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A comparison of how online payment methods work differently in two different countries: Brazil and Ireland, and how much they impact customer's life

Compiled by:

Cassia Souza Barbalho

Student number: 51702266

This project is submitted in part fulfilment of the Degree of Bachelor of Arts (Honours) in Business Studies.

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Abstract

As the world evolves technologically regarding digital transformation and payment systems, each country finds its ways to step forward according to its necessity and resources. Which was what happened regarding Brazil and Ireland. Taking into consideration that each followed a different online payment methodology pathway.

As a Brazilian immigrant living in Ireland, this subject matters due to its importance in my life and other thousands of countrymen living here as well. Living in two countries also implies managing two currency transactions, two banking accounts, two online payment methods, two systems and in two different time zones.

Basically, that was the kitten for this applied project to happen.

Therefore, the purpose of this study is to analyze deeply how both countries' online payment systems differs from each other, and how much they impact Brazilian immigrants' life.

Key words: Digital transformation, payment systems, Brazil and Ireland.

List of Acronyms

B2B: Business to Business

B2C: Business to Customers

EU: European Union

EEA: European Economic Area

IBAN: International Banking Account Number

ID: Identification

IPSDP: Instantaneous Payment System's Direct Participant

PIN: Personal Identification Number

PISP: Payment Initiation Service Provider

PIX: Payment Instantaneous System

POS: Points of Sales

PSP: Payment Services Provider

QR code: Quick Response

SSI: Single Settlement Infrastructure

Table of Contents

Chapter I.....	10
1. Introduction.....	10
1.1 Purpose of the Study	10
1.2 Objectives of the Research.....	11
1.3 Aims of the Research	11
1.4 Significance of the Study	12
Chapter II - Literature review	13
2.1 How Covid enforced – or influenced – people to move towards online payment?.....	13
2.2 An overview and comparison of how both countries online payment infrastructure works and who are the participants involved in the transaction.....	14
2.3 Differences and similarity between both account system’s identification, and digital e physical tools used in each country to assist people with online payment	17
2.4 Advantages for physical person from both countries’ payment system	19
2.5 Disadvantages for physical person from both countries’ payment systems.	21
Chapter III – Methodology	23
3.1 Introduction.....	23
3.1.1 Philosophy.....	23
3.1.2 Approaches	24
3.2 Method adopted	24
3.3 Sampling	25
3.4 Data Collection and Analysis.....	26
Chapter IV.....	28
4. Findings and Discussion	28
4.1 How Covid enforced – or influenced – people to move towards online payment?.....	30
4.2 An overview and comparison of how both countries online payment infrastructure work.	30
4.3 Differences and similarity between both account system’s identification, and digital e physical tools used in each country to assist people with online payment	33
4.4 Advantages for physical person from both countries’ payment system.	36
4.5 Disadvantages for physical person from both countries’ payment system.....	38
Chapter V	42
5.1 Conclusion	42
5.2 Limitations	43
Appendices.....	44
Appendix 1	44

Appendix 2.....	47
Appendix 3.....	51
Appendix 4.....	52
Appendix 5.....	55
References.....	58

List of Figures

Figure 1 - Card payment's process flow.....	15
Figure 2 - PIX infrastructure.....	16
Figure 3 - PIX key codes	18
Figure 4 - PIX's QR Code usage.....	18
Figure 5 - PIX payment flow	20
Figure 6 - Methodology onion	23
Figure 7 - How long people have been living in Ireland	28
Figure 8 - Pix frequency usage	28
Figure 9 - Relation between time living in Ireland and PIX frequency usage.....	29
Figure 10 - Cashless payment movement due to Pandemic	30
Figure 11 - PIX five keys identification and its significance.....	33
Figure 12 - PIX instantaneous tame taken transactions and its significance	34
Figure 13 - Transaction's bookings and its significance	35
Figure 14 - Transaction's daily significance and its significance.....	35
Figure 15 - PIX QR code and its significance	36
Figure 16 - Portable card reader machines and its significance.....	36
Figure 17 - The Irish system's advantages over PIX.....	37
Figure 18 - PIX's advantages over the Irish system	38
Figure 19 - Most impacting disadvantage.....	41
Figure 20 - Best system.....	42

List of tables

Table 1 - IT professionals interviewed for this study	26
Table 2 - Coding	27
Table 3 - Interview question about database challenges.....	31
Table 4 - Interview question about PIX operation.....	32
Table 5 - Interview question about PIX integration.....	32
Table 6 - Interview question regarding PIX unique codes	34
Table 7 - PIX's relevant gaps.....	39
Table 8 - Irish system's room for improvements.....	39
Table 9 - PIX's possible frauds.....	40

Chapter I

1. Introduction

Nowadays, with the assistance of the internet and an electronic device such as either cell phone or smart watches, everyone can make payments by tap. Indeed, the former device allows the account holder to get into the app and make online payment, transfers and mobile top up throughout few steps at any time, any day.

On the other hand, to keep up with competitors and to not lose clients, businesses have implemented many payment types from different bank institutions, credit or automatic debit options and even fintech's transfers.

However, technology improvement's is not a one-way road, which means that its pathway can diverge and move towards different directions, and that is what happened in the case of Brazil and Ireland's online payment.

Briefly explaining, the Brazilian central bank has developed a new method called PIX that connects all the financial institutes. While in Ireland the financial institutes interaction works independently, making online transactions take some time to occur, sometimes hours, and sometimes days.

Moreover, as a customer, I am interested in knowing what online payment services are available to me in each country, which advantages and disadvantages they bring to my life and how I can make the most of each of them.

1.1 Purpose of the Study

The purpose of this study is to compare two online payment methods related to banking transitions, currently operating in two different countries: Brazil and Ireland.

Nowadays, with the assistance of internet and an electronic device such as either cell phone or smart watches, everyone can make payments by tap. Indeed, the former device allows the account holder to get into the app and make online payment, transfers and mobile top up throughout few steps at any time, any day.

In parallel, to keep up with competitors and to not lose clients, businesses have implemented many payment types from different bank institutions, credit, or automatic debit options and even fintech's transfers.

However, technology improvement's is not a one-way road, which means that its pathway can diverge and move towards different directions, and that is what happened in the case of Brazil and Ireland's online payment.

1.2 Objectives of the Research

The objective of this research is to do the comparison using the perspective of people who have used both online payment methods.

On top of that, the objective here is to answer questions like: "How far can online payments improve?" "How can technology assist this improvement?" "How secure is online payment in each country?" "How can online payment affect my life as a customer?" "Is it possible to book transfers, payment, mobile top up in advance?"

Furthermore, as a businessperson, it is interesting to deeply understand the pros and cons from both methods to later, apply them personally and professionally in life.

1.3 Aims of the Research

That said, this research aims to evaluate how the users perceives the tools provided by both countries' system, the users' experiences in relation to what both systems have to offer and how much they impact their lives, taking into consideration that the target public needs to manage their finances in two different countries/currency/methods.

1.4 Significance of the Study

The significance of this study is to enrich the literary collection available. As PIX is a new system (created in 2020) there are a few academic findings about it, especially regarding immigrants who use this tool living abroad in Brazil.

Chapter II - Literature review

2.1 How Covid enforced – or influenced – people to move towards online payment?

As stated before, this study idea is not about comparing each country's financial situation, but to present and compare both countries' online payment methods regarding functionality, pros and cons (throughout client's perspective), and devices used.

In order to avoid the spreading of the CoronaVirus, many countries established restrictions regarding contactless measures, such as touchless devices, social distance and even encouraging contactless payments, which happened in Brazil and Ireland. Saying so, due to this new reality, people have moved from cash to digital payment solutions.

In Brazil, e-commerce was positively affected, registering a growth of 55% in the first semester of 2020 compared to the same period the year before. Also, in May 2020, the money withdrawals represented 35% of the monetary transactions, dropping to 17% in July 2020. (Americas Market Intelligence, 2020)

In Ireland, the impact of Covid 19 pandemic brought a digitalization and innovation coordinated with trends and changes in consumer behaviors, compressing years of digital modernization in the payments system into months due to an urge in online transactions and contactless payments. Furthermore, the value of online sales transactions' value grew due to the pandemic. Between June and October 2020, the number of online transactions registered a growth of 17% compared to the same period in 2019. Contactless payment in the third quarter of 2020 grew 36% compared to the same period 2019. At the same time, money withdrawals between June and October 2020 represented two thirds (lower) as the year before. Indeed, this changing behavior is unlikely to come backwards post pandemic. (Donnery, 2021)

According to Rimonato & Santos (2021), in 2022 Brazil finds itself operating an instantaneous payment method called PIX. Pix was created by the Central Bank of Brazil during the Covid 19 pandemic, in November 2020 to be more specific, and it has been administered by the institution since then. Before that, Brazil's online payment used to be what is considered to be "traditional digital payment", which is what we have in Ireland at the moment.

On the other hand, the Irish traditional digital payment's system operates relying on credit card payments (either inserted or tapped), banking apps' payments and transfers, and ATM machines. Although Donnery (2021) recognizes that the Irish payments system adapts to the current changing environment to meet the core needs of society and economy, Ireland does not have had any significant innovation in this field for many years, only projects from the Banking and Payment Federation Ireland (BPMFI) along with fintech's that are still being discussed, but not concluded either executed. (Banking and Payment Federations in Ireland, 2022)

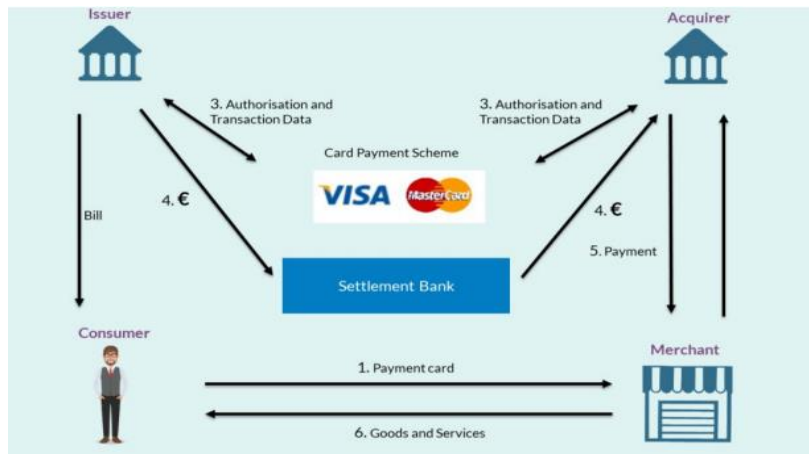
Although the study is not about Covid, it is undeniable how people have been moving far away from traditional cash payment and how both countries are organizing themselves to evolve from it. Brazil has launched the PIX, while Ireland is still brainstorming changes.

For this project, it is the base of why this research was done. Especially knowing that people were willing to move to a cashless payment system, but sometimes it is not possible due to some difficulties people face. For example, when getting to Ireland, one of the difficulties Brazilian immigrants faces is about opening a bank account.

2.2 An overview and comparison of how both countries online payment infrastructure works and who are the participants involved in the transaction.

According to the Central Bank of Ireland, the Irish traditional digital payment system (card medium) operates as the following figure below:

Figure 1 - Card payment's process flow



Source: Central Banking of Ireland (2020)

Here, the figure is explained as followed:

Step 1: A buyer wants to purchase a product (or service) from a merchant at a physical store (as used to happen on pre-pandemic terms) or online, and the individual pays with his card (MasterCard or Visa, provided by his bank).

Step 2: The seller's POS (point of sale) system sends it to the acquirer (card machine's companies). The person can insert and enter a personal identification number (called PIN) or tap and go (contactless payment).

Step 3: The acquirer sends a request to the card payment scheme in order to review the individual's account (for example to check if the card is not blocked and if there is enough fundings). If everything is ok, an authorization hold is placed on the person's account. The acquirer then gets the notification of the approval result (or error) via card payment scheme.

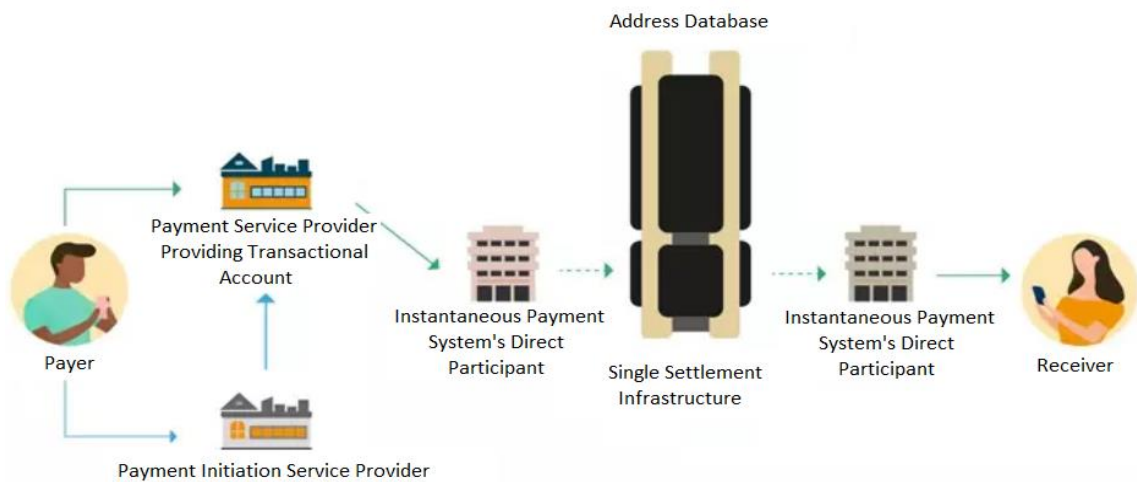
Step 4: Clearing is what we call transmission transaction data among card payment, acquirer and issuer. The amounts for settlement are calculated by the card payment scheme, and monies are exchanged between the acquirer and the issuer for the net value of the cleared transactions (timing and method of exchange varies depending on the contractual arrangements).

Step 5: The funds due are provided by the acquirer.

Step 6: The buyer receives the product (or service) from the seller. But, in reality, this would happen at step 4 where the product is exchanged at POS before clearing and settlement is complete.

On the other hand, in Brazil, the PIX method works as follows:

Figure 2 - PIX infrastructure



Source: Adapted from Leite (2021)

Thus, it is explained as follows:

Step 1: The payer intends to transfer money to the merchant/receiver. In this case, the payer can opt to use either a payment services provider who provides a transactional (PSP) account (Paypal for example) or a payment initiation service provider (PISP). (Uber and Ifood for example)

Step 2: The Instantaneous Payment System's Direct Participant (IPSDP) are the institutions (Banks) that are linked to the Central Bank that have a transactional account for the purpose of settling payments. In Brazil, we have 5 major banks: Caixa, Bradesco, Itau, HSBC and Santander. Which are similar institutions to AIB and Bank of Ireland. Hence, this organization receives requests from (PSP) and "repasses" it to the Single Settlement Infrastructure (SSI).

Step 3: The Single Settlement Infrastructure is the address database where the location will store. This base is protected by banking secrecy and the General Data Protection Law and guarantees security to the data provided by users. And once the bank repasses the request to the SSI, it instantaneously responds to it.

Step 4: The SSI then immediately “repasses” the information to the receiver’s bank (IPSDP), which does the transaction and sends the money to the receiver.

The author of this paper does not agree or disagree with what other authors have said about this topic in specific as it is not a matter of opinion or not. But a fact matters.

However, the author of this paper sees the importance of this topic to, later on, prepare a better comparison between methods and to understand the main character in each of them.

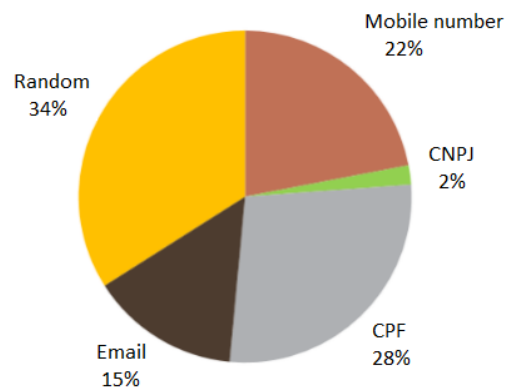
2.3 Differences and similarity between both account system’s identification, and digital e physical tools used in each country to assist people with online payment

According to the Banking and Payment Federation Ireland (2020), since January 2007, IBAN and BIC are the only banking route designation and account identifiers that a beneficiary customer has. The former stands for International Bank Account Number and the latter, Business Identifier Code. Thus, the Irish federation states that only these two are accepted by European banks (EU/EEA area). Both with standard numbers of digits. (Banking and Payment Federation Ireland, 2022)

Before PIX, Brazil used to have a similar rule for bank accounts identification, when each person had a standard agency number, account number and sort code, but not anymore. PIX is more versatile regarding code. Now users can use as a code the options below, along with its relative client’s chosen percentage (figure 3).

- Email;
- Mobile number;
- CPF (Brazilian ID number);
- CNPJ (National Registry of Legal Entities);
- Random number.

Figure 3 - PIX key codes



Source: Adapted from Leite (2021)

Regarding QR code usage on the Irish system, there was no finding on literature search, which can be interpreted as non-existing.

Additionally, Brazilian instantaneous payment uses QR code as a key code for transactions. Each person has a QR code, which can be used for small businesses payment, like independent artists, small sellers and so on.

Figure 4 - PIX's QR Code usage



Source: Central Bank of Brazil (2022)

In the figure above, it can be seen an independent artist using QR code to gather people's contribution, a small business using QR code to receive people's payment, and a public transport machine charging people for a transport ticket.

Meanwhile, Ireland online payers have the assistance of a card reader machine to make online payments. On the other hand, Brazilians do not have a tool like this to assist them to do online transactions.

The author of this study does not agree or disagree with the biographer present in this topic due to the fact that, as the previous topic, it is not a matter of opinion, but a matter of facts, and against facts there are no arguments.

Moreover, the information presented here is valuable to the study because it reinforces the differences (and small similarities) between both country systems. Which counts on some visual mediums like explained infrastructure and, code assistant (QR code) used or the lack of it, and the physical tool (Machine reader) or the lack of it. Also, this topic is important to help the reader understand the next one, which will talk about the advantages and disadvantages for both physical and legal persons.

2.4 Advantages for physical person from both countries' payment system

According to Leite (2021), the advantages of using the new system PIX are that fast transactions are made within 10 seconds or less, which allows the receiver to get the money immediately. Especially in the case of transactions made at night, weekend or bank holidays, where the money only gets to the receiver account holder on the next business day.

It is easy to use, as it requires no additional app download or subscription, as the PIX option is linked with the banking app. So, all the person needs to do is to access their banking app, select the PIX option (if it is a first time using), choose the kind of key he (she) wants among five options (already mentioned above), and start using it.

Availability is also a big benefit as an individual can choose among many key codes to be used to identify the account holder. It is cheaper than other traditional digital payment because it dismisses the card machines that have additional charges, also, it is totally free of fees for physical persons, and in the case of legal persons, it has a reduced fee charging.

It also allows different banking institutions to participate in the instantaneous payment system, which in theory works "as they were the same" regarding transactions. Thinking about a comparative scenario from the Irish system, for example, transferring from AIB to AIB is instantaneous because both are the same bank's account. In Brazil, using PIX allows transferring to be immediately independent of the bank.

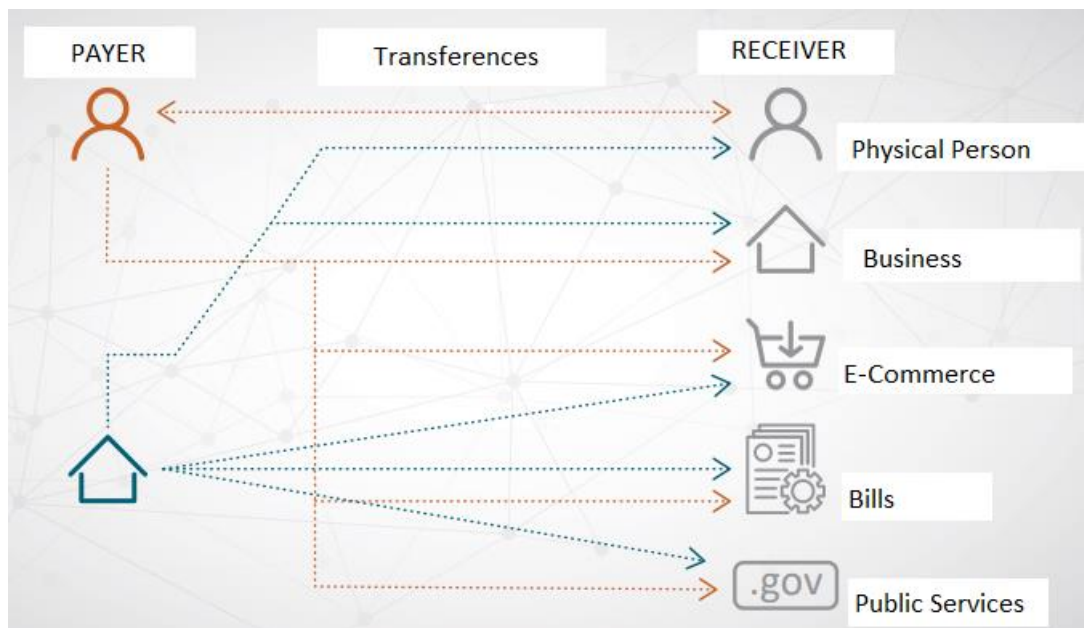
Thus, PIX allow users to book a payment. For example, for people who pay their bills in a

certain frequency, like weekly, fortnightly, monthly and so on, payments can be settled up in advance. Such as mortgages, loans, rent, among others.

Another benefit is that there is no daily limit, which means people can pay/transfer amounts of about a thousand monetary currency. Picturing a comparative scenario between both countries, in the case of Ireland, a physical person has a limit of a thousand euros per day, unless the person has a card reader and a computer available.

Versatility is another big benefit as PIX can be used for physical person regarding different endings, either paying or receiving, either small or big amounts, either during business day or out of business day period, especially from Person to Person, Business to Business or Person to Business and vice versa (as shown in figure 5).

Figure 5 - PIX payment flow



Source: Adapted from Central Bank of Brazil (2022)

According to Healy (2020), the current traditional digital payment Irish system helps the economy to move towards a cashless economy, as 88% of consumers have used cashless payment methods during 2020, compared to the 45% registered users in the period pre-pandemic. Also, 55% of Ireland's population declare to be cashless or believe they will become cashless in the next 5 years. (Healy, 2020)

The author of this paper agrees with the point of view of the presented biographers. Taking into consideration that the author is a user from both payment systems, the examples presented

above are part of the author's life. Hence, the author could not agree more on these opinions.

Talking about the advantages for both customers and business, according to the system that operates in each country is helpful to this study due to the clarification of how this affects the users, and consequently the country.

2.5 Disadvantages for physical person from both countries' payment systems.

Now that the advantages were presented, it is time to bring to the table the disadvantages both systems have. Regarding direct disadvantages in Brazil, the irreversibility is the major concern. Currently, once the transaction is done, there is no way to reverse it. Therefore, in case of human errors (dealing with the wrong key code, providing the wrong key code, or mistaking the amount of money to be sent) the money goes to the wrong bank account, and it is gone forever, with no possibility to revert it. (Mota, 2021)

Rimonato & Santos (2021) states that regarding indirect disadvantages, PIX is linked to the increasement of mobile stolen in Brazil after its implementation, as it is the main medium used to access banking account apps (followed by computers) and therefore PIX (specially transferring money from one account to another as the process is irreversible).

The Civil Police of São Paulo, along with digital expertise and FEBRARAM (The Brazilian Banks Federation) are working on the implementation of a call center where people will be able to call and immediately block the mobile, delete the banking app and other personal information, making it impossible to illicit actions to be performed. (FEBRARAM, 2021)

Another disadvantage that affects both systems is the internet dependency. Which means that with no access to mobile data, the user has no access to the banking app, and therefore no transferring can be made. (Chandran, 2014)

Furthermore, another disadvantage in the Irish system – as said before – is the gap between transactions when referring to different organization bank accounts. Along with one key code identification (mainly IBAN) to do transactions. Which normally a person does not know by heart.

Also, small merchants need to use card machines in order to charge customers, which comes

with a fee (small, but still).

The author of this paper agrees with the presented biographers. Bringing back a citation from Donnery (2020) said:

“... so as we adapt our payments systems in this changing environment we continue to deliver safe, efficient and resilient payment systems”

This citation is valued to bring the subject of adaptation and changing, hence, a dynamic process that is continuously bringing news. So, if each system has disadvantages today, it does not mean they will have them forever, but that the methods are adapting themselves (each one in their way) to come up with improvement, safety and efficiency as well.

As the advantages topic discussion, the disadvantages topic is also important for this study to explain how physical and legal people are affected by these disadvantages and to trace a comparative analysis.

Chapter III – Methodology

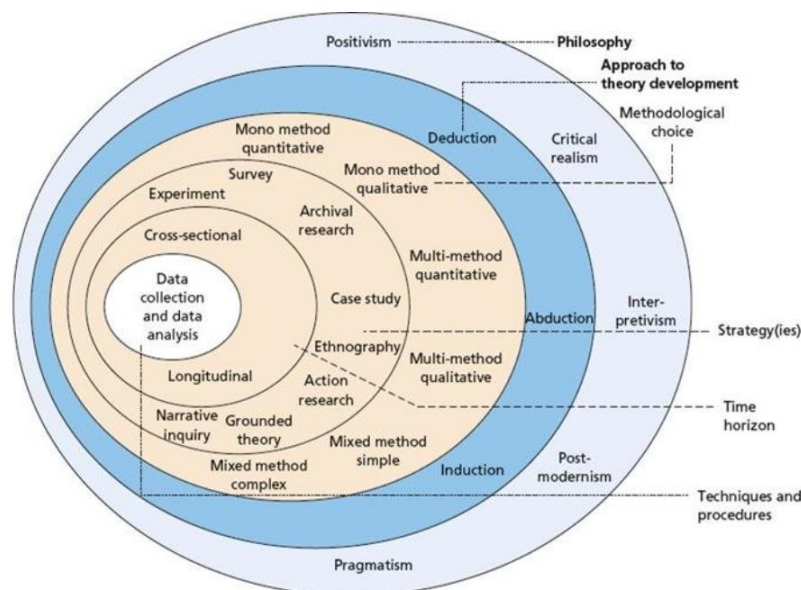
3.1 Introduction

As part of the methodology process, this study moves towards the epistemological focus that allow it to get to a general agreement based on the interview with IT professionals, the target public which is based on their personal life experience using both online payment system, in an effort to get an insight about both system differences and how they affect the target public's life.

3.1.1 Philosophy

Bringing the research onion to the table, we have got:

Figure 6 - Methodology onion



Source: Saunders & Tosey, 2013

In the outsider layer, the **Philosophy** that will be used in this paper is the **Interpretivist Researcher**, because of the mixture of survey (with open and closed questions) with interview (open questions that will be interpreted afterwards). The post positivist and conducting deductive research will not be considered because the paper will not rely on the Survey analysis only.

3.1.2 Approaches

For this study, in the Approach layer (second one from the outside in), the Inductive Research is the best option as it will conduct an analysis from the particularities of the two online payment methods, taking into consideration the general public's perception about them. Added to the quantitative interview carried out about the themes as well.

Although Survey (fourth layer) is positioned towards deduction and abduction (both located in the second layer), it will be an asset in this paper due to the possibility to collect quantitative data, identify patterns and organize them to better understand the comparison.

3.2 Method adopted

In the third layer, the methodological choice was the mixed method simple due to the need to collect information through surveys and interviews.

Regarding the Survey, this study counts on quantitative and qualitative collection data. The quantitative throughout Survey, which counts with twenty questions to support the five themes. Two questions to identify the demographic aspects of the public (age and gender). One question to understand how much time the public has been living in Ireland. One question to know if the public is really aware of both online methods as customers and how frequently they have been using them. Two questions to get to know the public habits regarding online payment during and after Covid pandemic. Six questions to point out the differences between both and to know how significant they are to the public. One open question to give the public the opportunity to bring another difference to the table that was not considered before. Four questions to know which differences the public considers more important and how much they impact the population's life. One question to ask is how both online payment disadvantages impact people's lives. The following two questions ask people's opinion whether both systems need improvement or not. And the last one finally asks which one the public judges as being the better online payment system.

The quantitative is carried through an interview that contains ten questions mainly about PIX than AIB/Bank of Ireland in order to get an insight about this new system. It goes through

security concerns, PIX background, procedures involved in identification systems, PIX possible flaws and improvements rooms, and database matters.

In addition, about strategic choices (fourth layer from outside in), although Survey is positioned towards deduction and positivism (which was not chosen in the previous layers), it will be an asset in this paper due to the possibility to collect quantitative data, identify patterns and organize them to better understand the comparison.

Furthermore, in the fifth layer (Time Horizons), between Cross Sectional and Longitudinal, the first one suits this paper better. As the collection of information (throughout Survey and interview) will happen once to support the main purpose here, cross section is the perfect fit. The reason why Longitudinal will not be considered is that there is no need to collect information more than once in a certain period of time to sustain the research, once is enough.

3.3 Sampling

Despite talking about online payment in general, which at some point every adult person has done it at least once in their life, the target public here needs to be narrower regarding Nationality. Saying so, the questionnaire targets Brazilian people who have been living in Ireland since 2020, or who used to live between 2020 and 2022, because PIX was created in 2020 and it is vital that the public have used both systems.

The survey sampling will focus on the Brazilian people who live in Ireland due to their personal experience with using both online payment systems. As the idea is to do a comparative analysis, the sampling should know about both systems to better answer the questionnaire and to judge which one is better. Furthermore, the survey will consist of multiple-choice closed questions (to facilitate post analysis and avoid errors).

On the other hand, for the interview, two Brazilians IT professionals who lived in Dublin between 2020-2021, are currently working as banking app developers in Brazil. They agreed to speak up about their point of view regarding online payment based on their professional experience once their names and institutions would be kept as anonymous.

Code	Position	Setting	Experience
P 1	Programmer / App developer	Bank Institution 1	1 year working as app developer in “Banking institute 1”. Responsible for back end (interface) design. <ul style="list-style-type: none"> - Visual studio - Python - Java Script
P 2	Programmer / App developer / Software engineer	Bank Institution 2	Graduated as a software engineer in 2017. Working in Bank Institution 2 since 2020. Responsible for: <ul style="list-style-type: none"> - Visual studio - Python - SQL server - Java Script - API rest

Table 1 - IT professionals interviewed for this study

3.4 Data Collection and Analysis

And finally, regarding the sixth layer (Data Collection Methods), there was the need to collect quantitative and qualitative data.

The methods of data collection for the literature review that was used were mainly academic papers (from Google Scholar and EBSCO), but in case there is not enough paper available, the attention will turn towards governmental websites, governmental reports, and documents from websites.

Once the data is collected, the analysis takes place. Hence, the software utilized was Google Survey, which presented the results in a graphic way, allowing the author of this paper to use the results to construct a comparative table (or charts) to better illustrate and facilitate the result understanding.

For the interview, the interviewed were given the option to proceed in English or Portuguese as he felt more comfortable with. In the case of Portuguese, despite the translation, the answers remained unedited.

Professional 1 subjects	Keywords in interview
PIX model based	China RTPs, similar but not identical
PIX's code uniqueness	Personal identifications, government, online servers, phone companies
PIX's maturity system	Security premises, rooted
PIX's relevant gaps	Transactions, irreversibility
PIX's integration possibility	Feasibility, bureaucracy, financial, technology, standardization, barriers
Irish's relevant gaps	Mobile app, interface, time consumption, IBAN
PIX's operation system	Database integration, scalability, reverse,
Frauds	Cibber frauds, indirect
PIX database's challenges	Finances, security, LGPD

Table 2 - Coding

3.5 Ethical Considerations

The ethical considerations needed in this research process starts with the Ethical undergraduate agreement to guarantee a set of morals on behalf of the author from the beginning to the end of the study.

There was also an ethical questionnaire conduction measure to guarantee to the public their contribution to this study was confidential regarding their identification, email addresses and answers.

Finally, the interview was also carried out in an ethical way due to the anonymity of the information of and from the interviewees.

Chapter IV

4. Findings and Discussion

This stage took a deep look at the questionnaire answered by 79 people to demographically identify them and to interpret their perception on the subject. From the 79 contributors, only one person did not give the consent to continue, leaving only 78 participants in total.

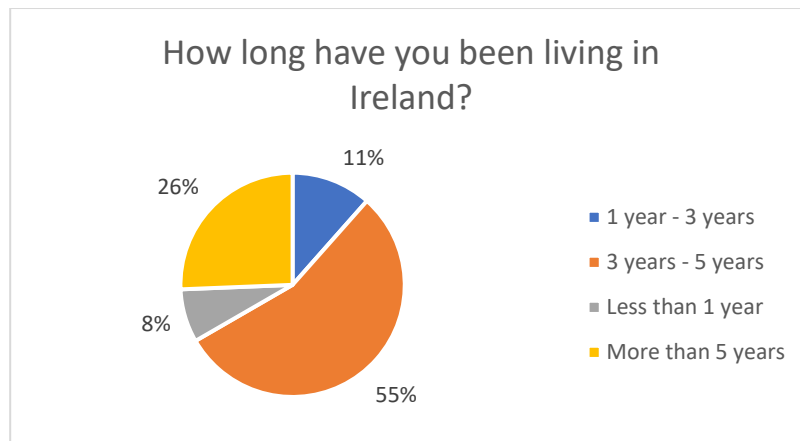


Figure 7 - How long people have been living in Ireland

The study asked people how long they had been living in Ireland by the moment the survey was answered, and the feedback revealed that 7.7% of them (6 people) had been living here for less than 1 year, 11.5% of them (9 people) had been here for between 1 – 3 years, 55.1% of them (43 people) lived here between 3 – 5 years and 25.6% of them (20 people) resides here for more than 5 years.

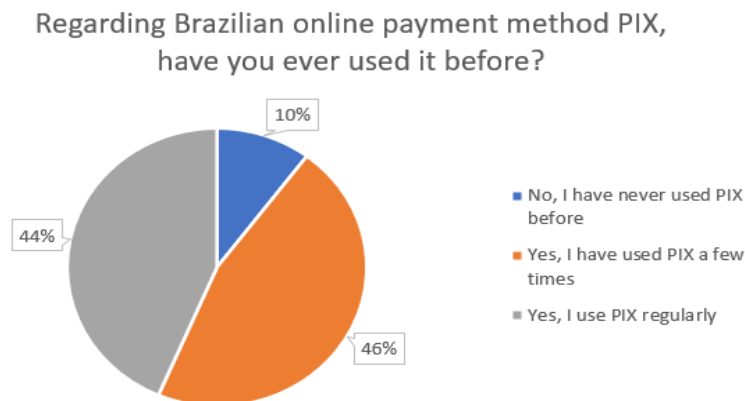


Figure 8 - Pix frequency usage

Regarding the PIX frequency usage, from the 78 contributors, 44% of them (34 people) declared to use it regularly and 46% (36 people) had used it a few times. But also, there is the 10% of them (8 people) who had never used PIX before.

Now, matching both information, we have got:

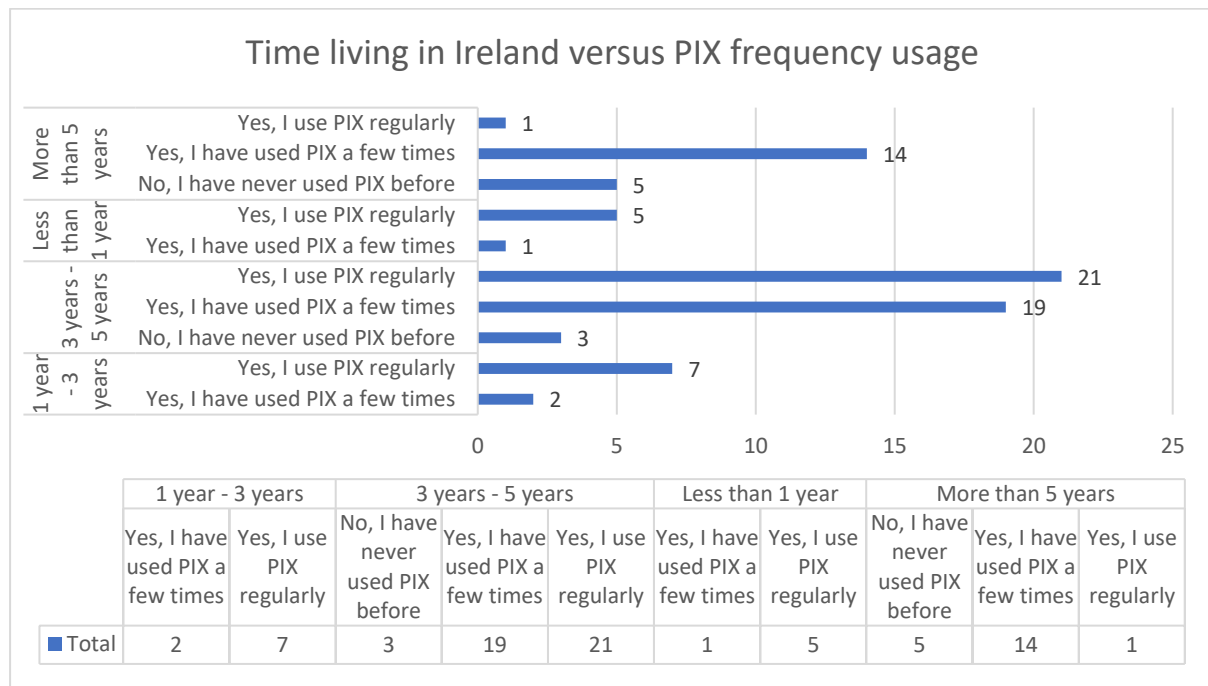


Figure 9 - Relation between time living in Ireland and PIX frequency usage

From this line column chart, it could be seen that people who got to Ireland in less than 3 years are totally aware of the system PIX as all of them had, at some point, used it a few times or frequently.

On the other hand, people who had been residing here for more than 3 years presented antagonism answers. The majority of this group (87%, which is 55 people out of 63) declared they used the system PIX before, while 13% (8 people out of 63) declared they had never used it before. In other words, when PIX was created in 2020 this group of people had been living abroad since. Even still, the majority of them showed interested on adopting PIX as online payment method, while only 13% remained stuck to the traditional online payment system in Brazil (same as Ireland had at the moment this study was done)

4.1 How Covid enforced – or influenced – people to move towards online payment?

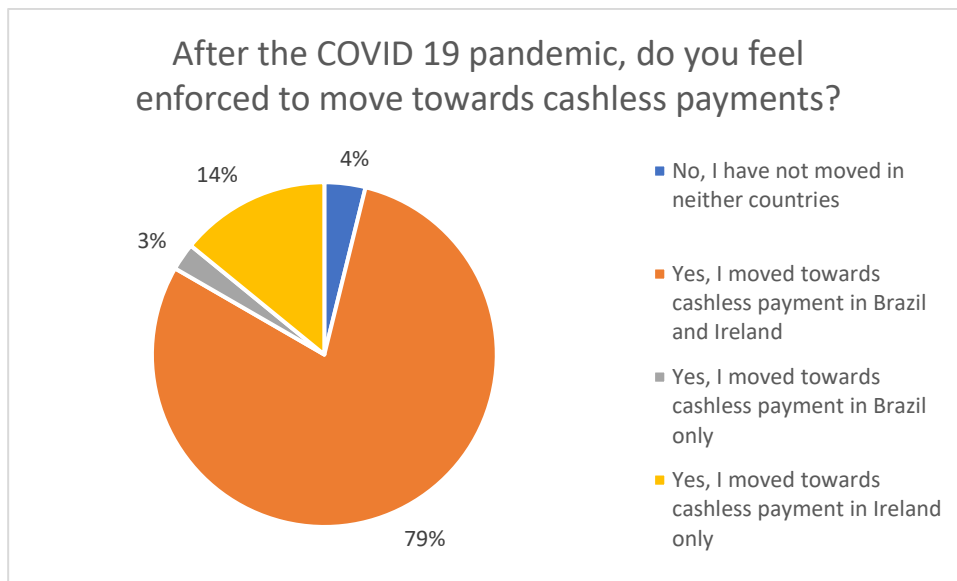


Figure 10 - Cashless payment movement due to Pandemic

The survey required participants to declare if they had moved to a cashless payment method due to the Covid 19 pandemic in 2020, and in which country this happened. This information can help understand how the pandemic had influenced people to change their payments habits and how much people adapted to it by sticking as cashless payers after the pandemic restrictions ended. According to the chart, the majority (79%) had moved to a permanent cashless method in both countries, 14% had adopted cashless payment in Ireland only, 2 of them (3%) had moved to cashless payment in Brazil and 3 (4%) declared they came back to cash payment after the pandemic in both countries.

Although the pandemic was not the main focus here, it is undeniable that it influenced people towards online payment, supporting the reduction in withdrawals registered in mid-year 2021 related to 2021, by Americas Market Intelligence.

4.2 An overview and comparison of how both countries online payment infrastructure work.

In order to properly analyze the infrastructure provided by both countries, this study counts with the assistance of IT professionals to support the literature review with their professional experience as well.

Parallel to what Leite (2021) presented as PIX infrastructure, in table number 3, interviewer Professional 1 complements his view about the address database. In his words, the database brings some challenges with it, such as financial and security. On the other hand, Professional 2 agrees about the financial part, and adds the technological aspect to the challenge as well.

Author: As an IT professional, what are the challenges that address database might have in order to operate properly? Considering that it joins the database from five banking institutions?	
P1	Well, I think the biggest challenge is to integrate the databases of all financial institutions in the country because obviously we are talking about personal data of individuals. And in the case of Brazil, let's assume that we have restricted data on millions of individuals that obviously have to be fully protected by the LGPD, and in addition to the volume of transactions that occur 24/7 So, the infrastructure needed to support this volume of data and this number of transactions has to be very robust so that there is no problem in the system.
P2	The biggest challenge is to support a database that big and important. That is the first step and that is the most important too. If you don't get the money, the project will not exist. Another challenge is the technological part, the integration that needs to be functioning 24/7 and all the work it would involve

Table 3 - Interview question about database challenges

Moving on to PIX operation possibility in other places, 1 says that the database infrastructure process could be integrated in Ireland, following a reverse pathway of what was done in Brazil. In other words, Ireland could (in the future) move to a payment system where there is a database to connect all the national institutions. Professional 2 follows the same argument but highlights that countries' needs are different, and despite being possible, maybe it is not the right moment for a small country to direct a big part of its finance's expenditures on a frequent basis. As shown in table 4 below.

Author: According to your professional experience and as a customer who uses both systems, do you believe that PIX is operational only in countries with a big population and few banking institutions? Or is it something that can be developed in a small country like Ireland, which has two banking institutions as well?	
P1	Well, it would certainly work in an Irish context because there are fewer institutions to do the database integration and there are also fewer users making use of these databases. In this case, it would be the reverse path of the system's scalability because we have successful cases such as Brazil, China and India using these instant payment methods, and we are talking about populations much larger than Ireland and with a greater number of banking institutions. So reducing and scoping to a country with transactions whose volume is reduced would certainly be an even easier implementation than it was in these countries. And not just a numerical issue, but also the issue of improvement.

	<p>Brazil has already been at the level that Ireland is today and has taken a step forward. The PIX came from this system that today is considered "traditional"</p> <p>And in addition to the ease that the tool brings to the application, it would also be more user-friendly, you would need to type less things and, from there, have more agility in the tasks.</p>
P2	<p>Oh that is absolutely possible. Once the project proves to function in a big environment, it is totally possible to be reproduced in a smaller one.</p> <p>But, it is vital that this smaller place with smaller population have in mind that this project represents a financial support that needs to keep going forever. And maybe a smaller place with smaller population just is not prepared to direct part of its financial expenditures to this project.</p> <p>At the end of the day is very relative. This small country might not do it because they don't need, or because it is not worth not invest on it right now, but maybe in the future.</p>

Table 4 - Interview question about PIX operation

However, moving to an address database system is not that easy as P1 explains. In his words, it would require an identification key standardization as – clearly – Ireland operates with IBAN and Brazil with other keys. Thus, the bureaucratic part would be too demanding, more than IT arrangements. Meanwhile, P2 explains that countries' bureaucracy and taxation are different and must be taken into consideration. Which explains why it is so difficult to integrate systems.

Author: Do you believe that the PIX system can be integrated with other countries' instantaneous payment as well?	
P1	<p>I believe that this is possible only if the integration (or normalization) of the unique keys between the tables of the database is performed.</p> <p>In this case an email would you think would be the most viable unique key because obviously we don't have the same national documents that are the same in other countries.</p> <p>But honestly, I don't see this happening anytime soon because database normalization, especially in such a large volume of data, population information is something that has to be looked at very carefully.</p> <p>And the work it would take to do that, I don't think it would be feasible nowadays because the tools are still recent.</p> <p>But then it is feasible, but thinking from the technological point of view, it is not viable thinking about the financial issue in the bureaucratic judicial issue.</p> <p>It would be possible in the technological issue, and perhaps in the financial issue, but the bureaucratic issue would be the biggest impediment because it is the most complicated due to the barriers and the time it would take</p>
P2	<p>Yes, why not? Nowadays we do have financial institutions integrating among themselves, you 're an immigrant, you manage to bring your money between countries, different banking institutions and system, you know that! Maybe it would require a more bureaucracy paperwork as countries have different laws and taxation. And unfortunately, it is all connected.</p>

Table 5 - Interview question about PIX integration

4.3 Differences and similarity between both account system’s identification, and digital e physical tools used in each country to assist people with online payment

Moving on to the similarity and differences between both systems, it was about time to analyze the public perspective regarding them. Saying so, the aspects brought into discussion were the identification keys, QR code and card reader machine.

The public were asked if they considered a significant difference the fact that PIX counts with five key identification while AIB / Bank of Ireland has one only. As shown in figure 11, the majority (87%) of the answers came back positively, against 13% that said no.

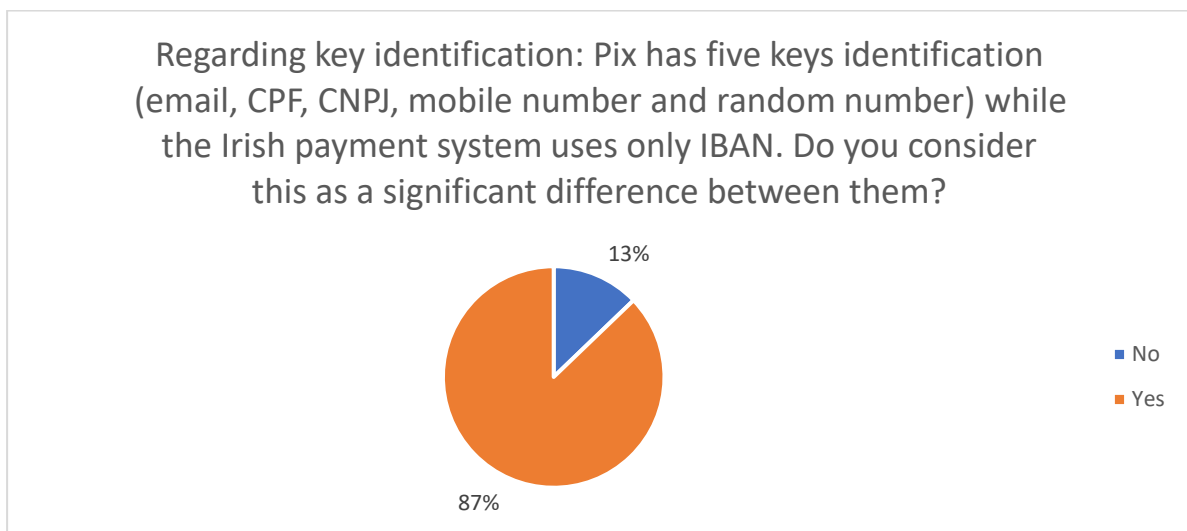


Figure 11 - PIX five keys identification and its significance

This information supported the idea that variety matters for the public. The more options of identification keys, the more significant it was for the civics.

In parallel, the interviewers provided information regarding how the uniqueness code works (as shown in the table below):

Author: What are the procedures that guarantee the PIX code is unique to each person?	
P1	Well, PIX is based on personal data that are already unique identifications from other sources such as the government itself, which provides CPF, RG and passport records. And it is the government itself that also ensures that these records are unique to each individual. Just like the phone companies that guarantee that the phone number is unique for everyone. And the same goes for email providers. So, PIX rely on these key sources because they are already guaranteed by their respective providers. Basically, PIX didn't create any new "records" to use as a key, it took advantage of other existing sources
P2	Banks use basic technological resources as machine learning or single source of

	<p>truth. By using them, it guarantees that a key is unique to each person, making it impossible to duplicate it. However, instead of creating a key database, PIX take advantage of those created by other companies or even from the government database. In other words, PIX accept email because email is already unique to each person thanks to Gmail or other company in the same field's database. PIX accept ID because thanks to the government database that grants each person a unique ID number, and the same for mobile number, passport, and CNPJ (company juridic number)</p>
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Table 6 - Interview question regarding PIX unique codes

So, PIX relies on these key sources because they are already guaranteed by their respective providers. Basically, PIX didn't create any new "code records" to use as a key identification, it took advantage of other existing sources.

About transaction time, people were asked if they consider PIX's instantaneous transaction more significant than the usual AIB / Bank of Ireland's traditional way. As shown in figure 12, 86% answered yes to this question, while 14% replied no.

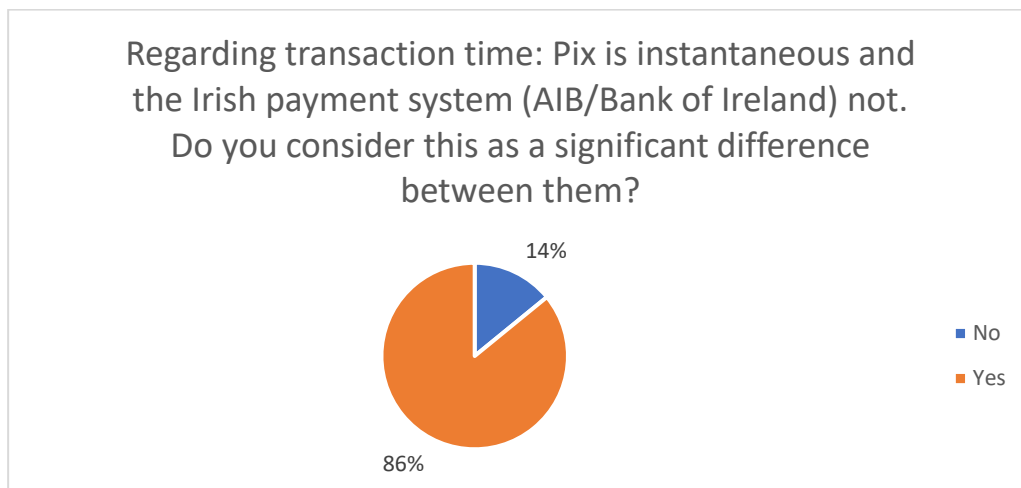


Figure 12 - PIX instantaneous time taken transactions and its significance

Regarding booking transactions, people were asked if they considered the fact that PIX allows transfers/payments bookings in advance as a significant aspect, while AIB / Bank of Ireland does not allow this function (figure 13). For this question, 85% said yes, while 15% said no.

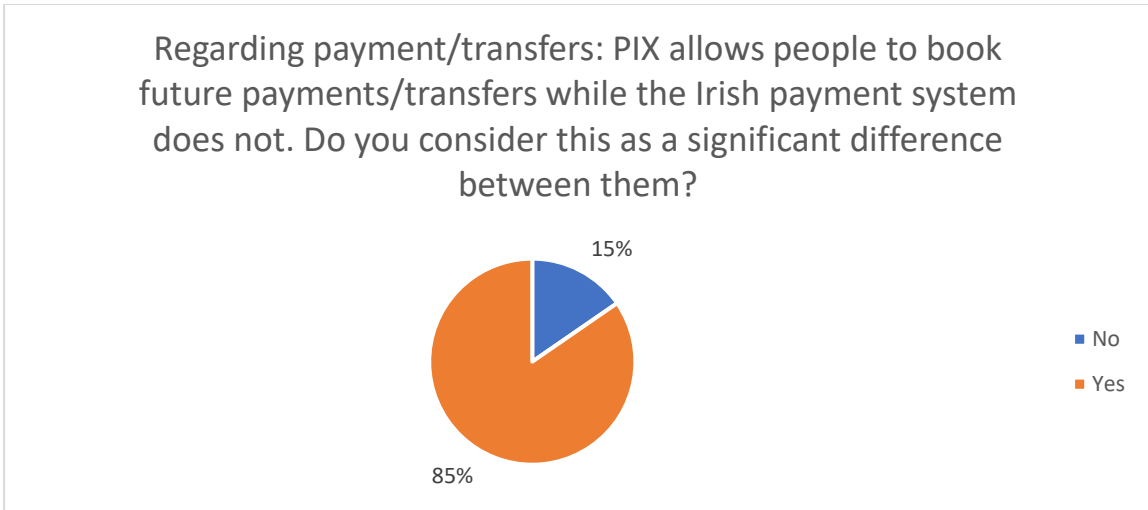


Figure 13 - Transaction’s bookings and its significance

About the transaction’s limit of money, people were asked if they considered significant the money limitation differences between PIX and AIB/Bank of Ireland. The first had no limit, while the second had a 1000-euro-daily limitation. As illustrated in figure 14, 91% found it significantly, against 9% who voted against.

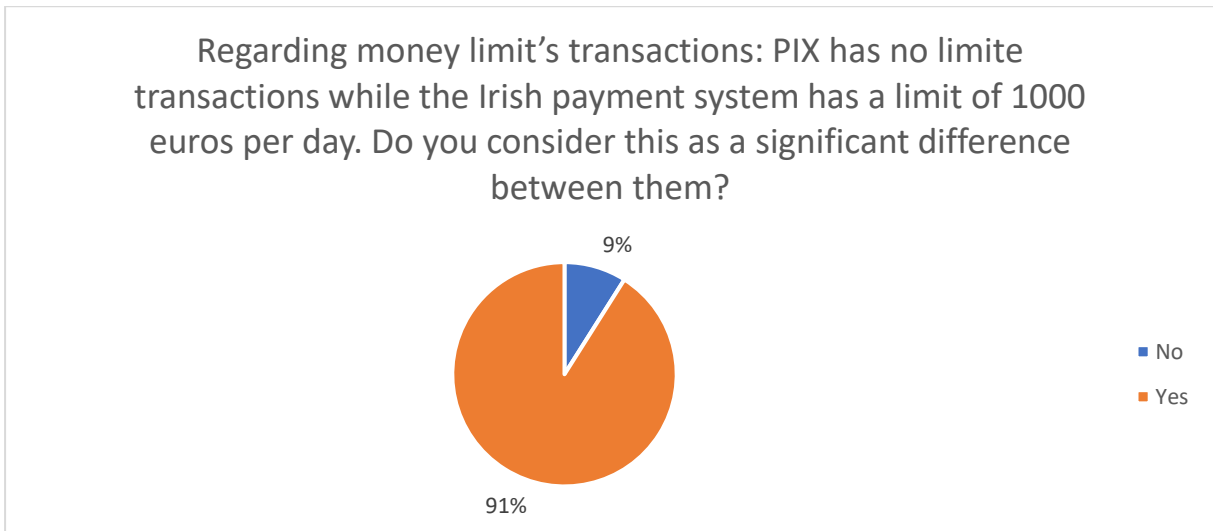


Figure 14 - Transaction’s daily significance and its significance

About QR code, the public were asked about the QR code that PIX uses as a way to do their transactions and if it was significant to them. As illustrated in figure 15, 85% of the public expressed it was important to them, while 15% did not see it as so.

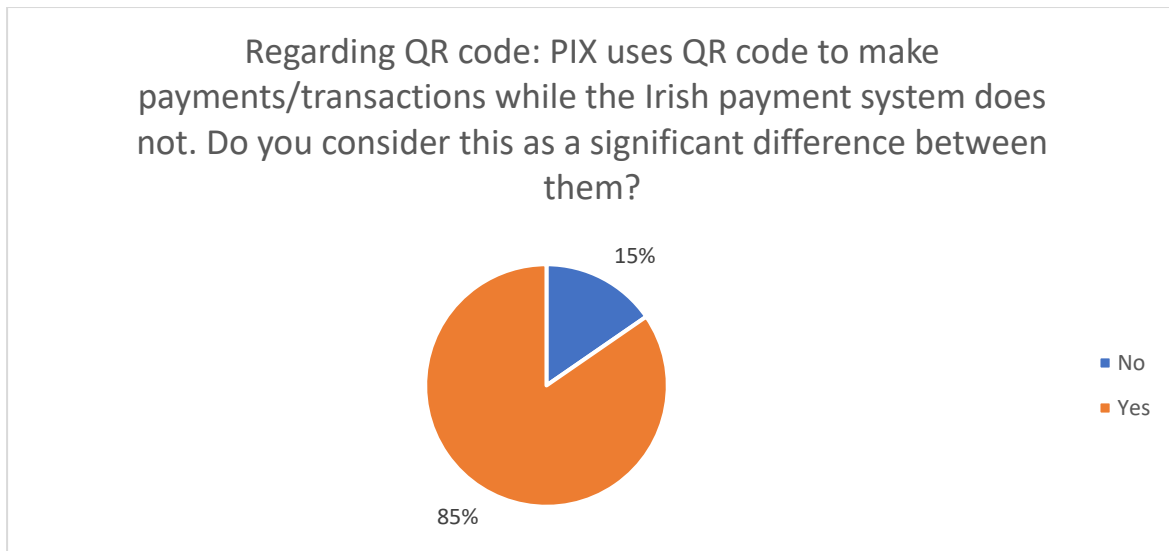


Figure 15 - PIX QR code and its significance

And lastly, talking about the systems differences, the public were asked about the importance of having a card machine as a way to aid in the transactions. Which is provided by the Irish payment system only (AIB / Bank of Ireland) (figure 16). As a result, 79% declared it as important, against 21% that did not declare it important.

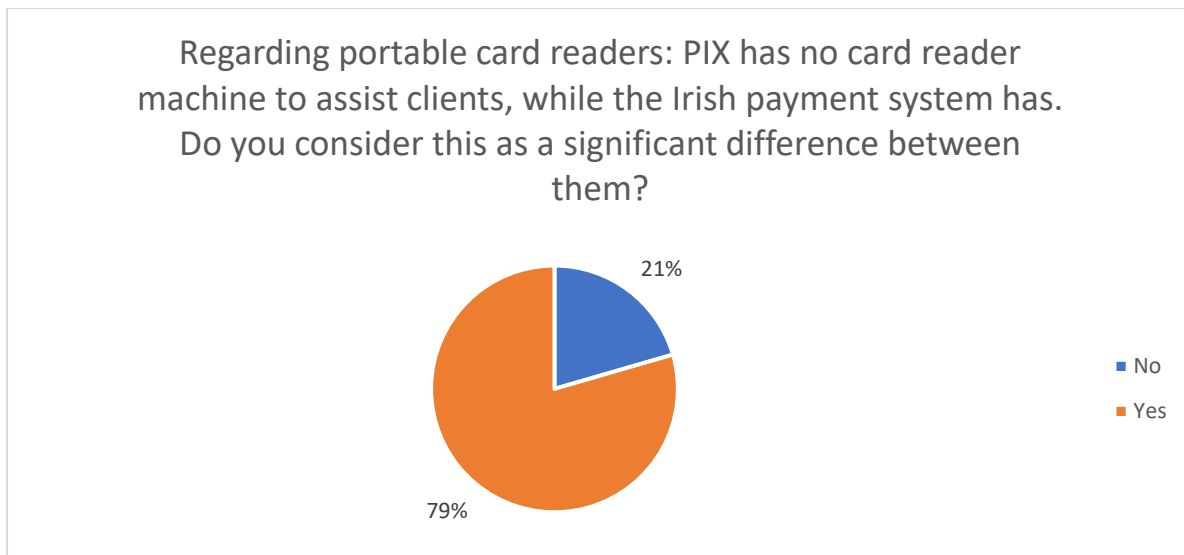


Figure 16 - Portable card reader machines and its significance

4.4 Advantages for physical person from both countries' payment system.

When talking about the advantages, all the items mentioned above (identification keys,

transaction time, transactions bookings, money limit, QR code and portable card reader machine) in the difference topic was brought into consideration again, it was already proving those differences are significant to the public, now this study needs to investigate the advantages they judge being better when compared PIX and the Irish system side by side.

To start off, let’s go through what people consider to be an advantage of the Irish system over PIX, illustrated in figure 17.

“One-key-identification” (IBAN) led the ranking with 33 votes, followed by “portable card reader” with 22 votes. At the same time, 22 people expressed that they don’t see any advantage of the Irish system over PIX. Meanwhile, “daily limit transactions” got the fourth place with 18 votes, and the “traditional transaction time taken” got the last position with 9 votes.

Which of the options below do you consider to be an advantage of the Irish system over PIX? Mark more than one if necessary

78 respostas

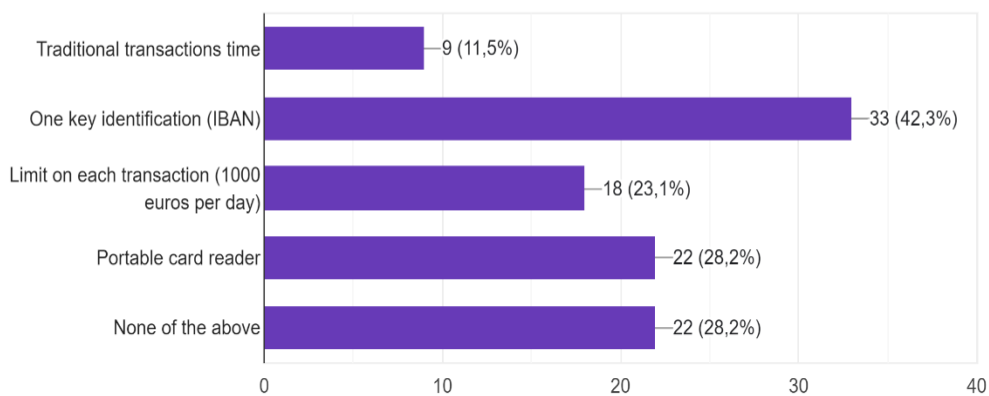


Figure 17 - The Irish system’s advantages over PIX

On the other hand, the participants were also asked to give their opinion on PIX advantages over the Irish system, and as illustrated in figure 18, the results were:

The majority voted “instantaneous transactions time” (65 people), followed by “no money limit transaction” with 42 votes. “QR code” and “five-key-identification” both received 34 votes, while “transactions booking” got 30. And only 4 people declared that there is no advantage of PIX over the Irish system.

Which of the options below do you consider to be an advantage of the system PIX over the Irish system? Mark more than one if necessary.

78 respostas

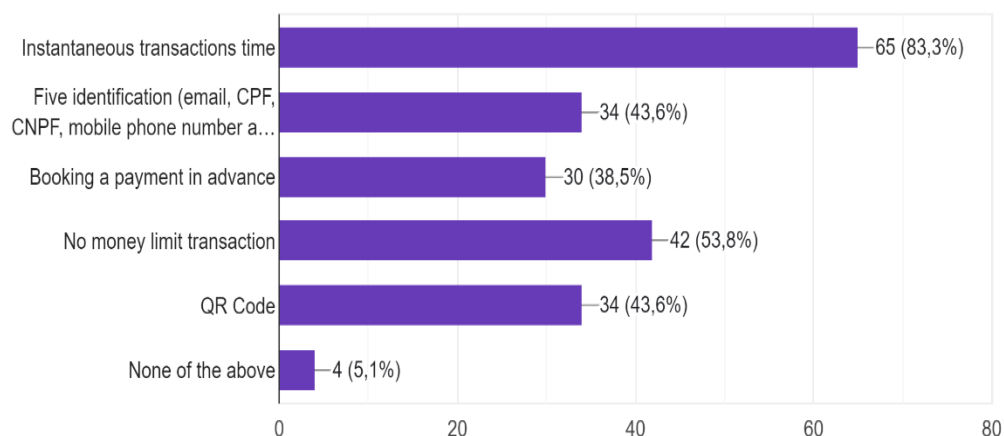


Figure 18 - PIX's advantages over the Irish system

In accordance with what Leite (2021) discussed in the literature review, this information represents the benefits people perceive in their daily activities. And as any experience is different, people perceive advantages differently as well. Moreover, it could be extracted that for people, the Irish system holds “one-key-identification” as the biggest asset while PIX has the “instantaneous transactions time taken” as asset.

4.5 Disadvantages for physical person from both countries' payment system.

From the literature review about disadvantages, it was highlighted that PIX's irreversibility is a problem once human errors happen frequently, such as mistaken key identification typing.

Saying so, when asked about disadvantages regarding both systems, IT professionals said as followed in table 7:

Author: Do you believe that PIX might have relevant gaps?	
P1	Yes, the fact that PIX transactions are not reversible is a point where there can be improvement because a person can mistakenly perform an improper transaction and PIX does not allow you to do the reversal. So, I think this would be the first point to be thought about in terms of improvement

P2	Yes, PIX is irreversible. Which some professionals from same area as I justify the fact that PIX is two years old as excuse, but not for me. Especially considering the criminality and scammers taking advantage of it. So, who PIX's irreversibility benefits to? The users or criminals?
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Table 7 - PIX's relevant gaps

Professional 1 confirmed that PIX's main drawback is the irreversibility. Even if caused by a human error, such as mistaken typing. While professional 2 discussed if this irreversibility is benefiting the users or criminals and scammers who take advantage of it.

Moving on to the Irish system drawbacks (table 8), from the literature review we have got the information about time taken between transactions. In parallel, P1 considered the mobile app interface and inoperative international transactions as challenges to be overpassed. While P2 talked about the translation service version that AIB/Bank of Ireland could have about important information such as terms and conditions.

Author: According to your professional experience and as a customer who uses both systems, do you believe that the Irish payment system (AIB/Bank of Ireland) has room for improvements? Why (not)?	
P1	Well, as a professional and a consumer of the service, I do believe that there is room for improvement, especially in the functions of the mobile app of banks, because user experience and user interface need improvement because they are not very intuitive applications. And speaking of features, I don't know if all banks are like that, but I have an AIB account and it doesn't allow me to make transactions to accounts in other countries, even if the banks in these other countries also use the IBAN. And technically IBAN stands for international Banking Account Number
P2	Well, every system has room for improvements, in AIB / Bank of Ireland's case, they could provide a translation version regarding their contracts, terms and conditions, and settings. Specially taking into consideration how important this information is, and how many nationalities are living in Ireland.

Table 8 - Irish system's room for improvements

On the other hand, from the literature review, another disadvantage rose was the cases of frauds

that both systems faced, P1 and P2 highlighted in table 9, criminal-social engineering frauds, such as cyber fraud (so called scamming) and burglary. The former happens when a person is deceived to transfer money to a scammer, and even median proof of that, the system does not take any responsibility to refund the victim. And the latter refers to robbery cases.

Author: Along with PIX popularity, do you believe there will be fraud cases?	
P1	<p>Well, I think the frauds have decreased through loopholes in the system. But cyber frauds through social or criminal engineering have increased. For example, cell phone theft by burglars forcing people to unlock their cell phones and perform a transaction they obviously didn't want to do.</p> <p>Or scams by scammers posing as desperate relatives or friends in a fictitious situation in need of money.</p> <p>But so far, I haven't heard of frauds because someone has cheated the system</p>
P2	<p>Yes, for sure, as long as transactions irreversibility exists, there is no way people avoid frauds from happening. One thing is connected to other. See what happens with mobile theft in Brazil. Look how many scam cases there are out there. Come on, everyone knows a person who got frauded, don't we? Criminality is evolving too at the same extend to keep up with online payment methods, and some security plan must be taken into consideration, but it seems it is not PIX's irreversibility's case, unfortunately.</p>

Table 9 - PIX's possible frauds

And finally, turning back to the Survey feedback in figure 19, the public has spoken up about what they consider being the most impacting disadvantage from both systems. We have got:

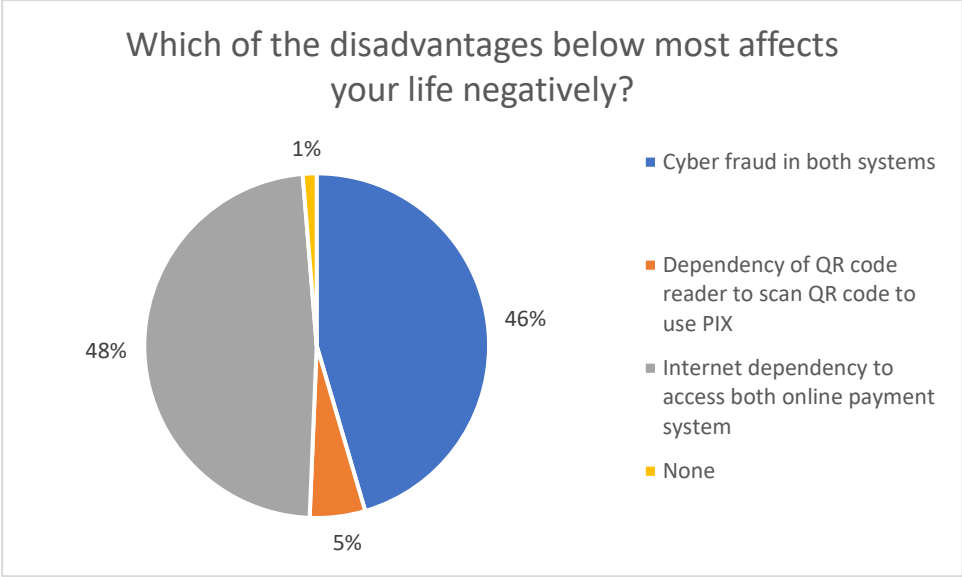


Figure 19 - Most impacting disadvantage

48% declared internet dependence is a big concern. Followed by cyber frauds with 46% voting for. In third place we have got the dependency of QR code with only 5%. And lastly, 1% voted as none.

Chapter V

5.1 Conclusion

Throughout this study, it could be concluded that:

Firstly, 96% of the survey participants felt forced to move to cashless payment due to Covid 19 pandemic.

Secondly, 90% of Brazilian people living in Ireland have been using PIX, against 10% declaring that they have never used it before.

Moving on, database was proved be the main character to break the paradigm between the “old” and “new” system

On the other hand, from the public perspective, all the differences between Brazil and the Irish system proved to be significant to the public. Being the “unlimited money transaction” the most voted (91%) and “portable card reader machine” the less voted (79%)

Comparing side by side, the public also voted “instantaneous transactions time taken” as PIX biggest advantage (83%) against the Irish system most voted advantage: “one-key-identification” with 42%.

On the other hand, the major disadvantages when talking about online banking is still the internet dependency (48%). An old, but unsolved issue.

And finally, it is about time to get to a verdict about the best system. From the survey in figure 20, it was concluded that 81% voted PIX as being the better system.

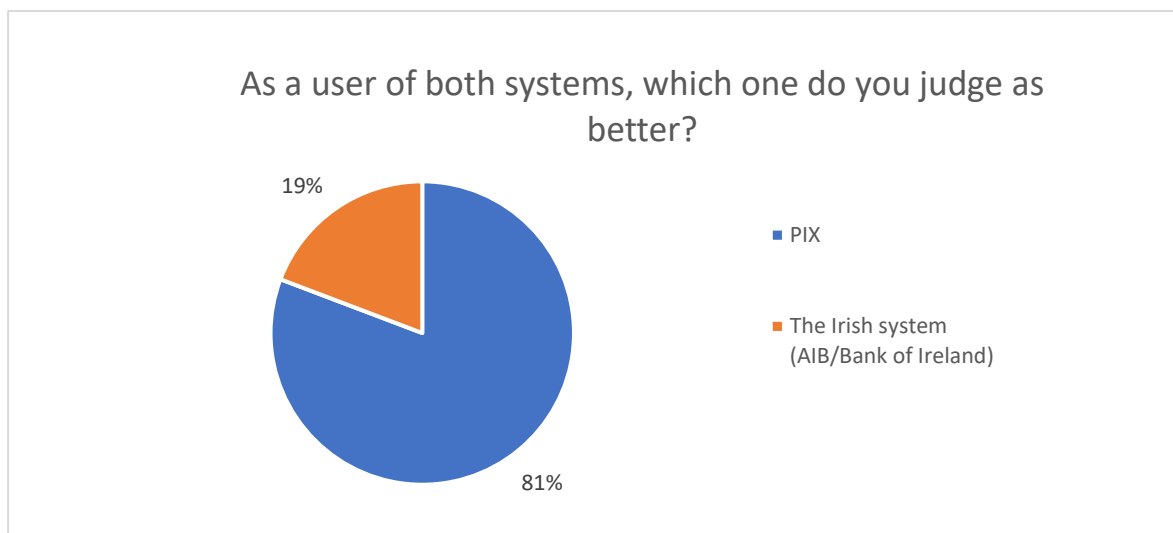


Figure 20 - Best system

Item	Question	Yes	No	NA
	<i>such characteristics may naturally occur within a general population, such as a sample of students)</i>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
		<input type="checkbox"/>	<input checked="" type="checkbox"/>	
<p>If you have ticked any of the shaded boxes above, you should consult with your module leader / supervisor immediately. You will need to fill in Form B Ethical Approval and submit it to the Research & Ethics Committee instead of this form.</p> <p>There is an obligation on the researcher to bring to the attention of the Research & Ethics Committee any issues with ethical implications not clearly covered by the above checklist.</p>				
<p>I consider that this project has no significant ethical implications to be brought before the relevant Research & Ethics Committee. I have read and understood the specific guidelines for completion of Ethics Application Forms. I am familiar with the codes of professional ethics relevant to my discipline (and have discussed them with my supervisor).</p>				<input checked="" type="checkbox"/>
Name of Learner	Daniel O'Sullivan			
Student Number	51702266			
Date	11/05/2022			
<p>I have discussed this project with the learner in question, and I agree that it has no significant ethical implications to be brought before the Research & Ethics Committee.</p>				<input checked="" type="checkbox"/>
Name of Supervisor/Lecturer	Daniel O'Sullivan			
Date	18/05/2022			

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