and after the benefit associated; and lastly, the leisure area that expresses a third place before and after the presented benefit.

	Rating	Mean
Health	1	3,97
Transports	2	3,83
Leisure	3	3,16

	Rating	Mean
Health Plus Benefit	1	4,17
Transports Plus Benefit	2	4,09
Leisure Plus Benefit	3	3,87

Table 12: Rating of the `Willingness to share personal geolocation data before and after a benefit was presented´

Finally, the last question was answered with a frequency of 201 respondents (65.9%) stating that interviewees feel more motivated after the start of the pandemic to share geolocation data and, 104 stating that there is no greater motivation in this context.

4.2.1. Impact of gender

Several Mann-Whitney U tests were carried out to assess the gender impact during the questionnaire. A significance level of 0,05 was defined as well as 95% of confidence interval.

Starting by assessing the impact of gender on the distribution of the variable `Mobile apps that require sharing geolocation data´, expressed in Table 13, we can analyse that the distribution is the same across categories of gender. In other words, there is no reason to say that there is a gender impact on this question.

Null Hypothesis (NH)	Mann-Whitney U test		
	Sig	U	Decision
The distribution of "Mobile apps that require sharing geolocation data" is the same across categories of Gender	0,219	10994,500	Retain NH

Table 13: Gender impact on the distribution of the variable `Mobile apps that require sharing geolocation data´

After this analysis, another Mann-Whitney U test was carried out to access the gender impact in relation to the perceived benefits and risks.

In the perceived benefits variable, only 2 benefits demonstrated an impact on the part of the gender. The distribution of `use of the service´ and` speed and effectiveness of the experience´ was not the same across categories of gender. In both benefits, the feminine population considered these (benefits) to have more weight than the masculine sample. That is, women showed more tendency to choose this benefit than men.

In the variable perceived risks, all distributions of different risks behaved is the same across categories of gender. In other words, no gender impact has been noticed. Both genders reacted similarly to all the risks presented.

	Null Hypothesis	Mann-Whitney U test		
		Sig	U	Decision
Perceived Benefits	The distribution of "Use the Service" is the same across categories of Gender	0,012	9992.500	**Reject NH**
	The distribution of "Speed and Effectiveness in experience" is the same across categories of Gender	0,005	9519.500	**Reject NH**
	The distribution of "Service Customization" is the same across categories of Gender	0,790	11520.000	Retain NH
	The distribution of "Location near" is the same across categories of Gender	0,264	12088.000	
	The distribution of "Convenience" is the same across categories of Gender	0,213	10688.000	
	The distribution of "None" is the same across categories of Gender	0,243	11264.000	
		Mann-Whitney U test		
		Sig	**U**	**Decision**
Perceived Risks	The distribution of "Fraud" is the same across categories of Gender	0,507	11789.000	Retain NH
	The distribution of "Data used for other purposes" is the same across categories of Gender	0,604	11124.000	
	The distribution of "Control by other Companies" is the same across categories of Gender	0,463	10886.500	
	The distribution of "Government Control" is the same across categories of Gender	0,162	10653.000	

Table 14: Gender impact on the distribution of the variables `Perceived Benefits´ and `Perceived Risks´

Moving on to the variables that express the likelihood of willingness to share in different areas before and after a presented benefit, Table 15 demonstrates that only in the distribution of the `Transport´ variable is there an impact on the part of the gender. In this variable, women, on average, are considered to have more desire to share personal data mobile geolocation than men.

In the remaining other areas, it can be proven that gender had no impact on the willingness to share personal data of geolocation.

Willingness to share in different areas before and after a benefit was presented

Null Hypothesis	Mann-Whitney U test		
	Sig	**U**	**Decision**
The distribution of "Health" is the same across categories of Gender	0,160	10345,000	Retain NH
The distribution of "Health associated to a benefit" is the same across categories of Gender	0,064	12599,500	Retain NH
The distribution of "Transports" is the same across categories of Gender	0,003	9199,500	**Reject NH**
The distribution of "Transports associated with a benefit" is the same across categories of Gender	0,949	11306,500	Retain NH
The distribution of "Leisure" is the same across categories of Gender	0,138	10257,500	Retain NH
The distribution of "Leisure associated with a benefit" is the same across categories of Gender	0,586	10957,000	Retain NH

Table 15: Gender impact on the distribution of the variable `Willingness to share in different areas before and after a benefit was presented´

At last, through Table 16, an analysis shows that the gender has no impact on the variable " Willingness to share in the current context of Covid-19. That is, the distribution of the variable is the same across categories of gender.

Null Hypothesis	Mann-Whitney U test		
	Sig	U	Decision
The distribution of "Willingness to share in the current context of Covid-19" is the same across categories of Gender	0,051	10134.000	Retain NH

Table 16: Gender impact on the distribution of the variable `Willingness to share in the current context of Covid-19´

4.2.2. Impact of age

As age is expressed in 4 different parameters, where a number is associated with each generation (X, Y, Z and, Baby Boomers), Kruskal-Wallis H tests were performed in SPSS. A significance level of 0,05 was defined as well as 95% of confidence interval.

Firstly, the impact of generations on the variable "Mobile apps that require sharing geolocation data" was analysed, to show whether the distribution is the same or not between gender categories. As shown in Table 17, generation has no impact on the variable previously described.

Null Hypothesis	Kruskal-Wallis H test		
	Sig	$\chi 2$ (3)	Decision
The distribution of "Mobile apps that require sharing geolocation data" is the same across categories of Generation	0,212	4,501	Retain NH

Table 17: Generation impact on the distribution of the variable `Mobile apps that require sharing geolocation data´

Then, another test was conducted to perceive the impact on the perceived benefits and risks, demonstrated in Table 18. Here the impact of gender was expressive. Only three variables retained the null hypothesis. Meaning that in the remaining variables the generation had an impact on their distribution.

On one hand, in the set of perceived benefits, the generations that were most associated said and identified the most variables, were respectively, generation Y, X, Z and Baby Boomers.

On the other hand, in the set of perceived benefits, the generations that were most associated said and identified the most variables, were respectively, generation Y, Z, Baby Boomers and X.

	Null Hypothesis	Kruskal-Wallis H test		
		Sig	**χ2 (3)**	**Decision**
Perceived Benefits	The distribution of "Use the Service" is the same across categories of Generation	0,032	8,820	**Reject NH**
	The distribution of "Speed and Effectiveness in experience" is the same across categories of Generation	0,425	2,790	Retain NH
	The distribution of "Service Customization" is the same across categories of Generation	<001	20,128	**Reject NH**
	The distribution of "Location near" is the same across categories of Generation	<001	24,738	
	The distribution of "Convenience" is the same across categories of Generation	0,003	13,9628	
	The distribution of "None" is the same across categories of Generation	0,199	4,648	Retain NH
		Kruskal-Wallis H test		
		Sig	**χ2 (3)**	**Decision**
Perceived Risks	The distribution of "Fraud" is the same across categories of Generation	<001	28,739	**Reject NH**
	The distribution of "Data used for other purposes" is the same across categories of Generation	0,100	6,240	Retain NH
	The distribution of "Control by other Companies" is the same across categories of Generation	0,005	13,008	**Reject NH**
	The distribution of "Government Control" is the same across categories of Generation	0,165	5,091	Retain NH

Table 18: Generation impact on the distribution of the variables `Perceived Benefits´ and `Perceived Risks´

Table 19 shows the Kruskal-Wallis H test for variable `willingness to share in different areas before and after a benefit was presented´. Only in the area of health and leisure associated with a benefit, generations behaved similarly in the motivation to share their personal geolocation data. In the remaining variables, the impact of the generation was foreshadowed.

Willingness to share in different areas before and after a benefit was presented

Null Hypothesis	Kruskal-Wallis H test		
	Sig	**χ2 (3)**	**Decision**
The distribution of "Health" is the same across categories of Generation	0,095	6,369	Retain NH
The distribution of "Health associated to a benefit" is the same across categories of Generation	<001	17,691	**Reject NH**
The distribution of "Transports" is the same across categories of Generation	<001	63,923	
The distribution of "Transports associated with a benefit" is the same across categories of Generation	<001	14,327	
The distribution of "Leisure" is the same across categories of Generation	<001	20,690	
The distribution of "Leisure associated with a benefit" is the same across categories of Generation	0,444	2,676	Retain NH

Table 19: Generation impact on the distribution of the variable `Willingness to share in different areas before and after a benefit was presented´

The following table (Table 20) helps to understand and reflect why the null hypotheses of the previous table are rejected. Since it shows the number of elements of each generation that are positioned above and below the median of the variable.

Variables	Median	Median Position	Gen Z	Gen Y	Gen X	Baby Boomers
Health with Benefit	-	>Median	0	0	0	0
		<=Median	75	97	79	54
Transports	4	>Median	44	43	15	2
		<=Median	31	54	64	52
Transports with Benefit	4	>Median	44	57	24	22
		<=Median	31	40	55	32
Leisure	3	>Median	34	53	29	14
		<=Median	41	44	50	40

Table 20: Position where generations stand in relation to the median of the variable `Willingness to share in different areas before and after a benefit was presented´

To conclude the presentation and analysis of the impact of the generation, we can see that it is not distributed equally by the variable "Willingness to share in the current context of Covid-19". Given that the generations that responded that their predisposition has changed with this current context have been, in order of more responses, generation Y, X, Baby Boomers and Z.

Null Hypothesis	Kruskal-Wallis H test		
	Sig	**χ2 (3)**	**Decision**
The distribution of "Willingness to share in the current context of Covid-19" is the same across categories of Generation	<001	25,646	Reject NH

Table 21: Generation impact on the distribution of the variable `Willingness to share in the current context of Covid-19´

5. Discussion and Conclusion

The discussion and conclusion of this investigation revolves around interpreting the analysis of the two methods that were used: the interviews and, later on, the questionnaire. The results of the questionnaire are those of which have been identified as being the most relevant to the investigation and, therefore, the ones that will be the most highlighted in this chapter.

5.1.Discussion

Based on the work Cousineau, Oakes and Johnson (2018), who believe that we live in a time when apps are a cultural factor, through the use of investigation we can continue along the same lines of reason, with only a very small part of the sample not downloading apps with a feature as concrete as it is required when one is to share personal geolocation data.

Divev and Hart (2004) state that a person makes a decision, in this particular case to share personal geolocation data, weighing the benefits on one side of the scale and the risks on the other. As there are no previous studies on the benefits and risks perceived in the sharing of personal geolocation data in mobile apps, it was created a list of them, which was based on the results of the exploratory study. From this list, where more than one element could be chosen from, it should be taken notice that a greater number of perceived benefits were recorded rather when compared to its risks. Which is in line with the sample, at least, in its majority, which affirms that when sharing data in apps, it shows that the benefits are weighing more on the balance side than in comparison to the risks on the other side.

The main focus of this investigation is the accessibility of the motivation to share may vary depending on the area and, depending on whether a benefit is associated or not. Taking the work of Milne and Boza (1999), where they believed that the will to share varies according to the industry. Accordingly, the results of the investigation also conclude that within the areas which were under study, there is an associated difference.

When a benefit was associated, all areas were positioned in the same order in terms of willingness to share and had an increase in will compared to when there was no specific benefit associated. These results are supported by the work of Park, Campbell and Kwak (2012), who finds that a counterpart works as a factor that influences sharing, and the work of Acquisti, (2004;) and Acquisti and Grosslags (2005), who mention that an immediate reward or gratification as a part on the increased willingness to share. In this case, an increase was seen immediately.

Consumer behaviour is changing due to the pandemic caused by Covid-19 (Donthu & Gustafsson, 2020). Supported by research results where respondents have noticed a difference in their behaviour, before and currently.

Regarding the impact of gender in this study, no significant results were found that would suggest a different motivation on the part of women and of men. Only on one area, of transports, that showed women were more willing to share their personal geolocation data than men. However, when it comes to fear of sharing, it is demonstrated that women express the same amount as men, which goes against with the opinion of (Sheehan & Hoy, 1999). In fact, the only difference was that women perceived more benefits than men.

Finally, the impact of age demystified the prejudice of the elderly and technology. The results obtained do not support the theory of Taraszow, Aristodemou, Shitta, Laouris and Arsoy (2010), where older adults are less likely to share than younger ones. According, it is highly interesting that generation

Baby Boomers appears before Z when asked if in the current context exists or not more willingness to share personal geolocation data.

5.2.Conclusion

There is no doubt that technology is increasingly present in people's daily lives and the use of mobile devices is very recurrent. With the use of this type of devices is allied to the installation of apps that, can ask for the sharing of personal data, such as geolocation. The sharing of personal mobile data sees associated risks and benefits, given the sensitive nature denoted.

Therefore, an innovative study was conducted in order to assess the motivation of sharing personal data mobile geolocation, in different areas of activity and to perceive how the motivation behaves in the face of a proposed benefit.

Derived from the innovative nature, the results were obtained through two methods. First, through in-depth interviews and later by conducting a questionnaire.

The conclusions drawn from the exploratory study, in-depth interviews, allowed to identify the areas which would later on be subject to assessment in the questionnaire. The marketing area was excluded after carrying out the first method, due to its poor evaluation by the 8 interviewees, who classified, on the average level, as being very unlikely to share personal geolocation data and, it also showed that there was no increase in the interviewees' predisposition to share towards a proposed benefit (as all other areas have had showed). It can also be concluded that several interviewees had the same perception of certain benefits and risks, which led to the creation of a list of them used later in the questionnaire. More benefits were associated with geolocation data sharing than

risks. Finally, the last conclusion drawn from the first chosen method was that a significant change of attitude of sharing in regard to the Covid-19 context, this was also a question that was subsequently asked in the questionnaire.

Now regarding to the conclusions drawn from the questionnaire, it can be concluded that there is a strong predisposition to share mobile personal data from geolocation and intensification of it in the period of the current context of Covid-19.

The results of the survey, as they took place in the middle of the pandemic stage, are probably under the influence of the responses of the agreement being slightly different due to the context that is being experienced. Since a significant part of the sample even reported feeling more like sharing their data today than at the time prior to Covid-19.

Several benefits and risks are perceived by the sample of the population residing in Portugal, with the benefits being more referred to than the risks. The most mentioned benefit is the possibility of using the app that requires this data sharing and, the biggest risk mentioned that the data will be used for other purposes.

It was also gathered that the area with the greatest predisposition towards sharing was the health area, probably derived from the pandemic directly associated with this thematic. Followed by the transport area and, subsequently, the leisure area. All areas experienced an increased predisposition to sharing in the face of an associated benefit and continued in the same predisposition to share.

Also, a very interesting fact was to see that the older generations are predisposed to sharing and, in this context of Covid-19, they are not the ones that express the least desire to share comparatively with more recent generations.

Finally, when analysing evaluation of willingness for sharing personal mobile data according to benefits, it can be shown that there is already a relevant predisposition to sharing that is intensified when benefits are associated.

5.3.Limitations of the Research

There are different limitations associated to the different methods which were used in the investigation.

In regard to the interviews, the fact that the sample is smaller, it can lead to the fact that the responses will not be able to represent a larger portion of the population. Also associated with this method is the fact that some of the responses may express an opinion or a personal experience, which can also limit it in a bigger picture. Since one of the main disadvantages of this method is its non-generalization (Queirós, Faria & Almeida, 2017).

And in regard to the questionnaire, as there was no direct interaction from the interviewer, the accuracy of the answers provided by the interviewees may not be reliable (Queirós, Faria & Almeida, 2017).

However, the biggest limitation found on this study is due to the ambiguity of the areas which were under analysis and its respective associated benefits. As they are considered to be very broad concepts, they can be targeted as biased opinions.

5.4.Recommendations

As a recommendation for future research, what would be suggested is to try to specify and taper the concept of areas and benefits, in order to obtain more conscious and reflected answers. And therefore, it will inflict on a lower possibility of ambiguity.

I also think that it would be interesting to analyse the willingness to share personal geolocation data in different areas, due to the fact that the associated

benefit to sharing data would greatly help and improve the building of smart cities through IoT devices.

Finally, this study took place during the pandemic caused by Covid-19 and it would be valuable if it could be studied in future research that may focus on the impact that this pandemic has had, after having a more pronounced control of it.

Evaluation of willingness for sharing personal mobile data according to benefits

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Appendix I – In-depth interview structure

First Part

1. What is your name and country of residency?
2. How old are you?
3. Please, identify your gender.

Second Part

4. Do you use mobile devices?
5. Do you install applications where you share personal data, specifically geo-tracking data?

Third Part

6. What benefits do you believe you have by sharing personal geo-tracking data?
7. What fears or risks do you perceive when you have to share personal geo-tracking data?

Fourth Part

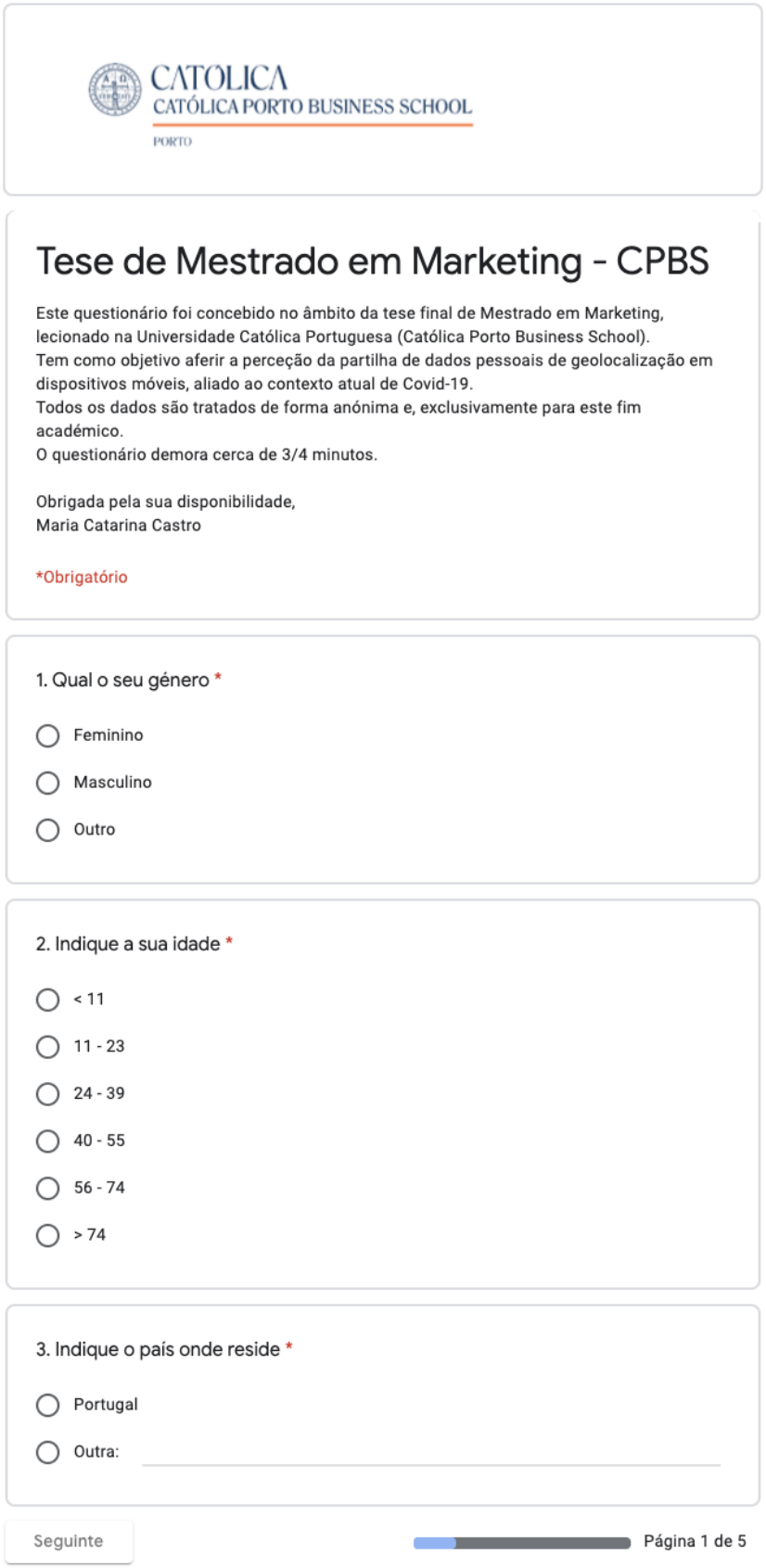
8. From 1 to 5, (1 being "Not likely at all" and 5 "Very likely"), characterize your willingness to share your geo-tracking data for each of the areas mentioned above.
    a. Health
    b. Transports
    c. Leisure
    d. Marketing

9. If there were counterparts to the sharing of personal data, from 1 to 5 (1 being “not likely at all” and 5 “very likely”), characterize your motivation in the following situations:
    a. Health - For example, with the Stay Away Covid application, if you are able to be aware, you have contacted close to people with the positive virus.
    b. Transport - If you could find out the occupied capacity of the transport you intend to use
    c. Leisure - if you knew how the capacity of a particular restaurant / bar is
    d. Marketing - if you could get a discount on a particular service

Fifth Part

10. Do you feel more or less motivated to share your geo-tracking data before or during the context of covid 19?

Appendix II – Questionnaire structure



CATÓLICA
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PORTO

Tese de Mestrado em Marketing - CPBS

Este questionário foi concebido no âmbito da tese final de Mestrado em Marketing, lecionado na Universidade Católica Portuguesa (Católica Porto Business School).
Tem como objetivo aferir a perceção da partilha de dados pessoais de geolocalização em dispositivos móveis, aliado ao contexto atual de Covid-19.
Todos os dados são tratados de forma anónima e, exclusivamente para este fim académico.
O questionário demora cerca de 3/4 minutos.

Obrigada pela sua disponibilidade,
Maria Catarina Castro

*Obrigatório

1. Qual o seu género *

- ◯ Feminino
- ◯ Masculino
- ◯ Outro

2. Indique a sua idade *

- ◯ < 11
- ◯ 11 - 23
- ◯ 24 - 39
- ◯ 40 - 55
- ◯ 56 - 74
- ◯ > 74

3. Indique o país onde reside *

- ◯ Portugal
- ◯ Outra: _____

Seguinte

Página 1 de 5

Dados de Geolocalização

Para contexto, dados de geolocalização são dados referentes à localização geográfica de um determinado objeto e/ou pessoa. Neste caso, a partilha de dados pessoais de geolocalização.
Alguns exemplos de aplicações onde é pedida esta partilha são: Uber Eats, Waze, Google Maps, Too Good To Go, etc.

4. Utiliza dispositivos móveis? (como por exemplo: smartphone; tablet; pc) *

- ◯ Sim
- ◯ Não

5. Instala aplicações onde partilha dados pessoais, mais concretamente dados de geolocalização? *

- ◯ Sim
- ◯ Não

6. Dos seguintes benefícios, quais acredita usufruir através da partilha de dados pessoais de geolocalização? *

- ☐ Utilização do serviço que necessita destes dados
- ☐ Rapidez e eficácia na experiência
- ☐ Personalização do serviço
- ☐ Informações de localização perto de mim
- ☐ Comodidade
- ☐ Outra: _____

7. Que receios acredita experienciar através da partilha de dados pessoais de geolocalização? *

- ☐ Fraude
- ☐ Que os meus dados sejam utilizados para outros fins
- ☐ Controlo por parte de outras empresas
- ☐ Controlo por parte do governo
- ☐ Outra: _____

Anterior Seguinte Página 2 de 5

Nunca envie palavras-passe através dos Google Forms.

Motivação à partilha de dados pessoais de geolocalização

8. De 1 a 5, sendo 1 "muito improvável" e 5 "muito provável", caracterize a sua disponibilidade em partilhar os seus dados de geolocalização para cada uma das áreas acima referidas.

8.1. Saúde *

	1	2	3	4	5	
Muito Improvável	○	○	○	○	○	Muito Provável

8.2. Transportes *

	1	2	3	4	5	
Muito Improvável	○	○	○	○	○	Muito Provável

8.3. Lazer *

	1	2	3	4	5	
Muito Improvável	○	○	○	○	○	Muito Provável

Anterior Seguinte Página 3 de 5

9. Caso percecionasse contrapartidas à partilha de dados pessoais, de 1 a 5 (sendo 1 "muito improvável" e 5 "muito provável"), caracterize a sua motivação a partilhar perante as seguintes situações:

9.1. Saúde - Por exemplo, com a aplicação Stay Away Covid, se conseguir ter noção se contactou perto de pessoas com o vírus positivo. *

	1	2	3	4	5	
Muito Improvável	○	○	○	○	○	Muito Provável

9.2. Transportes – Por exemplo, se conseguir saber a capacidade ocupada do transporte que tenciona utilizar *

	1	2	3	4	5	
Muito Improvável	○	○	○	○	○	Muito Provável

9.3 Lazer – Por exemplo, se souber como está a capacidade de um determinado restaurante/bar *

	1	2	3	4	5	
Muito Improvável	○	○	○	○	○	Muito Provável

Anterior Seguinte Página 4 de 5

10. Para finalizar, no atual contexto de covid-19, sente-se mais motivado/a a partilhar os seus dados de geolocalização? *

- ○ Sim
- ○ Não

Anterior Submeter Página 5 de 5