# An assessment of the key factors in the uptake of mobile banking apps

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# Abstract

**Title**: An assessment of the key factors in the uptake of Mobile Banking Apps.

**Purpose**: To investigate a person's intention to use mobile banking applications. Frameworks of Technology Acceptance Model and Innovation Diffusion Theory used to test perceived use, perceived usefulness, compatibility with lifestyle, attitude to trust, perceived risk and behavioural intention to use from the aspect of Age and Gender.

**Structure**: A quantitative approach was used, via a web-based survey. A questionnaire used closed question format to gather the data. The sample was made up of persons above 18 years of age.

**Value**: Gender and Age factors will bring an alternative view and will allow developers, marketers and applications builders understand the issues that prevail as barriers to uptake of mobile banking application.

**Conclusion:** The results have shown that under 8 of hypothesises reviewed it is concluded that gender and age do not differ and only 2 that of Perceived Ease of use and Compatibility with lifestyle both for age reject the hypothesis.

**Keywords**: Mobile Banking Applications, Technology Acceptance Model, Innovation Diffusion Theory, Age, Gender.

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# Acknowledgements

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# List of Abbreviations

| Name | Abbreviation |
|---|---|
| **Technology Acceptance Model** | TAM |
| **Innovation Diffusion Theory** | IDT |
| **EU** | European Union |
| **UK** | United Kingdom |
| **HQ** | Head Quarters |
| **ECB** | European Central Bank |
| **CB** | Irish Central Bank |
| **US** | United States |
| **IT** | Information Technology |
| **PEOU** | Perceived Ease of Use |
| **PU** | Perceived Usefulness |
| **Statistical Package for Social Sciences** | SPSS |

# Chapter 1 Introduction

The global Bank Crisis 2008, caused the world's financial landscape to change and is ever evolving (Peña, 2017). Fintech's growth over the past 10 years has been driven by the growth of the digital economy, sales of smartphones. Financial and tech companies look to fill the voids of unfulfilled demand and build a stronger more resilient Financial sector (Mnohoghitnei *et al.*, 2019). At the start of the financial crisis Fintech companies used the spirit of entrepreneurship to drive the sector (Gozman, Liebenau and Mangan, 2018).. Finance and technology always had a relationship, but the evolution Fintech was different, born out of available venture capital, and the need for new easy to access product offering and the transformation of traditional financial business channels (Gomber *et al.*, 2018). The nucleus of Fintech was not 2008, but with the advent of ATM's in the UK in the mid 60's

In an Irish context 33% of consumers would be more likely to shop in a store with the ability to accept mobile payments via smartphones. Currently the Irish consumer spends €3 billion outside of Ireland of the €5 billion spent online (PWC, 2018). This research will look argue the factors that affect the of mobile banking applications and how this information may enhance understanding that could be valuable to improve the offering. As traditional banks endeavour to integrate these products though systems that are outmoded and dated leading to slow uptake by consumers (Sebastian *et al.*, 2017). In the past the retail bank has used an 'inside out' approach when selling to a consumer, through cross selling financial products or advisory services. It argued the new approach should be 'outside in' and be more customer centric (Schäfer, Moormann and Rosemann, 2012). This area lacked any in depth study in Ireland, as only one peer reviewed document. In this study Duane, O'Reilly and Andreev (2014) highlighted trust as the single most important factor. But accepted sample size and age demographics as limitations on their result. It has been put forward that research to date has been shown to concentrate on 6 areas (Lee, Zhang and Chen, 2013) :

- Online banking versus mobile banking,

- Using mobile banking and its benefits

- The resistance factors to the uptake of mobile banking

- The functions or features of mobile banking

- Device's that are used for mobile banking

- Related security issues for mobile banking.

Mobile payment apps are a technology that gives a user ability to pay for products & services though their mobile smart phone using standard wireless systems. Initially consumers were confused as to the purpose of mobile payments and the requirement to use (Dahlberg *et al.*, 2008). But over time the growth in this sector has been extensive being the largest investment sector by private equity firms (Zalan and Toufaily, 2017).

In the past bank's had a physical network to build market share and multi market strategy, and by reducing the branch network savings of 23% can be made (Ruiz-Hernández, Delgado-Gómez and López-Pascual, 2015). This drive for new business channels, using digital technology in conjunction with a reduced physical presence on the high street (Sajić *et al.*, 2018). As banks drive to reduce operating costs and increase traffic via mobile operators, research shows that the perceived risk by the consumer is not a barrier to uptake of new mobile applications (Dash, Bhusan and Samal, 2014). Fintech is seen as a disruptive technology to the whole banking sector. It has not yet proliferated the commercial sector only the mobile payments consumer sector is its biggest growth area (Zalan and Toufaily, 2017). In the past the barriers to the growth of the mobile payment sector had been issues with the technology infrastructure such as: lack Near field Communication type phones, retailer terminals, security, but this is now a diminishing issue (Meijer and Bye, 2011). All discussed papers are the limited uptake of payment apps in the developed countries (Slade *et al.*, 2015). Banks are now in a battle with low cost financial service providers and the consumer is only *"just a mouse-click away from competitors"* (Schäfer, Moormann and Rosemann, 2012).

While some reseach to date has agrued that percived risk of the consumer is not a factor (Schäfer, Moormann and Rosemann, 2012) others argue a direct correlation between percived risk and related brand awarness as a imprtant factor in the uptake / success of the banking apps (Chen, 2013). This research will not look at brands specifcally in the litrature review what will be considered is Irelands' own banking crisis (O'Sullivan and Kennedy, 2010) as this may impact on percived risk. UK studies have highlighted security and privacy concerns as barriers to uptake (Mukhtar, 2015) which will allow comparability for review.

Comparison has been made internationally on country versus country uptake and how European countries can lag behind China on consumer up take of mobile solutions (Korella and Li, 2018) this research may allow measurement if required against other EU member state countries. Studies uncovered the factors of trust, risk, security impact and usage of banking apps but have failed to use gender information in their results and how it may the influence on uptake (Muñoz-Leiva, Climent-Climent and Liébana-Cabanillas, 2017; Komulainen and Saraniemi, 2019). The research will look at how gender may have an influence on perceived risk as has been done for similar studies with reference to shopping apps (Tan and Ooi, 2018).

The concept of Digital Natives and Digital Immigrants brought into discussion those born before and after 1980 (Prensky, 2001) and the fact we must understand how both approach the uptake of modern technology to be understood and appreciated. This paper will argue on whether this concept still pertains today, and it is still a consideration for apps in general not just related to banking related products.

This research will be using the template created by the Technology Acceptance Model (Davies, 1989) (TAM), and the 6 factors that influence a consumers uptake of technology. One factor already alluded that it does not cover is risk, as this is a core part of the research, we will be expanding on this model in order to address this which will be highlighted in the Literature review.

# Chapter 2 - Literature Review

## 2.1 Introduction

This Literature Review will investigate all the relevant factors related to the uptake of Mobile Banking Apps. The paper will be looking for gaps and formulate the research question and hypothesis as a result. A review of the world banking crisis followed by digitisation of the banking industry and factors that drove this related to the advent of Mobile Banking Apps. Followed by the growth of fintech following the period of the  world banking crisis (Peña, 2017) and how they exploited the market.  Finally the paper will approach to the issues of risk and trust (Chen, 2013; Duane, O'Reilly and Andreev, 2014) and how they are associated to gender (Venkatesh and Morris, 2000) and age (Gomber *et al.*, 2018) in order to try and uncover the driver of mobile banking adoption

The Theoretical framework put forward for this research is the Technology Acceptance Model (TAM) (Davies, 1989) this theory has been the default for many of the papers (Duane, O'Reilly and Andreev, 2014; Kalinic and Marinkovic, 2016; Sathitwiriyawong and Phuttaraksa, 2018) and point any flaws in the models. This theory will allow us to look at the factors that affect the uptake of technology by consumers. In addition the Innovation Diffusion Theory (Rogers, 1983) will help the paper allowed for any short comings of the TAM model.

The growth of the mobile banking may not be solely due to fintech and traditional banking, but the growth of smartphones  could also have driven the sectors (Noh and Lee, 2016). Part of the analysis with relate to gender (Yau and Cheng, 2012) and age the concept of digital natives and immigrants (Prensky, 2001) and how they be correlated (Tan and Ooi, 2018), and effect on adoption.

Other factors argued will be considered for the review are how banks have had to adopt their business model (Komulainen and Saraniemi, 2019) to adapt to the digital changes and the requirements of the customer.

## 2.2 World Banking Crisis

### 2.2.1 World Financial Crisis

"Silicon Valley Is Coming" Jamie Dimon, JPMorgan Chase's CEO, forewarned investors (Dimon, 2014) this added to the increased regulation, banks had imposed by Congress in America, concentrating on regulating Wall Street following the World Banking Crisis created the gap in the market for the growth of Fintech (Magnuson, 2018). Fintech is "any kind of technological innovation used to support or provide financial services" (European Central Bank, 2018) so while a traditional bank is made up of a HQ , branches , they maintain deposits, provide loans and maintain accounts, fintech's maybe a single office and are just start up with an initial idea and very limited barriers to entry (Van Loo, 2018). In 2017 it was estimated that over $75 billion was raised across 64 countries to fund fintech companies across many product types (Gomber *et al.*, 2018) while this is not an indicator of success it shows that investors are willing to invest in the $7 trillion dollars transacted in the US alone (Wika *et al.*, 2019). This industry is made up of many facets and products from blockchain to cryptocurrency to peer to peer lending. For this paper we are concentrating on the mobile banking applications as used by the consumer only non-business products.

### 2.2.2 Irish Banking Crisis

When we investigate the world banking crisis, we cannot ignore the impact in Ireland. The impact on the Irish economy at this period cannot be brushed over both from a societal and business viewpoint given that banks are the "fulcrum around which the economy turns" (O'Sullivan and Kennedy, 2010) and the fallout that ensued as a result. While some would argue the outcomes were as a result of the crisis, it was due in part to bad government policy and participation in the politics of the 'Galway Tent' plus the communication to Ireland and beyond we are just going to have a 'Soft Landing' (Taylor, 2011).

While others have contended that it may be more related to the Behavioural Science in the decisions been made whether that of Bankers, politicians and regulators (Lunn, 2013). By late 2010 Ireland had been bailed out to the tune of €85 billion (Gleeson, 2014) and so began the process of Ireland trying to recover from one of the worst Eurozone downturns (McDaid, 2014).

What had also been proffered through various papers was the relationship between bankers and politicians (Taylor, 2011; Lucey, Larkin and Gurdgiev, 2014; Clarke and Henderson, 2016) how the relationship between them had an impact on regulation, decision making and how to address the fallout / bailout. Through these relationships we see an uneasy relationship between the Irish State and Irish Business. For example, the tribunals of beef (90's), the McCracken, Moriarty and Flood/Mahon related to planning in 90's and 2000's all points to the uneasy relationship for the Irish public between the political elite and the related business.

The approach made by all bank to its customers pre 2006 was one of sell a financial product, followed by cross selling across a range of products (Schäfer, Moormann and Rosemann, 2012) lack of adequate governance ultimately resulted in house prices falling by over 50% from peak period and an estimated 314,000 mortgages in negative equity by late 2012 (Duffy, 2014). Thus a difficult relationship between customer and the 'bank' causing the "stress in suburbia" (Waldron and Redmond, 2016). Now begin to see the relationship with the bank change, mistrust becomes a factor (Ross and Squires, 2011) as people in mortgages arrears also struggle with other financial instruments that have been sold to them (Waldron and Redmond, 2016). As the crisis developed and the arrears grew the lack of forbearance shown by the banks, and the results of their lending practices is a contributor to mortgagors distress compounded by austerity (Waldron and Redmond, 2016). Thus, a study on mobile banking apps that will also consider trust and risk as part of the research may have to comment on this following the review of the data correlated. This is now a period of rebuilding for the Irish Banks as result of reduced consumer trust born out of the crisis and resulting recession bank need to rebuild their brands in order to gain back trust (Wallace, de Chernatony and Buil, 2011).

## 2.3 Banks Moving into a Digital World

### 2.3.1 Introduction

This section will look at the relationship between the bank and its customer has evolved over the time. The influence of regulation, the growth in digital technology impacted both the customer and bank. Plus, the attitudes of trust and risk to and by the banks as a result of this crisis.

### 2.3.2 Crisis Changes Banking

As the crisis grew, the banks came under pressure from turmoil of the financial markets as the instruments they had sold spiralled into difficulty. For example, in 2007 the vision of queues formed outside the offices of Northern Rock, UK, depositors endeavouring to gain back their monies, this had not been seen since 1878 and the collapse of City of Glasgow Bank (Goldsmith-Pinkham and Yorulmazer, 2010). The UK public reacted to this and the banking sector were then worried about the 'contagion' effect (Mülbert, 2010) and had to react. The perception that the bank was one of "privatised gains and socialised losses" (Borg and Hooker, 2019) again the relationship of the banks to the public changing. Around the crisis the erosion of trust especially in countries that are over-indebted around Europe such as Greece, Ireland and Iceland (Järvinen, 2014) and this in conjunction with lack of customer services falling below expected standards (Monferrer-Tirado *et al.*, 2016).

Through management theory the managers of business organisation are asked to maximise shareholder wealth but in Edward Freeman (1984) book '*Strategic Management: A Stakeholder Approach'* he argued the concept there are other stakeholders, one of those being the customer and they should be looked after, but through this period this wasn't managed (Maxfield, Wang and de Sousa, 2018). Some gained from the fallout of the market, for example

Michael Burry, indicating that Alan Greenspan and the Federal Reserve should have seen what his research saw of the US mortgage market (Burry, 2010). Regulators and governments on both sides of the Atlantic had to act. For this US & UK could control there monetary and fiscal policy, while Ireland could only control fiscal and deferred to the ECB for monetary control.

### 2.3.3 Regulation

As the crisis took hold, regulators now tasked with risk management through controlling the banks, who are placed in an industry for the purpose of order. They create the normal practices and if they see divergence they should act and sanction (Scott, 2014). As other research indicates the 'cosy' relationship between the Irish government and big business can often be intertwined (Taylor, 2011) during this period showed that three problems with the regulation in Ireland:

1. *"Gaps in problematization and advocacy of new practices"*

2. *"unwillingness to use force or sanctions, and"*

3. *"A lack of engagement with institutional contradictions"*

(Motherway, Pazzaglia and Sonpar, 2018).

These meant, as lending practices changed, new financial instruments were launched the regulators did not understand the full implications of the products. The Central Bank was not seen to sanction any large banking institution for breach of rules and not fully understanding the factors at play or had not been listening to the market and did not have transparency over banks, but this was not just isolated to Ireland (Huang, 2007). Ten years on the Irish Central Bank have understood errors of the past and made changes in the expectation they will not be in a similar position, among the measures are:

1. *Have sufficient financial resources, including under a plausible but severe stress;*

2. *Have sustainable business models over the long-term;*

3. *Be well governed, have appropriate cultures, with effective risk management and control arrangements, and*

4. *Be able to recover if they get into difficulty, and if they cannot, be resolvable in an orderly manner without significant externalities or taxpayer costs.*

(Central Bank, 2018)

In the US the issue of regulation is more difficult for banks as they must satisfy monetary and fiscal policy. The impact of politicisation on their system and the ability of policy makers to influence policy which may lead to an injection of 'juice' of the system (Leuitin, 2016) is always a concern. The 'Too Big to Fail' theory was tested during this period with the fall of Lehman Brothers in 2008, emphasising the interconnection of banks linked to Morgan Stanley, Bear Sterns and Goldman Sachs. The US regulators needed to act in order to prevent a "spillover" effect (Yang and Zhou, 2010) and the Emergency Economic Stabilization Act 2008 was enacted as a Bailout for US Banks and other measures over time were put in place to prevent further banks from collapsing. This led to the 'Dodd-Frank Wall Street Reform' and 'Consumer Protection Act of 2010' which included parts of the 'Volker Rule' these impacted the risk taking, trading methods of banks and the products they sell (Ruddy and Boyle, 2014) but others research argue it didn't go far enough to curb the banks by not eliminating the possible conflicts of interest across the banking system (Avci, Schipani and Seyhun, 2018)

As in the US the interlinkage of UK banks was also emphasised (Yang and Zhou, 2010) following a 2008 Treasury Committee inquiry after the potential collapse of Halifax Bank of Scotland only saved by a merger with Lloyds TSB as the UK government took a large stake (Dewing and Russell, 2016). The inquiry pointed to the risk taken by bank mangers for high rewards (Koslowski, 2011) that needed to be addressed through regulation. The UK banking system is now managed by:

- Bank of England,

- Prudential Regulation Authority,

- Financial Conduct Authority.

All are tasked to ensure compliance and risk is managed correctly, and the system does not put risk ahead of the customer thus reducing the self-interest of managers for short term gain (Aldohni, 2018). It's this regulation in conjunction with the legacy IT systems within banks that created the opportunity for Fintech (Hussain, Bhatti and Rasool, 2017)

## 2.4 Fintech Opportunity

Opportunity was created in part by not having to adhere to the regulation that for banks. Fintech companies were set up with ability via their versatile corporate structures to take full advantage of the new digital age of banking (Kim and Mauborgne, 2009). Over 25 years ago Bill Gates equated the banks to dinosaurs, it's as true now as it was then, while banks work through digitization only concentrating on the most basic customer transaction, fintech has seen the opportunity  (Mills and McCarthy, 2017).

Fintech is based on innovation, the past the constraints of funding to succeed was a barrier, but now the advent of new funding models provided them with the ability to enter markets previously blocked by large existing firms (Block, Fisch and van Praag, 2017). Regulation of large banks through the likes of Basel II and III created more and more acknowledgment of market risk. Fintech tried to get funding via the traditional bank route, this was blocked as the new internal risk models of the banks would not allow them to lend, and so they turned to "crowdfunding" (Block *et al.*, 2018). Crowdfunding explained as the colloquial term to describe a number of funding methods usually via the internet (Ahlers *et al.*, 2015).  Some would conclude the emergence of fintech is due to the financial crisis & the resulting regulation, together with the emergence of technologies related to the internet (Block *et al.*, 2018). Others

would contend that is due to innovation, new technology designed to be different to normal offering plus business models putting customers at the core, not the institution, and in actual fact helped the banks adjust to administering regulation (Gomber *et al.*, 2018) at the same time.

Other factors affecting the relationship between banks and the consumer was service. Customer trust in the business relationship is created by the expectations of this will be conducted in the future (Monferrer-Tirado *et al.*, 2016) and through this period this was not always the case. The relationships were shown to have deteriorated across Europe, as the lack of transparency, mis selling and perceived lack of personal communication to customer from the banks grew over the years (Linsley and Slack, 2013; Monferrer-Tirado *et al.*, 2016). Banks distanced themselves from their customer, they should have been ensuring that all stakeholders were been managed, ensuring that ethical practices were been pursued (Fassin and Gosselin, 2011). What was required was for banks to use simpler products in order to regain trust and eliminate perceived risk  (Järvinen, 2014)

Fintech companies reacted to this by building 'customer centric' systems, putting customer values at the forefront of business drivers (Liang and Tanniru, 2006) and ensuring the value chain (Porter, 1985) is continually changing to meet the customers expectation. This is especially important as the customer is continually interacting with the system, self-service is the key and engaging the customer (Gomber *et al.*, 2018). Fintech companies also are able to piggy back on the fact that there are an estimated 2.4 billion smartphone users worldwide and about 600,000 apps and the ability to access 600,000 iPhone (Schäfer, Moormann and Rosemann, 2012; Miliano *et al.*, 2018). Thus creating a 'blue ocean' strategy for their products in the 'red ocean' of banking (Kim and Mauborgne, 1984) which can be difficult as fintech companies and apps don't always succeed  (Basotia, 2019).

Table 1: Number of smartphone users worldwide from 2016 to 2021 (in billions)
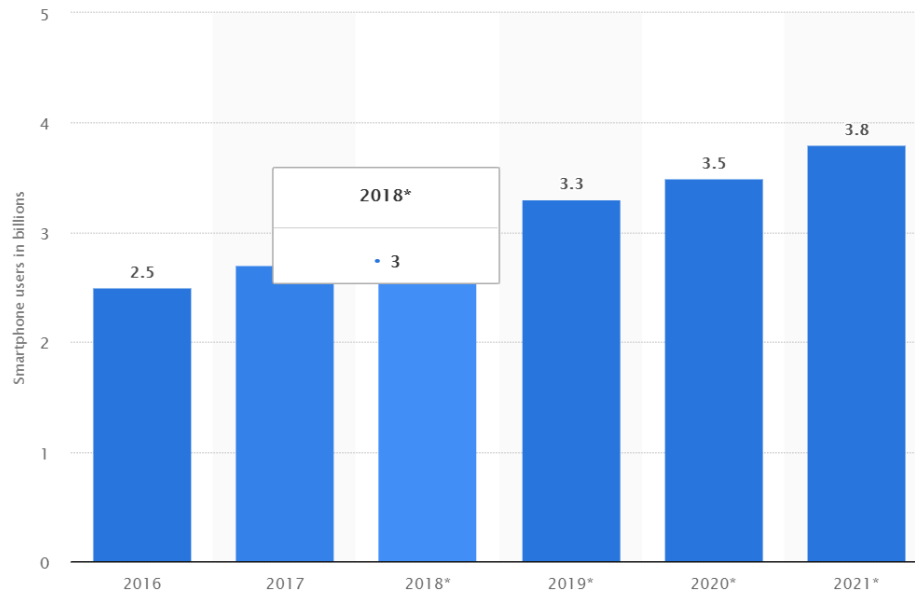
(Statistica, 2019)

Banks trying to compete with fintech have to deal with legacy IT systems that would require significant investment in order to bring up to date (Mills and McCarthy, 2017) while fintech businesses are software companies with modern systems not dating back to the 70's (Heidmann, 2010) and these systems can in some cases create barrier to progress against the newcomers (Flinders, 2019). This is not the case for all, we see evidence of Citibank restructuring in order to adapt and look at all facets of the business to meet the new challenges (Chen *et al.*, 2017) of the new banking world. It has been put claimed a lack of capital spending on IT infrastructure will lead to failures, as a result have implications and create investor unease (Benaroch and Chernobai, 2017) but it is not always about the capital spend, it is to ensure the IT investment and strategy are aligned (Sabherwal and Jeyaraj, 2015). As the innovators Fintech companies are in a prime position to be disruptors of the existing retail banking market (Gomber *et al.*, 2018)

### 2.4.1 Customer-Centric Banking

We have discussed, what possibility created the opportunity for Fintech is via regulation issues. This section will review what constitutes a 'mobile platform' and how both banks and fintech are moving towards a 'self-service' model, and how these new distribution channels are used to gain and retain customers depending on your starting point, existing bank or new entrant.

Irish banks try to still overcome the fallout out from the banking crisis, they now find themselves still overcoming factors 10 years later: including technology, bad loans and regulation among other things (Brennan, 2019; Cogley, 2019). The spend on banking infrastructure dealing with a 'hodgepodge of systems' with spending in the region of $519 billion worldwide, bringing the system together and deal with fintech (Deloitte, 2017). As new distribution channel for banking has been opened, mobile banking, Irish banks must also compete with the likes of Revolut[1], N26[2] or Monzo[3] in this sector. Plus, the change in the way customers interact with their bank, the traditional bricks and mortar approach has changed and the need for physical outlets is diminishing. Papers have shown that providing the an e-commerce solution is more important than providing the human touch solution (Ba, Stallaert and Zhang, 2010) but ensuring at the same time you have built an adequate e-commerce platform to satisfy the consumers' needs is imperative as it could affect the customer retention levels (Bitner, Brown and Meuter, 2000; Hitt and Frei, 2003).

## 2.5 Mobile Banking

Mobile banking is a form of banking that allows customer to access services anytime, anywhere via a number of platforms thus reduce the need to visit the physical bank. Availability and number of services can vary from the type of platform being used to the bank or fintech been engaged in order to access

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[1] https://www.revolut.com/
[2] https://n26.com/en-eu
[3] https://monzo.com/

these services. Different platforms are: Internet via Tablet or PC's, Smartphone access, Dial up Telephone service or in branch self-service unit. As the consumer requires an 'always on' connectivity we now see the shift away from PC and moving more to mobile devices and laptops (Püschel, Afonso Mazzon and Mauro C. Hernandez, 2010). Since consumers look for more convenient methods of banking, the industry is looking to move their services to the mobile network platform (Pousttchi and Schurig, 2004). Presently we have many ways to access mobile banking (pc's, tablet, portals) but the smartphone has become the device of choice for the public (Pew Ressearch Centre, 2019) this is now the focus. This form of interaction can have many benefits for the customer, but for the financial sectors a cost effective way of gaining a competitive advantage over the competition (Kim, Shin and Lee, 2009). The market has agreed the growth of mobile banking is the model and the way of the future (Cummins *et al.*, 2014) as people change how they interact with the banks (Choudrie *et al.*, 2018) the issue has been the pace at which the consumer has adapted to this shift in technology as they get to grips with the ongoing changes (Alavi and Ahuja, 2016) but also having to understand that we cannot be separated from the technology of today (Weiser, 2002).

Table 2: Smartphone market share

| Company | 2017 Shipment Volumes | 2017 Market Share | 2016 Shipment Volumes | 2016 Market Share | Year-Over-Year Change |
|---|---|---|---|---|---|
| 1. Samsung | 317.3 | 21.6% | 311.4 | 21.1% | 1.9% |
| 2. Apple | 215.8 | 14.7% | 215.4 | 14.6% | 0.2% |
| 3. Huawei | 153.1 | 10.4% | 139.3 | 9.5% | 9.9% |
| 4. OPPO | 111.8 | 7.6% | 99.8 | 6.8% | 12.0% |
| 5. Xiaomi | 92.4 | 6.3% | 53.0 | 3.6% | 74.5% |
| Others | 577.7 | 39.5% | 654.5 | 44.4% | -11.7% |
| Total | 1472.4 | 100.0% | 1473.4 | 100.0% | -0.1% |

Source: IDC Worldwide Quarterly Mobile Phone Tracker, February 1, 2017

2017 smartphone market shares    IDC WORLDWIDE QUARTERLY MOBILE PHONE TRACKER, FEBRUARY 1, 2017

(Forbes, 2019)

Put forward is that mobile banking is not yet the preferred choice for customers of banks as they still use internet platforms for services (Nel and Boshoff, 2018) and evidence shows there is still a slow uptake on the mobile banking options available (Ramos *et al.*, 2018). A factor in this is: trust in the bank, the security risk and the impersonal nature of mobile applications has implications for the uptake (Muñoz-Leiva, Climent-Climent and Liébana-Cabanillas, 2017). While the expectation is that trust is related to the online factor it has been shown that 'cyber trust' is increased in the Online space and is in stark contrast with the increasing distrust of the 'offline' institutions (Etzioni, 2019) given that this is a time of increases in privacy violations through hacking and the related public discord (Chen, 2013).

Looking at mobile banking application as one of the steps in the innovation, as banks who do not or can't adopt these technologies, risk being left behind. The risk to banks financially is in the order of 25% to decline in profits if CEO's don't adopt their mindset to the changes and risk having their own 'kodak' moment, they will have to look acquiring and building for the next 50 years not reacting for the next 5 (Shaikh, 2017). How a company is structured will affect this approach also, as discussed fintech companies are software entities offering financial product and banks are looking to compete with this and ensuring they have the right roles at board level to adapt, is crucial so as to avoid negatively on the development of IT infrastructure for digitization (Benaroch and Chernobai, 2017)

## 2.6 Other Factors in the Adaptation of New Technologies

### 2.6.1 Introduction

As part the literature review two other factors have be argued as effect on the acceptance of new technologies. From an Irish context research does not review the concept of gender and age as factors in the uptake of apps (Duane, O'Reilly and Andreev, 2014). These will be included for the review in order to frame the discussion.

### 2.6.2 Gender

Gender has been studied as an influence in how people approach technology and the different reactions to new and changes in technology, from the initial perception of males to the actual use by females (Gefen and Straub, 1997). In some cases this may relate to trust of the technology or trust of oneself been able to complete the task on these devices (female) (Gefen, Karahanna and Straub, 2003) it may also relate to the perception of the technology (Ahuja and Thatcher, 2005). While at the same time some have seen no difference in the approach to Technology (Calluzzo and Cante, 2004) others say that they do not any difference in approach by females to males and this issue can be ignored (Block, 2004). Understanding the implications of the influence of gender on adoption can be important in the matters of training on new technologies, and how different parties approach the new technology and understanding how the information is imparted could be useful and a dual approach may be required (Venkatesh and Morris, 2000)

Due to the advancement of the technology through smartphone and mobile applications it is right to review the possible impact of Gender, if any, on the uptake of these new technologies. It will then allow companies to customise market strategies to allow for these possible differences, but at the same time cognisant that this is a study in 'western culture' and as such may not be valid in other cultures  (Yapp *et al.,* 2018). Price sensitivity related to gender and the related cost of using the app has also been reviewed (Ghose and Han, 2014) but still the element of perceived risk (Gefen, Karahanna and Straub, 2003) along with trust or lack thereof are the pre-dominant factors in usage (Riedl, Hubert and Kenning, 2010).

### 2.6.2 Age

Understanding the influence of age in the decision to adoption can also be factored in as part of the process. Will the new generation of customers trust the fintech's, in the same way that past generations trusted the traditional

banks (Gomber *et al.*, 2018). Or will the fact that you are a digital native or immigrant (Prensky, 2001) influence the approach taken to technology. The impact of social circles on uptake (Cummins, Peltier and Dixon, 2016) or will the consumer have to be targeted through segmented marketing to understand the product and be influenced to adopt (Cummins *et al.*, 2014). As digital native grew up with the concept of technology and perceived  ease of use and perceived usefulness (Venkatesh *et al.*, 2003) maybe an easy concept but what about the generation before and are they liable to resist change and will systems have to adapt to them rather than they adapt to the app (Vodanovich, Sundaram and Myers, 2010). While other studies show that as long as the functionality of the product is clear age may not be a factor (Kim, 2016) but in the same study gender had an influence on usage.

# Chapter 3 - Theorical Framework

## 3.1 Introduction

This section will introduce the theoretical models been used to create the hypothesis for this research and the factors that pertain to the adoption of mobile banking. A number of models were reviewed as part of this process and the two used have been adopted as the predominant ones used in studies reviewed (Mathieson, 1991; Gefen and Straub, 1997; Gefen, Karahanna and Straub, 2003; Tung, Chang and Chou, 2008; Lee, 2009; Brown, Venkatesh and Goyal, 2012; Kim and Shin, 2015; Kim, 2016; Hur, Lee and Choo, 2017; Muñoz-Leiva, Climent-Climent and Liébana-Cabanillas, 2017)

## 3.2 Technology Acceptance Model

The Technology Acceptance Model (TAM) sets out an individual's intention to use technology. TAM looks at perceived ease of use and perceived usefulness as the key factors of intention which leads to actual use. How free from effort relates to perceived ease of use and seeing if a system enhances an individual's effectiveness, is a better system for predicting use (Davies, 1989). Unless a developer of technology has taken care to understand these considerations or predicted behaviours, it can produce incorrect outcome resulting in poor uptake of applications. In essence, a product will either not be required or not seen as a benefit to the end user. This theory can also be influenced by the respondent conforming to social norms or social pressure and may have an influence of the research outcomes (Haegemans, Snoeck and Lemahieu, 2018).

In studies evidence shows that perceived usefulness is the leading determinant of intention and use (Venkatesh *et al.*, 2003) and other research has shown the ease of use does not have any impact in relation to uptake (Agarwal and Prasad, 1998) and usefulness was further proven in relation

usage over time (Davis and Venkatesh, 2004). The theory that an individual's beliefs will be determined by their attitude towards objects, and attitude being a form of 'behavioural control' on intention that's will result in 'actual behaviour' (Tung, Chang and Chou, 2008). When a product / technology is seen or perceived to be easy to operate the consumer will see the technology as useful and have positive attitudes towards the new application, as a result they are more likely to begin or continue to use a technology (Kim and Shin, 2015). For a company being able to understand how their customer will adopt a new technology will have an impact on profits in the face of money spent on R&D for new product and getting this balance right in order to put the customer at the heart of product design (Liang and Tanniru, 2006) will help to  minimise issues at launch and effect uptake.

As the TAM model has been used as the theory of choice this research will argue for this model in order measure the uptake of mobile applications this will allow us to correlation against similar research done, as it is one of the most widely used in research for end user acceptance (Kim and Shin, 2015). Although an effective model it is not without its shortcomings especially as it was designed in the 80's for technological impacts of the day but it has shown a lack of appreciation for the individuals own character, in conjunction with a longitudinal study would be done if time allowed but this is not feasible (Slade *et al.*, 2015). In addition the quality of the information can also be very general rather that specific it will indicated whether a system is easy to use or not but will not direct the research to the specific problem with its use and the other side it is a very cost effective method for research (Mathieson, 1991)

Alternate theories that are developments on the TAM model such as Unified Theory of Acceptance and Use of Technology (Venkatesh *et al.*, 2003) to address the shortcomings. These additional theories will be disregarded, and data gathered will be used against previous studies. As this study will be for apps that a consumer can chose or already using them, should eliminate the weakness of TAM (Lee, 2009).

**3.2.1 TAM Explained**
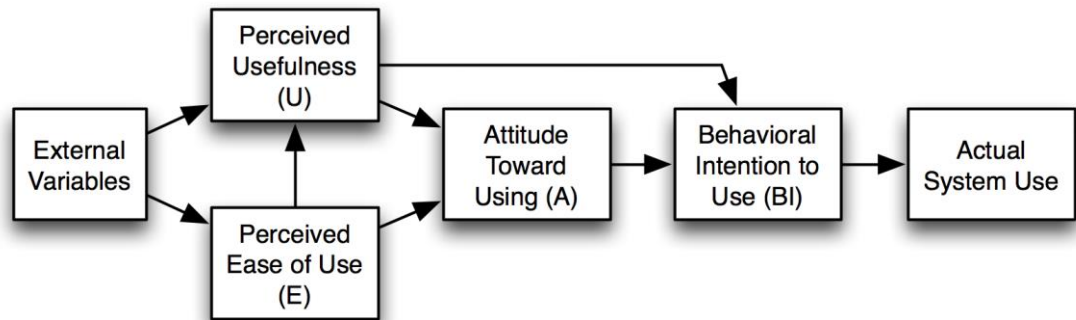


(Audunson and Evjen, 2017)

TAM is based on 2 factors that is 'perceived usefulness' and 'perceived ease of use' and these has been used to asses technology and its usage in many previous studies (Mortimer *et al.*, 2015). The two psychological factors of user acceptance of technology been perceived ease of use (PEOU) and perceived usefulness (PU). PEOU works on the premise that a user has the expectation that a technology is easy for them to master, and PU associates the benefits perceived by the potential user may gain from adoption of a new technology (Davis, 1989). As a result, there is evidence of expectation of PU and the resulting attitude, the more likely a person will adopt to use a new technology. If the perception of the ease of use is negative and may not enhance or increase the performance of their life likely uptake is negative (Surendran, 2012).

Davis (1989) ascertains that the two factors of PEOU and PU are the most significant factors in understanding the markers of future and current product technology usage and that PU had a greater significance to usage. The Tam model is based on assessing how technology / systems / applications will allow and individual to perform theirs tasks / jobs faster and more efficiently (Muñoz-Leiva, Climent-Climent and Liébana-Cabanillas, 2017). Upon this Davis (1989) also contended that if a technology has difficulty in usage this can be tolerated

if it is required for an essential function but also stated that if a technology has little or no PU absolutely no PEOU will offset this.

One the shortfalls of TAM is not recognizing Trust and the relationship it bears with technology adoption that 'overall trust' in the vendor of the application and trust in the ease of use (Gefen, Karahanna and Straub, 2003). Gefen (2003) extended the TAM model in this study to allow for trust, in relation to online shopping and how the vendor must understand the concerns of their customer that the can be eased and not to be concern they will by 'cheated' by the vendor. In addition to this the element of 'perceived risk' has to extended into TAM and has been used in past studies to allow for this (Tung, Chang and Chou, 2008; Lee, 2009; Muñoz-Leiva, Climent-Climent and Liébana-Cabanillas, 2017; Ramos *et al.*, 2018) and looking at whether risk has negatively influenced the uptake of banking applications. The correct communication of related risk issues is important for the parent company due to the continuous flow of data breaches as in the case of 18,000 British Airways customers personal details hacked (Jolly, 2018) which turned out to be 500,000 and the publicity around the £183m fine (Sweney, 2019)

**3.3 Innovation Diffusion Theory**

Innovation Diffusion Theory (IDT) has been put forward as to explain, over a time period, an innovative or idea for new products is filtered and adopted across a population or social system (Rogers, 1983). The theory was initially used in the communications sector and has been developed to work in many other sectors of research including technology. The acceptance or adoption is how an individual does something than was the case previously, the central key to adoption is that the individual must recognise the idea or product as innovative and new (Rogers, 1983).

Process through which an individual (or other decision-making unit) passes from first knowledge of an innovation, to forming an attitude toward the innovation, to a decision to adopt or reject, to implementation of the new idea and to confirmation

of this decision. Rogers states that the process of an individual's adoption of innovation is:

> *"Process through which an individual (or other decision-making unit) passes from first knowledge of an innovation, to forming an attitude toward the innovation, to a decision to adopt or reject, to implementation of the new idea and to confirmation of this decision"* (Rogers, 2003)

It is also put deliberated that during the decision process for the innovation uncertainty can enter the mind of potential adopters but the potential advantage to be gained for the adoption of the innovative product works as a motivator as a result they seek further information in order to help the process and with added learning remove the uncertainty. (Rogers, 1983). One of the core concepts of IDT relates to behaviours, includes certain "attributes" that can influence the adoption of innovation, tactics targeting innovation attributes can be implemented by an innovator in order to influence the motivation, and create the opportunities that can change the behaviours of the individual (Holly *et al.*, 2017). Innovation can have a number of attributes, according to Rogers (2003), there are five in particular that have the most impact on the adoption of an innovation:

1. Relative advantage: The extent to which the innovation better than a previous idea / product an organisation is then required to focus an offering incentive to consumers to help drive the change.

2. Compatibility: The extent to which an innovation is seen / perceived as being consistent with current values and past experience of the new customer / innovator

3. Complexity: The extent to which the product of easy or difficult to use. The easier to use the better as a product that is difficult to use can create a negative view and as a result impact adoption (Holly *et al.*, 2017). Making a product simpler to use or easy to learn with easy to follow instruction a eliminate any "misconceptions" about the product (Banerjee, Wei and Ma, 2012) and understanding the adopting is hindering and slowed by more complex innovation (Drape *et al.*, 2013)

4. Trialability: The extent in which an innovation can be experimented with could be over a limited period e.g trail period. Allowing the consumer, the opportunity to try it and can create desire to adopt. This can be important factor that consumers can trail new technology – such as 'beta' launches and live demonstrations of the product to potential customers (Holly *et al.*, 2017) and has been shown to have a positive influence on adoption (Dash, Bhusan and Samal, 2014)

5. Observability: The extent to which the results of an innovation are visible to others and the more the benefits can be seen by others the correlation is that the innovation more likely is to be adopted. We have seen how the creation of a role model (Holly *et al.*, 2017) or how people see other and how they have adopted (Dash, Bhusan and Samal, 2014) can accelerate this process.

## 3.4 Categories of Innovation



| Innovators 2.5% | Early Adopters 13.5% | Early Majority 34% | Late Majority 34% | Laggards 16% |
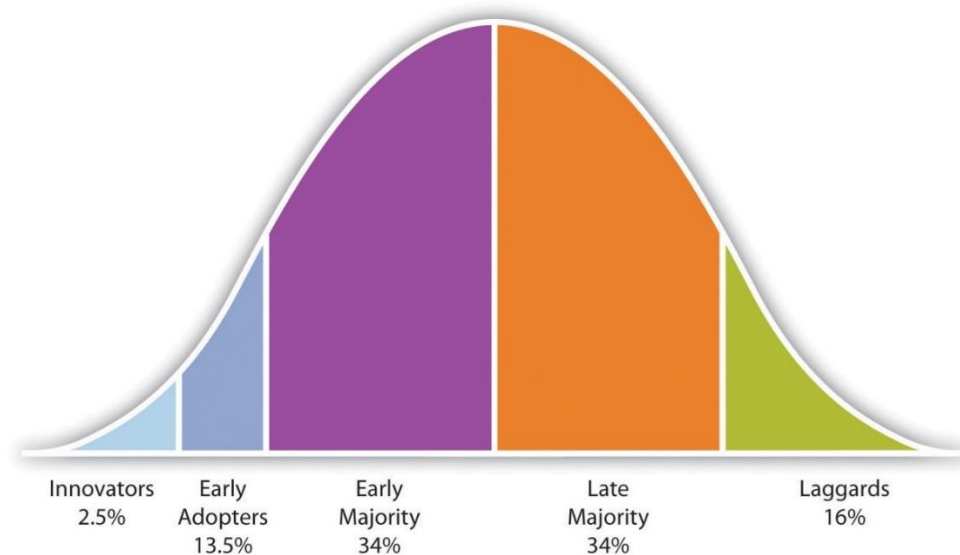
(LEENAERT, 2016)

There are five categories into which individuals are according to Rogers (1983) which is based on a person's willingness to adopt a new product or service. The categories in are:

- Innovators: People who actively seek out new products / ideas. These are individuals who are in most cases at ease with the uncertainty related to early adoption

- Early adopters: These can be opinion leaders or role models that respected in their social system as people look to these people for feedback on their experience of a product. These help in the reduction of uncertainty and give comfort for other categories of adopters.

- Early majority: Tend to be part of the 'herd' tend to be less affluent than do not hold positions of leadership in the immediate social circles. They are willing to innovate but less willing to lead

- Late majority: Tend to adopt new innovations at a much slower pace than the average social member in some case due to age or income factors but require all uncertainty to be removed prior to adoption of a product as they can be sceptical of them.

- Laggards: these are the last to adopt and take the longest to make the innovation adoption decision and can be traditionalist in their approach to change. In some cases, technology move at such a pace they miss the initial offering and only adopt a more polished version which can be the finial one.

As companies look to target market segments it has been put discussed to market to the early adopters and late adopters in order to increase a company's chances of success as the late adopters may become early adopters as the product develops, and understanding their motivation to adopt new technology is significant (Ryu, 2018) this will research will aim to uncover this.

## 3.5 IDT and TAM relationship

The usage of IDT and TAM as they have been seen as symbiotic to each other in a number of studies (Venkatesh and Morris, 2000; Kim, Shin and Lee, 2009;

Frimpong *et al.*, 2017). As with these studies the relationship of 'relative advantage' under IDT is similar to that of 'perceived usefulness' under TAM and complexity under IDT is similar to 'perceived ease of use' under TAM (Venkatesh *et al.*, 2003). As a result, this research proposes to utilise an amalgamated framework the bring together TAM and IDT to look at the follow factors of mobile application acceptance by the consumer:

- perceived usefulness

- perceived ease of use

- compatibility to lifestyle

- Attitude to risk

- perceived trust

- Behavioural Intention to use

We have selected these factors as the literature highlights these as the main drivers of technology adoption and as a result will measure the intention to use Mobile with PU and PEOU been high as factors of intention and as the other factor lag behind in priority.

### 3.5 Research Aim

As the mobile banking application market has grown over the past number of year and has been shown to have great potential (PwC, 2017; PWC, 2018) and has been highlighted as big factor for the existing traditional bank to adapt to (Mills and McCarthy, 2017). While we have evidenced as number of studies looking as mobile banking adoption in a number of countries but in an Irish context this is bear with only m-commerce (Duane, O'Reilly and Andreev, 2014) cited for review. For this reason, it is felt that this study is an opportunity to unlock information for an Irish market applicable to marketers, banking, fintech and future researchers.

## 3.6 Research Question

The researcher proposes to conduct research in order to evaluate customer behaviour once new banking technology has been offered to them. This shall be 'An assessment of the key factors in the uptake of Mobile Banking Apps'. The purpose of this study is to identify the factors that effect this under the IDT and TAM framework. This assessment will be processed through the use of quantitative research.

## 3.7 Conclusion

As technology is becoming more and more part of our everyday lives and as a society we transition from the norms of the past to the norms of the day and moving to the future. But as technology changes how does the user feel about it and how can a company use this information in order to design, build and market to them. How can companies create a perception rather than react to one already formed via social interaction and ensuring companies get a return on investment

This dissertation will investigate customer behaviour in relation to new banking technology on offer to them. The areas highlighted in the literature review relating to adoption of technology will be scrutinised.

# Chapter 4 - Research Methodology

## 4.1 Introduction

This section will lay out how the research will be conducted, the methods used for gathering and analysis of the data and will highlight any research. Broken down by section, explaining the relevant theoretical assumption that correlate to the research. It will also communicate the method of selection of the research sample, how and what data is collected. This chapter relates the theory behind the research, what's done and the justification for it (Saunders *et al.*, 2016)

## 4.2 Proposed Research Methodology

Ensuring that the methods being used in the research align with the objectives of the research question use of the 'Research Onion' as put forward by Saunders *et al.* (2016) will be utilised. It will guide us to the centre where the research problem resides, it is a process of peeling away at the layers in order to get to it. Each layer is significant in its own right, each 'layer' determines the research methodology as such the framework for this research proposal. This will ensure a focused, organised structure throughout.
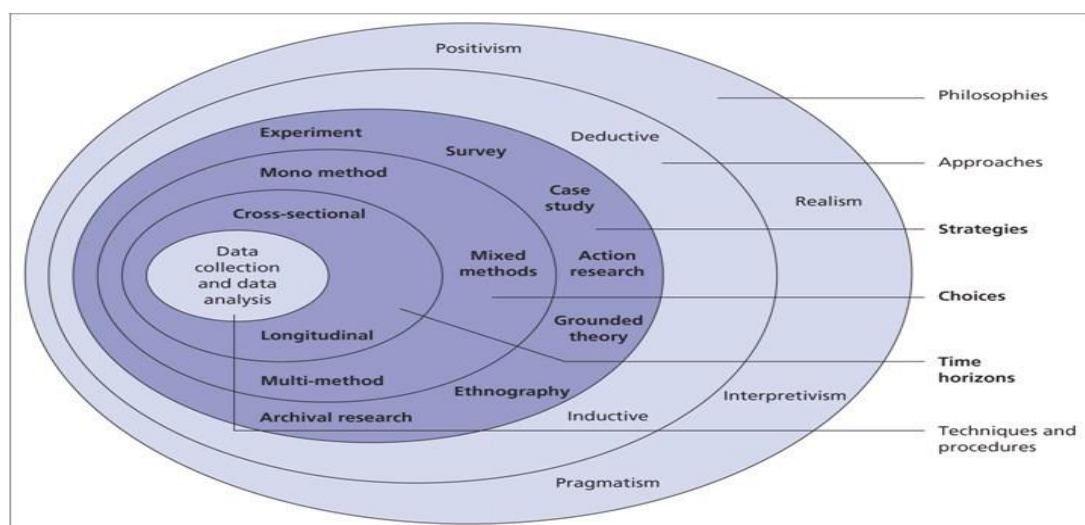


(Saunders *et al.*, 2016)

As the layers are 'peeled' the initial process is understanding the research philosophies, followed by the consideration for research strategies, then the data collection and analysis.

**4.3 Research Philosophy**

In the research process the significance of research philosophy is important, with this with this initial step on the process to get to the research problem. This is about the research and its "development of knowledge" and the makeup (Saunders *et al.*, 2016) of the knowledge It will guide the logical data collection method, and the importance of the relationship between the theory the collection of data must not be underestimated (Johnston, 2014). Further to this the philosophical framework is the underpinning of each research project (Quinlan, 2011). Through research we gain new knowledge of what is known and what is unknown.

Saunders *et al.* (2012) describe three research philosophies each one has an influence on how a researcher would approach the research process, they are:

- Ontology: "This is the researcher's view of the nature of reality or being";

- Epistemology: "The researcher's view regarding what constitutes acceptable knowledge";

- Axiology: "The researcher's view of the role of values in research".

While Quinlan (2011) only uses Ontology and Epistemology, but as the research proposal is related to our understanding of knowledge, its creation and the value of it the validity of this new knowledge it is an Epistemology philosophy approach that will be taken.

Epistemology is broken down into 3 areas: Positivism, Realism, and Interpretivism.

Positivism, that is accepted from natural science and can see society as shaping the individual. It concerns the collection of data from observation and

is "value free" from the position of the researcher i.e. the feelings / values of the researcher do not impact the research but this can be hard at times to ensure (Saunders *et al.*, 2016). Under this philosophy the data is collected, the hypothesis, and theories are tested and confirmed or refuted that then leads to further research to develop the theory through the engagement of the collection to data in the world via observation (Saunders *et al.*, 2016). Through the collection of data via quantitative methods. As discussed, the adoption of mobile banking through a structured questionnaire will frame the research and will lead to either acceptance or rejection of the hypotheses.

The research is from positivism perspective with an epistemological approach and as questionnaire and surveys are can be very precise forms of gathering data testing the nature of reality (Quinlan, 2011) it would be appropriate to use these methods. The data collection by its data should be factual and a very efficient method of data collection (Saunders *et al.*, 2016).

### 4.4 Research Question

When formulating the objectives of a research project this should be guided by the original research question and a clear set of objectives should guide the research (Saunders *et al.*, 2012).

Overall Objective: **An assessment of the key factors in the uptake of Mobile Banking Apps**

Resulting Hypothesises:

1. Female attitude to perceived usefulness differ to that of Male

2. Different surveyed age groups attitude to perceived usefulness differ

3. Female attitude to perceived ease of use differ to that of Male

4. Different surveyed age groups attitude to perceived ease of use differ

5. Female attitude to lifestyle compatibility of using mobile banking apps differ to that of Male

6. Different surveyed age groups attitude to lifestyle compatibility differ

7. Female attitude to risk of using mobile banking apps differ to that of Male

8. Different surveyed age groups attitude to risk using mobile banking apps compatibility differ

9. Female attitude to trust of using mobile banking apps differ to that of Male

10. Different surveyed age groups attitude to trust using mobile banking apps compatibility differ

11. Female attitude to Behavioural Intention of using mobile banking apps differ to that of Male.

12. Different surveyed age groups attitude to Behavioural Intention using mobile banking apps compatibility differ

These will be measured through the survey completed and the resulting data gathered be used to test the about hypothesis. The measures for the objectives are through the TAM and IDT frameworks.
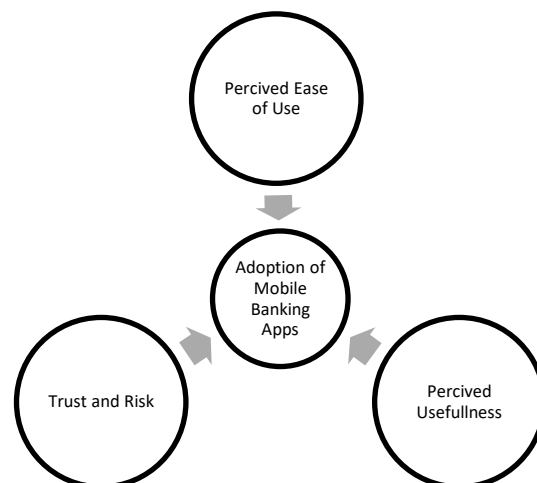
## 4.5 Research Approach

For researchers there are two approaches that can be taken, Inductive or Deductive. If the research followed the inductive approach it would be about trying to find a hole or gap in observed data to explore a 'phenomenon' and formulating a framework from this (Saunders *et al.*, 2016) they may also be developments of incomplete theories (Horn, 2009).

In the case of deductive this is the view taken on the relationship between a theory and research done. As part of research we review theory in relation to a subject as a result a hypothesis is deduced. Following that, as a result of further research, the theory is examined and scrutinised and revised if required (Bryman and Bell, 2007). For Bryman and Bell (2007) they identified the process of deduction as:

```
┌─────────────────────┐
│       Theory        │
└─────────────────────┘
           ↓
┌─────────────────────┐
│     Hypothesis      │
└─────────────────────┘
           ↓
┌─────────────────────┐
│   Data collection   │
└─────────────────────┘
           ↓
┌─────────────────────┐
│      Findings       │
└─────────────────────┘
           ↓
┌─────────────────────┐
│ Hypothesis confirmed│
│     or rejected     │
└─────────────────────┘
           ↓
┌─────────────────────┐
│  Revision of theory │
└─────────────────────┘
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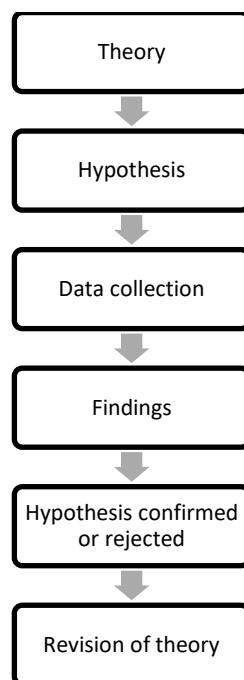
This will allow a structured approach to the research and as a result confirm the guidance also given by *Saunders et al.* (2012) and the characteristics of deductive approach. Both argued that the collection of quantitative data will allow us to uncover is the theory we have put forward is verified or found to be false.

**4.6 Research Strategy**

The research strategy is how a researcher is going to achieve their final goal, through the correct course of action chosen, thus attain the objective of the research question (Saunders *et al.*, 2012). The choice of the strategy is guided and dictated by the research question, a plan is required for our research linked back to research philosophy and the approach as the third layer of our 'Research Onion'. Consideration must be allowed for the resources available and applicable time considerations.

Quantitative research can be explained, as one that measures the collection and analysis of the data, that uses a deductive approach with consideration for the relationship between theory and the research with stresses the testing of the theory, use a natural scientific model with positivism been specific in an objective reality (Bryman and Bell, 2007). As a result, a survey approach via questionnaire will be used in order to collect the data required. This allow for a standardised, deductive, ease of access to a population and in addition easy to compare to other studies (Saunders *et al.*, 2012) although a survey can have issues with 'internal validity' (Bryman and Bell, 2007).

**4.7 Research Choice**

When formulating a paper choice of multiple methods, or mono methods, a choice between numeric data, and non-numeric and thus the choice between quantitative and qualitative and how these fit with the research question (Saunders *et al.*, 2012). Qualitive tends to involve interviews, focus groups or observation and would not be appropriate to our requirements. A quantitative approach is to be taken for a data collection methodology which will allow to use this data for statistical analysis.

Furthermore from a review of the literature (Lee, Zhang and Chen, 2013; Duane, O'Reilly and Andreev, 2014; Muñoz-Leiva, Climent-Climent and Liébana-Cabanillas, 2017) among other they have all used this approach and

this will allow cross reference the data against previous studies. Additionally, 82% of 55 research papers reviewed showed that a quantitative approach via survey was the dominant methodology used (Shaikh and Karjaluoto, 2014) again allowing for cross correlation of results on previous studies.

## 4.8 Secondary data Collection

Secondary data is both quantitative and qualitative in nature and is classified into three main subgroups documentary, survey-based and those compiled from multiple sources, although it has many advantages researchers must be wary of use as some data collected may not be specific to your own research (Saunders *et al.*, 2016). For this purpose, a number of sources have been used in order to complete a thorough academic review of the research question. From the outset the initial review of papers was directed at Irish papers of mobile banking and it was apparent that yielded a low volume of results through using NCIRL Library, and at the same time ensuring the validity (Quinlan, 2011). It was expanded beyond Irish papers to look at recognised peer review academic paper and the results of these have been. These papers allowed the researcher to 'back search' and find the original written document which gave a more in-depth picture of research to date and gaps that allowed to formulate the research question. Also consulted were academic books, web searches, industry recognised research (non-academic) and periodicals. As part of the initial scope for this paper industry experts in the banking sector were also consulted in order to help with the direction of research.

**4.9 Quantitative Primary Data Research**

A self-administered questionnaire is to be used as a data gathering tool[4]. Respondents will be emailed invitations and to participate in the survey. This method was chosen, as it is efficient, economical and very simple to administer and simple for respondents to complete and understand. Pitfalls prior to distribution are the response rates and ensuring our population can access the survey (Quinlan, 2011). The question will be structured as 'closed-ended' type as and limit the options for participants.

The invitation email for the survey are be distributed to persons who in turn will distribute the invitation to persons within their organisations based in Ireland plus additional methods. Also, within the mail would be a link to access the survey via Survey Monkey platform.[5]

**4.10 Questionnaire Design**

When using a questionnaire approach to data collection the design of the questions must be simple to understand, navigate and designed to gather the required data (Horn, 2009; Quinlan, 2011; Saunders *et al.*, 2012). A stated response rate can be a factor but this can also be influenced by poor question design and ensuring people have the motivation to complete a survey (Bryman and Bell, 2007). In order to counter this the questionnaire is designed to take no longer than 5 minutes to complete with an intended seamless approach to the questions.

Questions were broken down into sections for data collection purpose as below. But the online survey was completed as one questionnaire and did not require 'clicking through' each section in order that the participant was not hindered and reduce barriers to completion

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[4] See Appendix 1
[5] See Appendix 2

Questionnaire Sections:

- Demographics

    o Age

    o Gender

- Perceived usefulness, (PU)

- Perceived ease of use, (PEOU)

- Compatibility with Lifestyle,

- Attitude to risk,

- Perceived trust

- Behavioural Intention

For each question the Likert Scale (1-7) was used as has been used in a number of similar surveys and is a good measurement of attitude and the force of the attitude (Quinlan, 2011). Each question design allowed for the wording of question to be similar i.e. the scale ran from "strongly disagree" the beginning to "strongly agree" at the opposite end. In ideal circumstances this scale should run in a straight line (Saunders *et al.*, 2012) but due to constraints of the Survey Monkey platform the options were placed in 2 columns.

A small initial pilot test to 5 people was run prior to the distribution to the population this was in the form of a printed word document in order to check the flow, wording and grammar was correct. It was also used to highlight any issues as is suggested by most authors read. Some minor adjustments were made, and the questions were put into Survey Monkey platform via a paid subscription as this allowed additional functionality both in design and outputting of results.

**4.11 Sample**

With sampling techniques there are 2 types that are then further broken down in the image below:
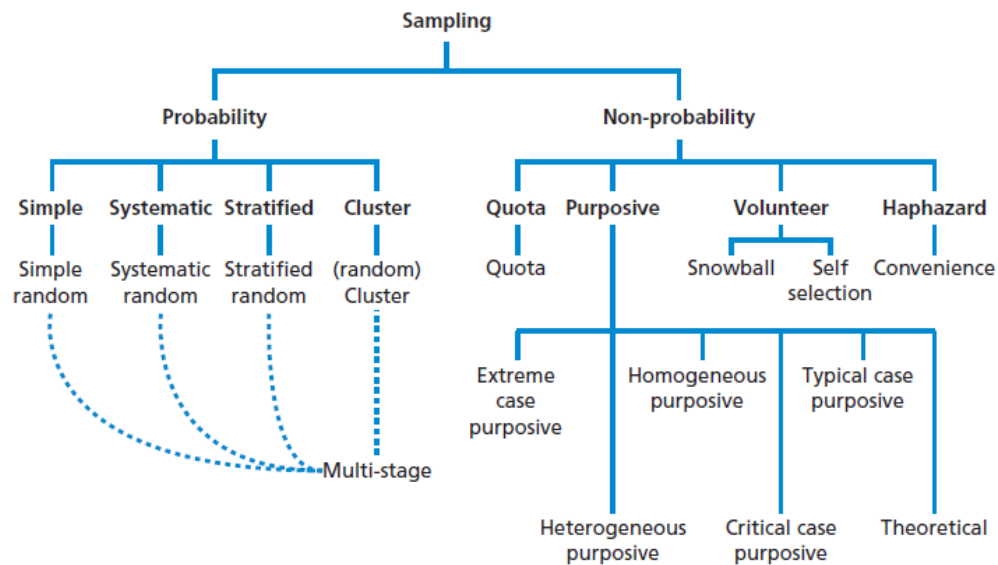


(Saunders *et al.*, 2016)

For the purpose of this research probability sampling will be used as it is the most common form for survey type research and would be most appropriate for this research. The target population will be the Irish consumer both male and female above the age of 18 who are users of bank accounts and used mobile banking presently. Gender and age are an important sample of the research as this has not been factored in other research and has been highlighted as a gap research.

Convenience and snowball sampling techniques will be used for this research. Convenience allows for simple and access the availability of a sample and snowball sampling allows us to use one point of contact to establish contacts with others (Saunders *et al.*, 2016). Snowballing allows us to contact target population that we may not have access to via a distribution email sent out to the target sample that became then self-selecting.

With all research the larger the sample the lower the probability of error. The size of sample is constrained by time and cost and this may have a bearing on

the accuracy of the results. Allowing for the margin of error and how much of this can we tolerate given the size of the total population and our sample size is important (Saunders *et al.*, 2016).  Table 3 for margin of error:

Table 3: Margin of Error Scale

| Population | Margin of error | | | |
| | 5% | 3% | 2% | 1% |
|---|---|---|---|---|
| 50 | 44 | 48 | 49 | 50 |
| 100 | 79 | 91 | 96 | 99 |
| 150 | 108 | 132 | 141 | 148 |
| 200 | 132 | 168 | 185 | 196 |
| 250 | 151 | 203 | 226 | 244 |
| 300 | 168 | 234 | 267 | 291 |
| 400 | 196 | 291 | 343 | 384 |
| 500 | 217 | 340 | 414 | 475 |
| 750 | 254 | 440 | 571 | 696 |
| 1 000 | 278 | 516 | 706 | 906 |
| 2 000 | 322 | 696 | 1091 | 1655 |
| 5 000 | 357 | 879 | 1622 | 3288 |
| 10 000 | 370 | 964 | 1936 | 4899 |
| 100 000 | 383 | 1056 | 2345 | 8762 |
| 1 000 000 | 384 | 1066 | 2395 | 9513 |
| 10 000 000 | 384 | 1067 | 2400 | 9595 |

(Saunders *et al.*, 2012)

## 4.12 Data Collection

Once the questionnaire was completed a hyperlink was imbedded into a distribution email, and an additional self-selecting technique was used to send the link out via text, WhatsApp and LinkedIn. The cover email and a message prior to 'clicking in' to the survey explained the nature of the research and highlighted that the survey was anonymous and confidential. The questionnaire is designed to take five minutes approximately to complete and this was also stated in the cover email in order to measure expectations form the sample to as time required to complete. All collected data is stored in a password protected Microsoft 365 platform. No personal details are collected through the process of the survey and all related emails have been stores on password protected email server.

**4.13 Ethical Issues**

As part of the progression of this research paper and survey the ethical guideline as set out by the National College of Ireland were adhered to at all times to ensure avoidance of ethical issues arising during the process. This conformity shall be ongoing (Quinlan, 2011). The distribution email also was used to reinforce this message. In addition, after the link to the survey was clicked on and additional message with reference to anonymity, confidentiality and no data been collected was stated. No question required personal data to be supplied.

**4.14 Time Horizon**

For the purpose of the study and cross-sectional study was undertaken which is a snap shot of data collected at a particular point in time (Saunders *et al.*, 2012). The alternative to this is a longitudinal study over a longer period of time and the collection of data at different instances over this period, the time constraints on the researcher did not allow for this approach but it would allow for a more insightful approach.

**4.15 Limitations to Research**

This research is a pure quantitative base project and as such loses in the ability to gain further insight from doing additional qualitative researcher. Although the quantitative approach is in line in with papers view areas also highlighted for future research was via qualitative approach to dive deeper into the information gained and the factors that influence the choices made by the sample. In addition, the survey used has 100% closed questions with did not allow for insights to be gain from the answers and this may have given a more in dept answer where required.

**4.16 Data analysis validity and reliability**

All the data was inputted into Statistical Package for Social Sciences (SPSS), this software allows researchers to analyse large amounts of data gathered (Quinlan, 2011).  With each of the sections following the data will be tested for the reliability of the data used for the results. Cronbach' Alpha is a test of the internal reliability of the data and would be one of the more commonly used test (Bryman and Bell, 2007) and is also a most applicable to researchers when respondents have a set of questions with a scale. In order to measure the internal reliability of the measure of consistency in responses to a scale via set of questions (in this case Likert scale) a value after data entry of between 0 (no reliability)  and 1 (perfect internal reliability) with returned results above 0.7 will indicate that question and scale are measuring the same item (Saunders *et al.*, 2012).

**4.16.1 Reliability and Validity for perceived usefulness of mobile banking applications**

Validating the PU, the researcher conducted a reliability analysis through the application of the Cronbach's Alpha. Tests of validation and reliability where undertook to show the reliability of the version used within this study and its reliability with respect to the sample. **Table 5** depicts a Cronbach Alpha score of .915.

Table 4: Case Summary for PU Scale

**Case Processing Summary**

| | | N | % |
|---|---|---|---|
| Cases | Valid | 117 | 100.0 |
| | Excluded[a] | 0 | .0 |
| | Total | 117 | 100.0 |

a. Listwise deletion based on all variables in the procedure.

Table 5: Cronbach Alpha PU Scale

**Reliability Statistics**

| Cronbach's Alpha | Cronbach's Alpha Based on Standardized Items | N of Items |
|---|---|---|
| .915 | .926 | 4 |

### 4.16.2 Reliability and Validity for perceived ease of use of mobile banking applications

Validating the PEOU the researcher conducted a reliability analysis through the application of the Cronbach's Alpha. Tests of validation and reliability where undertook to show the reliability of the version used within this study and its reliability with respect to the sample. **Table 7** depicts a Cronbach Alpha score of .901.

Table 6: Case Summary for PEOU

**Case Processing Summary**

| | | N | % |
|---|---|---|---|
| Cases | Valid | 117 | 100.0 |
| | Excluded[a] | 0 | .0 |
| | Total | 117 | 100.0 |

a. Listwise deletion based on all variables in the procedure.

Table 7: Cronbach Alpha PEOU Scale

**Reliability Statistics**

| Cronbach's Alpha | Cronbach's Alpha Based on Standardized Items | N of Items |
|---|---|---|
| .901 | .902 | 4 |

### 4.16.3 Reliability and Validity for Compatibility of mobile banking with lifestyle

Validating the lifestyle, the researcher conducted a reliability analysis through the application of the Cronbach's Alpha. Tests of validation and reliability where undertook to show the reliability of the version used within this study and its reliability with respect to the sample. **Table 9** depicts a Cronbach Alpha score of .857.

Table 8: Case Summary for Lifestyle Scale

**Case Processing Summary**

| | | N | % |
|---|---|---|---|
| Cases | Valid | 116 | 99.1 |
| | Excluded[a] | 1 | .9 |
| | Total | 117 | 100.0 |

a. Listwise deletion based on all variables in the procedure.

Table 9: Cronbach Alpha Lifestyle Scale

**Reliability Statistics**

| Cronbach's Alpha | Cronbach's Alpha Based on Standardized Items | N of Items |
|---|---|---|
| .857 | .858 | 5 |

**4.16.4 Reliability and Validity Perceived risk of mobile banking**

Validating the perceived risk composite, the researcher conducted a reliability analysis through the application of the Cronbach's Alpha. Tests of validation and reliability where undertook to show the reliability of the version used within this study and its reliability with respect to the sample. **Table 11** depicts a Cronbach Alpha score of .952.

Table 10: Case Summary for Perceived Risk

**Case Processing Summary**

| | | N | % |
|---|---|---|---|
| Cases | Valid | 117 | 100.0 |
| | Excluded[a] | 0 | .0 |
| | Total | 117 | 100.0 |

a. Listwise deletion based on all variables in the procedure.

Table 11: Cronbach Alpha Perceived Risk Scale

**Reliability Statistics**

| Cronbach's Alpha | Cronbach's Alpha Based on Standardized Items | N of Items |
|---|---|---|
| .952 | .953 | 4 |

**4.16.5 Perceived trust in Mobile banking**

Validating the perceived trust composite score, the researcher conducted a reliability analysis through the application of the Cronbach's Alpha. Tests of validation and reliability where undertook to show the reliability of the version used within this study and its reliability with respect to the sample. **Table 13** depicts a Cronbach Alpha score of .902.

Table 12: Case Summary for attitude to trust

**Case Processing Summary**

| | | N | % |
|---|---|---|---|
| Cases | Valid | 115 | 98.3 |
| | Excluded[a] | 2 | 1.7 |
| | Total | 117 | 100.0 |

a. Listwise deletion based on all variables in the procedure.

Table 13: Cronbach Alpha attitude to trust

**Reliability Statistics**

| Cronbach's Alpha | Cronbach's Alpha Based on Standardized Items | N of Items |
|---|---|---|
| .902 | .903 | 4 |

### 4.16.6 Behavioural intention towards mobile banking

Validating the behavioural intention composite score, the researcher conducted a reliability analysis through the application of the Cronbach's Alpha. Tests of validation and reliability where undertook to show the reliability of the version used within this study and its reliability with respect to the sample. **Table 15** depicts a Cronbach Alpha score of .962.

Table 14: Case Summary of Behavioural Intention Score

**Case Processing Summary**

| | | N | % |
|---|---|---|---|
| Cases | Valid | 115 | 98.3 |
| | Excluded[a] | 2 | 1.7 |
| | Total | 117 | 100.0 |

a. Listwise deletion based on all variables in the procedure.

Table 15: Reliability Result for Behavioural Intention Questions

**Reliability Statistics**

| Cronbach's Alpha | Cronbach's Alpha Based on Standardized Items | N of Items |
|---|---|---|
| .962 | .964 | 8 |

# Chapter 5 - Findings

## 5.1 Introduction

This section will present the findings of this study obtained from the research questions. In particular the results associated with the 6 independent variables: PU, PEOU, Lifestyle, Risk, Trust, Behavioural. In each subsection we present a summary of the descriptive statistics followed by the results of inferential test. The results are presented with respect to these categories with differences across gender and age being presented.

### 5.1.1 Analysing Quantitative Data

As the data from the research will be in the form of numerical data all collected data will be entered into SPSS system for analysis, and is design specially to manage large data (Quinlan, 2011).
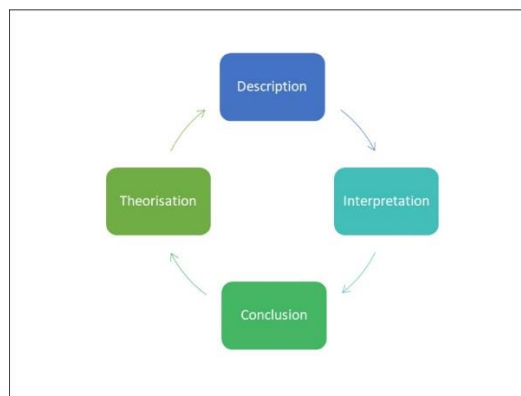


(Quinlan, 2011)

### 5.1.4 Examination of the Data

This research sets out to test the relationship if any between the uptake of mobile banking applications under the TAM and IDT frameworks, each section

a composite score of the results is been used and no weighting to value each response equally, each section is highlighted in the survey[6] as per below

1. PU of mobile banking applications: Question Number 3 to 6

2. PEOU of mobile banking applications: Question Number 7 to 10

3. Compatibility of mobile banking with lifestyle: Question Number 11 to 15

4. Perceived risk of mobile banking: Question Number 16 to 19

5. Perceived trust in Mobile banking: Question Number 20 to 23

6. Behavioural intention towards mobile banking: Question Number 24 to 31

We will compare the difference in the means of the two separate group either male or female, and age using the composite of the scores (Saunders *et al.*, 2012).

### 5.2.1 Demographics

Table 16: Total sample summary

**Case Processing Summary**

| | | Cases | | | | | |
|---|---|---|---|---|---|---|---|
| | | Included | | Excluded | | Total | |
| Are you | | N | Percent | N | Percent | N | Percent |
| Male | Are you | 55 | 100.0% | 0 | 0.0% | 55 | 100.0% |
| Female | Are you | 62 | 100.0% | 0 | 0.0% | 62 | 100.0% |

Questions 1 thru 3 of the survey were target in order to gain the demographics of the sample. A total sample of 117 completed surveys with all survey completed with a 100% response rate. The Gender break down as seen in **Table 16** is a follows: Females made up 53% (62 respondents) been the

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[6] Appendix 1

higher percentage of respondents to that of men 47% (55 respondents). No person in the survey replied to 'other' as a gender option and as such will not being reported on as an option in the survey results, hence we may have a slight gender bias in the results albeit insignificant.

Table 17: Total sample by age group

| | | Frequency | Percent | Valid Percent | Cumulative Percent |
|---|---|---|---|---|---|
| Valid | 18 - 24 | 4 | 3.4 | 3.4 | 3.4 |
| | 25 - 34 | 23 | 19.7 | 19.7 | 23.1 |
| | 35 - 44 | 36 | 30.8 | 30.8 | 53.8 |
| | 45 - 54 | 33 | 28.2 | 28.2 | 82.1 |
| | 55 - 64 | 15 | 12.8 | 12.8 | 94.9 |
| | 65 + | 6 | 5.1 | 5.1 | 100.0 |
| | Total | 117 | 100.0 | 100.0 | |

As we can be seen from **Table 17** above for the breakdown of age, there was respondents for all categories. The youngest group 18 - 24 had only 4 responses and 65 + this was to be expected due to the self-selecting sample and the invite to part take was sent to places of work. The majority of the responders in the 35 to 36 and 45 to 54 age grouping with 69 of sample been 59% of the total sample.  This will be considered when reporting the finding. See graphic below for visual reference of the age data

Table 18: Age Demographic Pie Chart
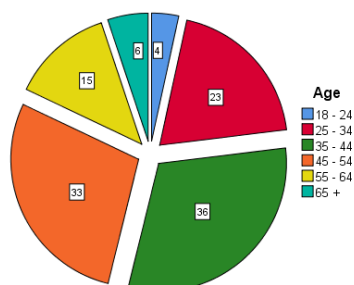
**Table 19**, below, shows the gender breakdown of the sample only in one age profile 25-34 do we see a dominate gender, where more female reponded versus male.

Table 19: Gender Comparison of total sample
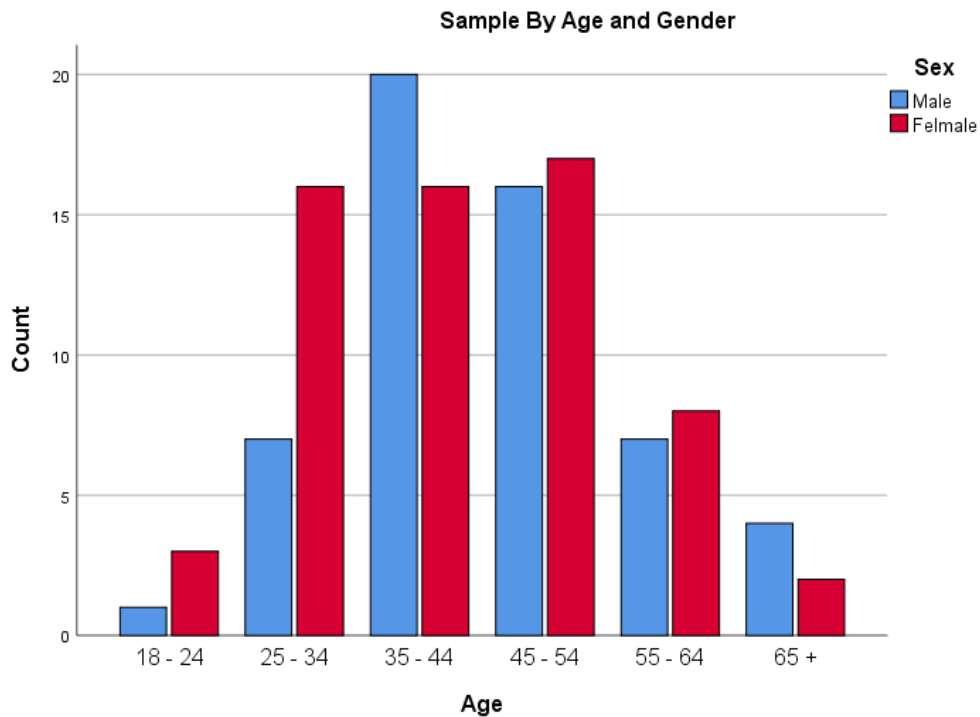


## 5.3 Perceived usefulness of mobile banking applications

We have tested the complexities to which a person believes that using mobile banking apps will enhances an individual's effectiveness and as a result have a positive impact on usage and uptake. This is captured through the construct PU and was analysed to assess whether there is a difference in magnitudes in PU depending on gender or age.

Distributional shape was estimated using histograms the shape for the male and female distribution is in **Figure 1** and **2** respectively. In both cases we can see the they are non-normally distributed and as such nonparametric tests were undertaken. In particular, the nonparametric Mann Whitney test was

undertaken to see whether median PU score for males was different to PU score for females. The results are presented below

**Hypothesis**

Hypothesis 1: Females attitude to perceived usefulness differ to that of Males

Hypothesis 2: Different surveyed age groups attitude to perceived usefulness differ

Considering the differences in PU across genders, the study considered a total of 117 participants all of which valid responses. Of the respondents, 55 were male and 62 were female. A case summary is presented in **Table 20**. In both cases the horizontal axis represents the frequency of responses, with vertical axis depicting the applicable response to each question in this construct.

Table 20: PU case summary grouped by gender

**Case Processing Summary**

| | | Cases | | | | | |
| | | Valid | | Missing | | Total | |
| | Are you | N | Percent | N | Percent | N | Percent |
|---|---|---|---|---|---|---|---|
| Perceived Use Composite Score | Male | 55 | 100.0% | 0 | 0.0% | 55 | 100.0% |
| | Female | 62 | 100.0% | 0 | 0.0% | 62 | 100.0% |

Figure 1 - PU Male Distribution
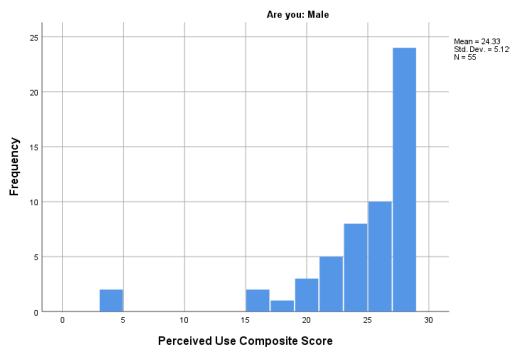


Figure 2 - PU Female Distribution
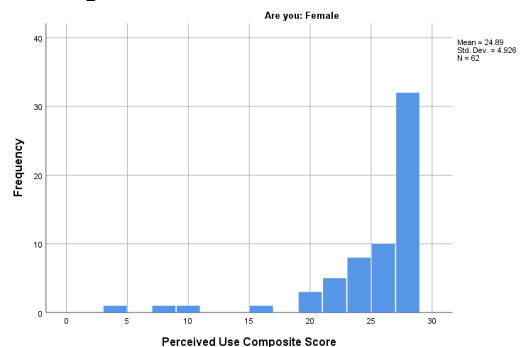


Due to the left skewed histogram a Shapiro-Wilk's test of normality was run to test for the existence or not of normality in both the male and female samples.

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The null hypothesis associated with the Shapiro-Wilk's test assumes normality of the sample under consideration. Within the normality results presented in **Table 21**, it can be seen that in both cases our results show significant deviations from normality (*Male = .702, df = 55, p < .000*), (*Female = .659, df = 62, p < .000*).

Table 21: PU normality results based on Gender

**Tests of Normality**

| | Are you | Kolmogorov-Smirnov[a] | | | Shapiro-Wilk | | |
|---|---|---|---|---|---|---|---|
| | | Statistic | df | Sig. | Statistic | df | Sig. |
| Perceived Use Composite Score | Male | .237 | 55 | .000 | .702 | 55 | .000 |
| | Female | .264 | 62 | .000 | .659 | 62 | .000 |

a. Lilliefors Significance Correction

Due to these deviations from normality the non-parametric Mann-Whitney test was run in order to ascertain if median perceived use composite scores differed based on gender. The results indicated that there was no significant difference in male median PU composite scores (***Male = 56.03***) compared to female median PU composite scores (***Female = 61.64***), (***U = 1541.5, p = .355***).

An independent-samples t-test was conducted to compare PU of mobile banking applications in males and females. There was not a significant difference in the scores for Males (M=24.33, SD = 5.121) and Females (M=24.89, SD = 5.121), t (115) = -.602, p = .55

A one-way ANOVA was conducted to compare the effect of Age Group on perceived usefulness. An analysis of the variance showed that the effect on perceived usefulness of mobile banking applications between age groups was not significant, F (5, 111) = 1.836, p = .112.

Table 22 : PU One Way Anova based on Age Group

**ANOVA**

Perceived Use Composite Score

| | Sum of Squares | df | Mean Square | F | Sig. |
|---|---|---|---|---|---|
| Between Groups | 221.926 | 5 | 44.385 | 1.836 | .112 |
| Within Groups | 2683.527 | 111 | 24.176 | | |
| Total | 2905.453 | 116 | | | |

## 5.4 Perceived ease of use of mobile banking applications

We have tested the complexities to which a person believes that using mobile banking apps will be free of effort and as a result have a positive impact on usage and uptake. This is captured through the construct PEOU and was analysed to assess whether there is a difference in magnitudes in PEOU depending on gender or age.

Distributional shape was estimated using histograms the shape for the male and female distribution is in **Figure 3** and **4** respectively. In both cases we can see the they are non-normally distributed and as such nonparametric tests were undertaken. In particular, the nonparametric Mann Whitney test was undertaken to see whether median PEOU score for males was different to PEOU score for females. The results are presented below

**Hypothesis**

Hypothesis 3: Females attitude to perceived ease of use differ to that of Males

Hypothesis 4: Different surveyed age groups attitude to perceived ease of use differ

Considering the differences in PEOU across genders, the study considered a total of 117 participants all of which valid responses. Of the respondents, 55 were male and 62 were female. A case summary is presented in **Table 22**. In both cases the horizontal axis represents the frequency of responses, with vertical axis depicting the applicable response to each question in this construct.

Table 23: PEOU case summary group by gender

**Case Processing Summary**

| | | Cases | | | | | |
|---|---|---|---|---|---|---|---|
| | | Included | | Excluded | | Total | |
| Are you | | N | Percent | N | Percent | N | Percent |
| Male | Perceived Ease of Use Composite Score | 55 | 100.0% | 0 | 0.0% | 55 | 100.0% |
| Female | Perceived Ease of Use Composite Score | 62 | 100.0% | 0 | 0.0% | 62 | 100.0% |

Figure 3 - Male PEOU Distribution
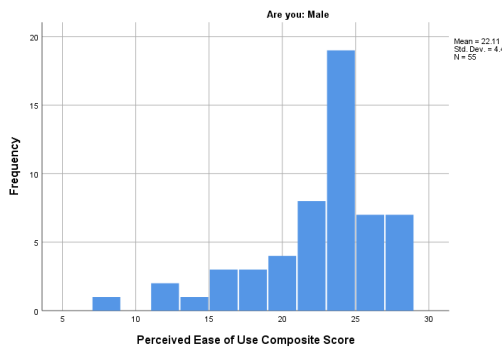


Figure 4 Female PEOU Distribution
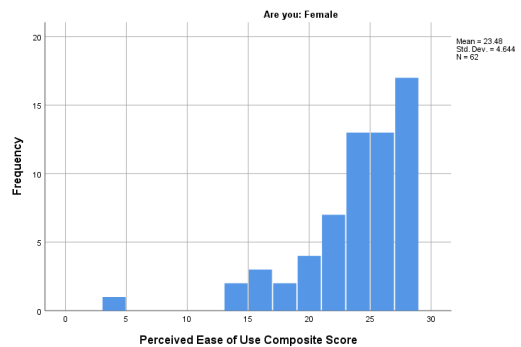


Due to the left skewed histogram a Shapiro-Wilk's test of normality was run for the existence or not of normality in both the male and female samples. The null hypothesis associated with the Shapiro-Wilk's test assumes normality of the sample under consideration. Within the normality results presented in **Table 23**, it can be seen that in both cases our results show significant deviations from normality (*Male = .886, df = 55, p < .000*), (*Female = .840, df = 62, p < .000*).

Table 24: PEOU normality results based on gender

**Tests of Normality**

| | | Kolmogorov-Smirnov[a] | | | Shapiro-Wilk | | |
|---|---|---|---|---|---|---|---|
| | Are you | Statistic | df | Sig. | Statistic | df | Sig. |
| Perceived Ease of Use Composite Score | Male | .217 | 55 | .000 | .886 | 55 | .000 |
| | Female | .165 | 62 | .000 | .840 | 62 | .000 |

a. Lilliefors Significance Correction

Due to these deviations from normality the non-parametric Mann-Whitney test was run in order to ascertain if median perceived ease of use composite

scores differed based on gender. The results indicated that there was a significant difference in male median PEOU composite scores (**Male = 51.88**) compared to female median PEOU composite scores (**Female = 65.31**), (**U = 1313.5, p = .031**).

An independent-samples t-test was conducted to compare perceived ease of use of mobile banking applications in males and females. There was not a significant difference in the average scores for males with respect to PEOU (M=22.11, SD = 4.4) and the average score of females with respect to PEOU (M=23.48, SD = 4.644); t (115) = -1.638, p = .10

A one-way ANOVA was conducted to compare the effect of Age Group on perceived ease of use. An analysis of the variance showed that the effect on perceived ease of use of mobile banking applications between age groups was significant, F (5, 111) = 2.545, p = .032

Table 25 : PEOU One Way Anova based on Age Group

### ANOVA

Perceived Ease of Use Composite Score

|  | Sum of Squares | df | Mean Square | F | Sig. |
|---|---|---|---|---|---|
| Between Groups | 248.455 | 5 | 49.691 | 2.545 | .032 |
| Within Groups | 2167.460 | 111 | 19.527 |  |  |
| Total | 2415.915 | 116 |  |  |  |

Because we have found a statistically significant result in this example, we needed to compute a post hoc test. This test is designed to compare each of our conditions to every other condition. This test will compare the Age Groups from 18-24 to 65+. The pair wise groups that were identified to be different, differences were observed between:

- 25-34 group and 45-54 group (M= 1.200, SD =0.010)

- 25-34 group and 55-64 group (M= 1.467, SD =0.021)

- 35-44 group and 65+ group (M= 1.949, SD =0.050)

Full set of result are showed in Appendix 3

## 5.5 Compatibility of mobile banking with lifestyle

We have tested the complexities to which a person believes that using mobile banking apps will be compatible with their lifestyle and as a result have a positive impact on usage and uptake. This is captured through construct Lifestyle and was analysed to assess whether there is a difference in magnitudes in Lifestyle depending on gender or age.

Distributional shape was estimated using histograms the shape for the male and female distribution is in **Figure 5** and **6** respectively. In both cases we can see the they are non-normally distributed and as such nonparametric tests were undertaken. In particular, the nonparametric Mann Whitney test was undertaken to see whether median Lifestyle score for males was different to Lifestyle score for females. The results are presented below

**Hypothesis**

Hypothesis 5: Females attitude to lifestyle compatibility of using mobile banking apps differ to that of Males

Hypothesis 6: Different surveyed age groups attitude to lifestyle compatibility differ

Considering the differences in compatibility with lifestyle across genders, the study considered a total of 117 participants with 1 male response no valid, valid response 116. Of the respondents, 54 were male and 62 were female. A case summary is presented in **Table 24**. In both cases the horizontal axis represents the frequency of responses, with vertical axis depicting the applicable response to each question in this construct.

Table 26: Lifestyle case summary grouped by gender

**Case Processing Summary**

| | | Cases | | | | | |
| | | Valid | | Missing | | Total | |
| | Are you | N | Percent | N | Percent | N | Percent |
|---|---|---|---|---|---|---|---|
| Lifestyle Comp Score | Male | 54 | 98.2% | 1 | 1.8% | 55 | 100.0% |
| | Female | 62 | 100.0% | 0 | 0.0% | 62 | 100.0% |

Figure 5 - Lifestyle Male Distribution
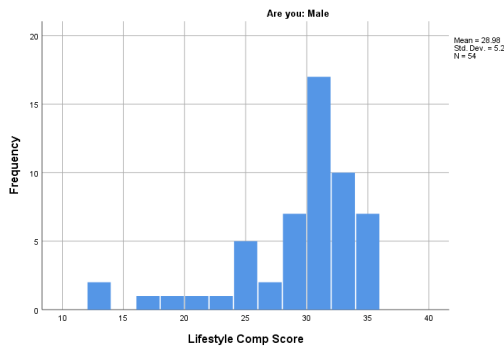


Figure 6 - Lifestyle Female Distribution
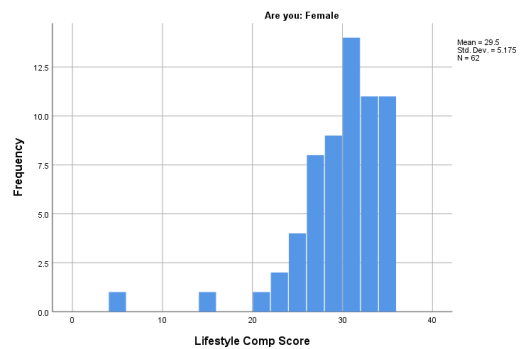


Due to the left skewed histogram a Shapiro-Wilk's test of normality was run for the existence or not of normality in both the male and female samples. The null hypothesis associated with the Shapiro-Wilk's test assumes normality of the sample under consideration. Within the normality results presented in **Table 8**, it can be seen that in both cases our results show significant deviations from normality (*Male = .837, df = 54, p < .000*), (*Female = .811, df = 62, p < .000*).

Table 27: Lifestyle normality results based on gender

**Tests of Normality**

| | | Kolmogorov-Smirnov[a] | | | Shapiro-Wilk | | |
| | Are you | Statistic | df | Sig. | Statistic | df | Sig. |
|---|---|---|---|---|---|---|---|
| Lifestyle Comp Score | Male | .224 | 54 | .000 | .837 | 54 | .000 |
| | Female | .153 | 62 | .001 | .811 | 62 | .000 |

a. Lilliefors Significance Correction

Due to these deviations from normality the non-parametric Mann-Whitney test was run in order to ascertain if median compatibility with lifestyle composite scores differed based on gender. The results indicated that there was significant difference in male median lifestyle composite scores (***Male = 57.07***) compared to female median lifestyle composite scores (***Female = 59.74***), (***U = 1597, p = .668***).

An independent-samples t-test was conducted to compare compatibility with lifestyle of mobile banking applications between males and females. There was not a significant difference in the scores for Males (M=28.98, SD = 5.2) and Females (M=29.50, SD = 5.174), t (114) = -.537, p = .59

A one-way ANOVA was conducted to compare the effect of Age Group on compatibility with lifestyle see Table 26. An analysis of the variance showed that the effect on perceived usefulness between age groups was significant, F (5, 110) = 2.459, p = .037

Table 28: Lifestyle One Way Anova based on Age Group

### ANOVA

Lifestyle Comp Score

| | Sum of Squares | df | Mean Square | F | Sig. |
|---|---|---|---|---|---|
| Between Groups | 309.037 | 5 | 61.807 | 2.459 | .037 |
| Within Groups | 2765.204 | 110 | 25.138 | | |
| Total | 3074.241 | 115 | | | |

Because we have found a statistically significant result in this example, we needed to compute a post hoc test. This test is designed to compare each of our conditions to every other condition. This test will compare the Age Groups from 18-24 to 65+. The pair wise groups that were identified to be different, differences were observed between:

- 25-34 group and 45-54 group (M= 1.362, SD =0.016)

- 25-34 group and 55-64 group (M= 1.664, SD =0.017)

- 35-44 group and 45-54 group (M= 1.217, SD= 0.048)

- 35-44 group and 55-64 group (M= 1.547, SD =0.0547)

Full set of result are showed in Appendix 3

## 5.6 Perceived risk of mobile banking

We have tested the complexities to which a person believes that they will have an attitude to perceived risk in using mobile banking apps and as such an impact on usage. This is captured through the Risk construct and was analysed to assess whether there is a difference in magnitudes in attitude to risk depending on gender or age.

Distributional shape was estimated using histograms the shape for the male and female distribution is in **Figure 7** and **8** respectively. In both cases we can see the they are non-normally distributed and as such nonparametric tests were undertaken. In particular, the nonparametric Mann Whitney test was undertaken to see whether median Lifestyle score for males was different to risk score for females. The results are presented below

**Hypothesis**

Hypothesis 7: Female attitude to risk of using mobile banking apps differ to that of Male

Hypothesis 8: Different surveyed age groups attitude to risk using mobile banking apps compatibility differ

Considering the differences in compatibility with perceived risk across genders, the study considered a total of 117 participants all valid responses. Of the respondents, 55 were male and 62 were female. A case summary is presented in Table 27. In both cases the horizontal axis represents the frequency of responses, with vertical axis depicting the applicable response to each question in this construct.

Table 29: Risk case summary grouped by gender

**Case Processing Summary**

| Are you | | Cases | | | | | |
| | | Included | | Excluded | | Total | |
| | | N | Percent | N | Percent | N | Percent |
|---|---|---|---|---|---|---|---|
| Male | Risk Comp Score | 55 | 100.0% | 0 | 0.0% | 55 | 100.0% |
| Female | Risk Comp Score | 62 | 100.0% | 0 | 0.0% | 62 | 100.0% |



Figure 7 - Risk Male Distribution

Are you: Male

Mean = 19.05
Std. Dev. = 6.491
N = 55
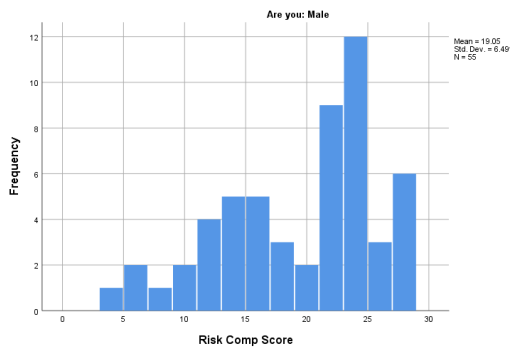


Figure 8 - Perceived Risk Female Distribution
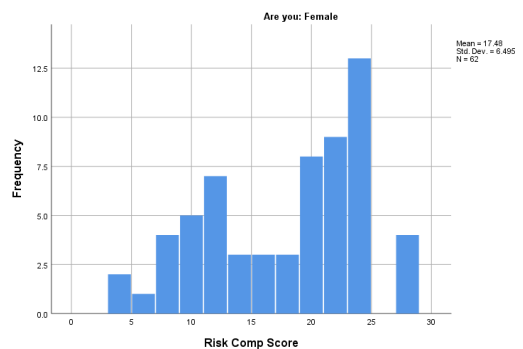
Are you: Female

Mean = 17.48
Std. Dev. = 6.495
N = 62

Due to the left skewed histogram a Shapiro-Wilk's test of normality was run for the existence or not of normality in both the male and female samples. The null hypothesis associated with the Shapiro-Wilk's test assumes normality of the sample under consideration. Within the normality results presented in Table 28, it can be seen that in both cases our results show significant deviations from normality (*Male = .932, df = 55, p < .004*), (*Female = .941, df = 62, p < .005*).

Table 30: Risk normality results based on gender

**Tests of Normality**

| | Are you | Kolmogorov-Smirnov[a] | | | Shapiro-Wilk | | |
| | | Statistic | df | Sig. | Statistic | df | Sig. |
|---|---|---|---|---|---|---|---|
| Risk Comp Score | Male | .163 | 55 | .001 | .932 | 55 | .004 |
| | Female | .141 | 62 | .004 | .941 | 62 | .005 |

a. Lilliefors Significance Correction

Due to these deviations from normality the non-parametric Mann-Whitney test was run in order to ascertain if median compatibility with risk composite scores differed based on gender. The results indicated that there was no significant

difference in male median risk composite scores (***Male = 64.05***) compared to female median risk composite scores (***Female = 54.52***), (***U = 1427.5, p = .128***).

An independent-samples t-test was conducted to compare the attitude to risk of mobile banking applications between males and females. There was not a significant difference in the scores for Males (M=19.05 SD = 6.49) and Females (M=17.48, SD = 6.49), t (115) = 1.306, p = .194

A one-way ANOVA was conducted to compare the effect of Age Group on the attitude to risk. An analysis of the variance showed that the effect on attitude to risk usage of mobile banking applications between age groups was not significant, F (5, 111) = 2.074, p = .074

Table 31: Risk One Way Anova based on age group

**ANOVA**

Risk Comp Score

|  | Sum of Squares | df | Mean Square | F | Sig. |
|---|---|---|---|---|---|
| Between Groups | 420.341 | 5 | 84.068 | 2.074 | .074 |
| Within Groups | 4499.881 | 111 | 40.539 |  |  |
| Total | 4920.222 | 116 |  |  |  |

## 5.7 Attitude to Trust of mobile banking

We have tested the complexities to which a person believes that they will have an attitude to trust and how it will affect using mobile banking apps and as such an impact on usage. This is captured through the Trust construct and was analysed to assess whether there is a difference in magnitudes in attitude to trust depending on gender or age.

Distributional shape was estimated using histograms the shape for the male and female distribution is in **Figure 9** and **10** respectively. In both cases we can see the they are non-normally distributed and as such nonparametric tests were undertaken. In particular, the nonparametric Mann Whitney test was

undertaken to see whether median trust score for males was different to risk score for females. The results are presented below

**Hypothesis Objective**

Hypothesis 9: Females attitude to trust of using mobile banking apps differ to that of Males

Hypothesis 10: Different surveyed age groups attitude to trust using mobile banking apps differ

Considering the differences in compatibility with perceived risk across genders, the study considered a total of 117 participants, 1 male and 1 female did not respond, giving a total response of 115. Of the respondents, 54 were male and 61 were female. A case summary is presented in Table 30. In both cases the horizontal axis represents the frequency of responses, with vertical axis depicting the applicable response to each question in this construct.

Table 32: Trust case summary grouped by gender

**Case Processing Summary**

| Are you | | Cases | | | | | |
| | | Included | | Excluded | | Total | |
| | | N | Percent | N | Percent | N | Percent |
| Male | Trust Comp Score | 54 | 98.2% | 1 | 1.8% | 55 | 100.0% |
| Female | Trust Comp Score | 61 | 98.4% | 1 | 1.6% | 62 | 100.0% |

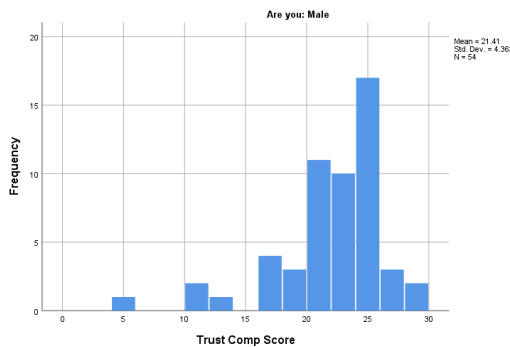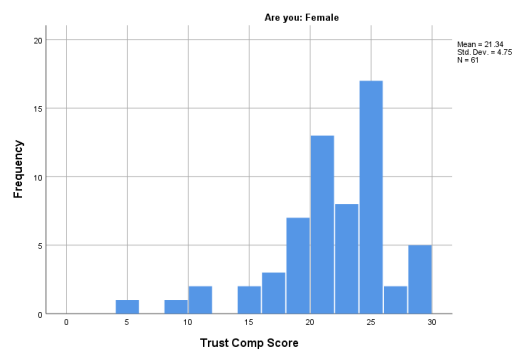Figure 9 - Attitude to Risk Male Distribution



Figure 10 - Attitude to Risk Female Distribution



Due to the left skewed histogram a Shapiro-Wilk's test of normality was run for the existence or not of normality in both the male and female samples. The

null hypothesis associated with the Shapiro-Wilk's test assumes normality of the sample under consideration. Within the normality results presented in Table 31, it can be seen that in both cases our results show significant deviations from normality (*Male = .866, df = 54, p < .000*), (*Female = .899, df = 61, p < .000*).

Table 33: Trust normality results based on gender

**Tests of Normality**

| | Are you | Kolmogorov-Smirnov[a] | | | Shapiro-Wilk | | |
|---|---|---|---|---|---|---|---|
| | | Statistic | df | Sig. | Statistic | df | Sig. |
| Trust Comp Score | Male | .179 | 54 | .000 | .866 | 54 | .000 |
| | Female | .143 | 61 | .003 | .899 | 61 | .000 |

a. Lilliefors Significance Correction

Due to these deviations from normality the non-parametric Mann-Whitney test was run in order to ascertain if median compatibility with lifestyle composite scores differed based on gender. The results indicated that there was no significant difference in male median lifestyle composite scores (***Male = 58.04***) compared to female median lifestyle composite scores (***Female = 57.97***), (***U = 1645, p = .991***).

An independent-samples t-test was conducted to compare the attitude to trust of mobile banking applications between males and females. There was not a significant difference in the scores for Males (M=21.41 SD = 4.363) and Females (M=21.34, SD = 4.750) , t (113) = .074, p = .941

A one-way ANOVA was conducted to compare the effect of Age Group on the attitude to trust. An analysis of the variance showed that the effect on the attitude to trust using mobile banking apps between age groups was significant, F (5, 109) = 2.728, p = .023

Table 34: Trust One Way Anova based on age group

**ANOVA**

Trust Comp Score

| | Sum of Squares | df | Mean Square | F | Sig. |
|---|---|---|---|---|---|
| Between Groups | 262.806 | 5 | 52.561 | 2.728 | .023 |
| Within Groups | 2100.116 | 109 | 19.267 | | |
| Total | 2362.922 | 114 | | | |

Because we have found a statistically significant result in this example, we needed to compute a post hoc test. This test is designed to compare each of our conditions to every other condition. This test will compare the Age Groups from 18-24 to 65+. The pair wise groups that were identified to be different, differences were observed between:

- 25-34 group and 45-54 group (M= 1.200 SD =0.035)

- 25-34 group and 55-64 group (M= 1.488, SD =0.006)

- 35-44 group and 45-54 group (M= 1.066, SD= 0.037)

- 35-44 group and 55-64 group (M= 1.383, SD =0.006)

Full set of result are showed in Appendix 3

## 5.8 Behavioural intention towards mobile banking

We have tested the complexities to which a person believes that they will have a Behavioural Intention to use mobile apps in the future and as such an impact on usage. This is captured through the Behavioural construct and was analysed to assess whether there is a difference in magnitudes in attitude to Behavioural depending on gender or age.

Distributional shape was estimated using histograms the shape for the male and female distribution is in **Figure 11** and **12** respectively. In both cases we can see the they are non-normally distributed and as such nonparametric tests

were undertaken. In particular, the nonparametric Mann Whitney test was undertaken to see whether median trust score for males was different to risk score for females. The results are presented below

**5.8. 1 Hypothesis Objective**

Hypothesis 11: Females attitude to Behavioural Intention of using mobile banking apps differ to that of Males.

Hypothesis 12: Different surveyed age groups attitude to Behavioural Intention using mobile banking apps compatibility differ

Considering the differences in compatibility with perceived risk across genders, the study considered a total of 117 participants, 1 male and 1 female did not respond, giving a total response of 115. Of the respondents, 54 were male and 61 were female. A case summary is presented in **Table 33**. In both cases the horizontal axis represents the frequency of responses, with vertical axis depicting the applicable response to each question in this construct.

Table 35: Behavioural case summary grouped by gender

**Case Processing Summary**

| | | Cases | | | | | |
| --- | --- | --- | --- | --- | --- | --- | --- |
| | | Included | | Excluded | | Total | |
| Are you | | N | Percent | N | Percent | N | Percent |
| Male | Beh Comp Score | 54 | 98.2% | 1 | 1.8% | 55 | 100.0% |
| Female | Beh Comp Score | 61 | 98.4% | 1 | 1.6% | 62 | 100.0% |

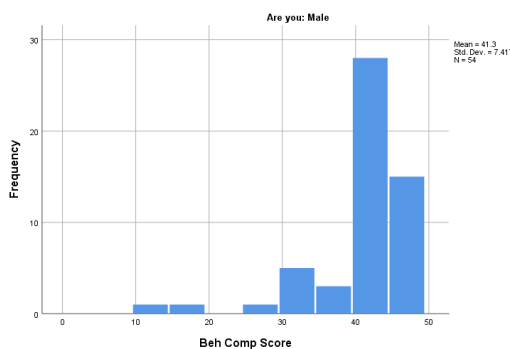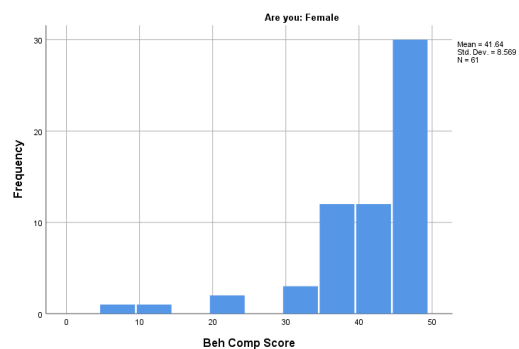Figure 11 - Behavioural Intention Male Distribution



Figure 12 - Behavioural Intention Female Distribution

Due to the left skewed histogram a Shapiro-Wilk's test of normality was run for the existence or not of normality in both the male and female samples. The null hypothesis associated with the Shapiro-Wilk's test assumes normality of the sample under consideration. Within the normality results presented in Table 34, it can be seen that in both cases our results show significant deviations from normality (*Male = .780, df = 54, p < .000*), (*Female = .789, df = 61, p < .000*).

Table 36: Behavioural normality Results based on gender

**Tests of Normality**

| | Are you | Kolmogorov-Smirnov[a] | | | Shapiro-Wilk | | |
|---|---|---|---|---|---|---|---|
| | | Statistic | df | Sig. | Statistic | df | Sig. |
| Beh Comp Score | Male | .279 | 54 | .000 | .780 | 54 | .000 |
| | Female | .195 | 61 | .000 | .789 | 61 | .000 |

a. Lilliefors Significance Correction

Due to these deviations from normality the non-parametric Mann-Whitney test was run in order to ascertain if median compatibility with Behavioural intention composite scores differed based on gender. The results indicated that there was no significant difference in male median behavioural composite scores (**Male = 56.11**) compared to female median behavioural composite scores (**Female = 59.67**), (**U = 1545, p = .563**).

An independent-samples t-test was conducted to compare the Behavioural intention of mobile banking applications between males and females. There was not a significant difference in the scores for Males (M=41.30 SD = 7.417) and Females (M=41.64, SD = 8.569), t (113) = -0.228, p = .820

A one-way ANOVA was conducted to compare the effect of Age Group on the behavioural intention to use mobile banking applications. An analysis of the variance showed that the effect on Behavioural Intention to use mobile banking apps between age groups was not significant, F (5, 109) = 2.134, p = .067

Table 37 : Behavioural One Way Anova based on age group

**ANOVA**

Beh Comp Score

| | Sum of Squares | df | Mean Square | F | Sig. |
|---|---|---|---|---|---|
| Between Groups | 653.222 | 5 | 130.644 | 2.134 | .067 |
| Within Groups | 6671.473 | 109 | 61.206 | | |
| Total | 7324.696 | 114 | | | |

## 5.9 Hypothesis Results

Table 38: Summary of hypothesis results

| Hypothesis | Gender | Age |
|---|---|---|
| PU | Accepted | Accepted |
| PEOU | Rejected | Rejected |
| Lifestyle | Accepted | Rejected |
| Risk | Accepted | Accepted |
| Trust | Accepted | Accepted |
| Behavioural Intentions | Accepted | Accepted |

# Chapter 6 – Discussion

Analysis of data this will now be tied back to the findings in a literature in order to investigate how this relates to previous studies.

## 6.1 Perceived Usefulness and Perceived Ease of Use

We set out to argue the hypothesis set out in PU and PEOU to investigated whether age or gender was a factor or barrier in the uptake of banking application. In research this is required for simpler products for banks to regain the customer (Järvinen, 2014). Building a system to ensure the customer what at the heart of the product was important (Liang and Tanniru, 2006). It was argued was that banks now had to engage the customer, and ensure that with this large growing smartphone market the usefulness of an app is maintained (Gomber *et al.*, 2018).

What the results of the research have shown use is that PU & PEOU is acknowledge across gender and age as a significant factor. The skewed histograms in the results show almost every respondent irrespective of age or gender saw a benefit to using mobile banking application with only a few outliers to this result. This limitation to the report and a larger sample may bring a different result as previous research contends PU has a smaller impact on usage (Duane, O'Reilly and Andreev, 2014) these results indicate the opposite. That said Mukhtar (2015) contends that consumers will have a positive perception of the product if they have a positive feel for usefulness. Under PU both hypotheses were accepted and confirms that age and gender do not differ in relation to PU. One of the key findings with respect to PEOU was that age and gender both differ. Based on this inference marketers, banks and fintech would need to adapt to age and gender demographic as both groups may require separate strategies.

The PU and PEOU of a product is most likely born out of the convenience of the product (Pousttchi and Schurig, 2004) and ensuring that product always is accessible by the consumer (Püschel, Afonso Mazzon and Mauro C. Hernandez, 2010). Based on these findings' banks and fintech must ensure to

that PU and PEOU been that easy to use and have a positive impact is maintained. Any drop in this statistical type analysis would most likely reduce usage of an application.

## 6.2 Compatibility with Lifestyle

The impact using banking apps has on a person's lifestyle across gender on age, the hypothesis for gender was accepted and for age rejected. We can also see from the results from the age profile 44 yrs. and below they see the apps more useful and how females also seen them as better fit to lifestyle with a higher mean result. But we can see how both groups found it compatible with lifestyle again showing how convenience and the 'always on' (Pousttchi and Schurig, 2004; Püschel, Afonso Mazzon and Mauro C. Hernandez, 2010) are important to people.

This enhances the point made by Ba (2010) that ensuring you have the right e commerce solution is of more benefit that having the human touch of a branch, but a company must maintain this compatibility with consumer needs (Bitner, Brown and Meuter, 2000; Hitt and Frei, 2003). Again we see the skewed results which is a limitation that may be due to sample size, but also as previous studies have not seen this as a factor (Duane, O'Reilly and Andreev, 2014) but other studies say that this should be at the core of development (Sathitwiriyawong and Phuttaraksa, 2018).

## 6.3 Perceived Risk and Attitude to Trust

In the papers reviewed (Lee, Zhang and Chen, 2013; Duane, O'Reilly and Andreev, 2014) they have all highlighted that risk and trust are the factors that are to the forefront their data. In this study we see the sample beginning to see the applications as safer that previous studies even in the face of losing money (Q16) where over 40 respondents gave the answer 'safe' and almost 50 believe that banks are trustworthy. The trust and risk response is not in agreement with other research (Muñoz-Leiva, Climent-Climent and Liébana-Cabanillas, 2017). This is a positive for the industry as trust is seen as

significant (Ramos *et al.*, 2018) this research shows a trust in the technology available to the sample. The factor of mistrust in banking (Ross and Squires, 2011) has this changed as this research says yes, but we need to be wary as we cannot say this definitively. We do have the fact that under the composite score for trust in age the hypothesis was accepted so different age demographics the data shows that trust across age groups differ, could that be the influence of digital natives and immigrants, the bands of the age group does not allow to confirm with certainty and so marketing by demographic / gender may not be required.

## 6.4 Behavioural intention to use

What was seen in the previous research was that mobile banking was not the preferred choice (Nel and Boshoff, 2018) and there was a slow uptake on them (Ramos *et al.*, 2018) this sample showed that there is a confidence in the technology been used and intention to use this technology with 94 of the sample confirming they will use the platforms. The pace of change that needs to ensure the momentum is carried ensuring a company gains a competitive edge (Kim, Shin and Lee, 2009b) it was argued that they adopt the business model in order to meet the changing requirements of the customer (Komulainen and Saraniemi, 2019). Also one of the constraints to adoption was trust in a user themselves (Gefen, Karahanna and Straub, 2003) to be willing to use the technology the results disagree with this as 93 respondents say they are confident in using the technology demonstrating a willingness on their part to adopt irrespective of age or gender.

## 6.5 Gender

The initial concept proffered for this paper was that the research would find a difference in the uptake and attitude to the technology (Yau and Cheng, 2012) this paper would agree with Calluzzo (2004) that the research can see no significant difference in the approach by either gender and this would move toward the possibility this can be ignored (Block, 2004). For marketers this would escape the need for a dual approach (Venkatesh and Morris, 2000) and

based on the findings a single track approach would reduce marketing costs. Also the data points to agreement with (Gefen and Straub, 1997) that gender does not affect actual use. We would contend the argument put forward that a dual approach is required (Venkatesh and Morris, 2000) does not correlated with this research and would be more aligned with Block (2004) that gender can be ignored.

## 6.6 Age

Prensky (2001) discussed the digital native and immigrant variant in this research without having the exact age of the sample we cannot truly agree to this. But what I argue as we saw the rejection of the hypothesis under lifestyle and PEOU and different approach the age groups, from this I suggest digital native and immigrant may play a role in this. In the paper we put forward that it was argued we won't see resistance to adapt to changes in technology (Vodanovich, Sundaram and Myers, 2010) but we can argue this is a factor based on the results of PEOU.

Again this is useful for Markets in meaning a more streamlined approach rather that differentiated strategy as against to segmented (Cummins, Peltier and Dixon, 2016). Ensuring that the technology is functional and easy to use this will disregard the age factor (Kim, 2016) and this study may point to this.

## 6.7 Limitations of the Study

There we a number of limitations some highlighted already:

1. Sample size: 117 completed surveys gave reliable data but a larger sample would be more representative

2. Age: In the Age groups of 18-24 and 65+ there was a limited response. Ideally in larger sample this may be more balance in order to compare across all groups equally

3. Skewed Results: All histograms were left skewed and hence we cannot have full confidence in the results it would be preferable to have symmetric results.

# Chapter 7 Conclusions

The research and the review of the finding have highlighted information that will be of benefit to banks, fintech, marketers and app developers. By using the TAM and IDT the research was able to asses a consumer's willingness to try new banking technology across gender and age.

The main conclusion from the research after twelve hypotheses were tested under the framework is the industry needs to account for the perceived ease of use of mobile banking applications and may require alternate strategies for this. The sample showed a willingness to trust and be risk averse to the adoption of banking apps which is a positive for the relevant industries.

Additional Future research

As the questionnaire did not record occupation of the respondents, we would see this in conjunction with exact age and salary would give more dynamic data for interrogation.

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## Appendices

## Appendix 1 – Online Survey / Questionnaire

### Factors Affecting Mobile Banking Apps Adoption

This survey forms part of my MSc Thesis at National College of Ireland. The questionnaire has been designed to investigate consumer's adoption of mobile banking apps on smartphones in Ireland.

Your participation is voluntary, if you do not wish to participate you may simply discard the survey.

The survey consists of 35 questions and will take approximately 5 minutes of your time and contribution will help make the survey a success and is greatly appreciated. The information provided will be confidential and used only for purpose of this study.

1. Age, are you

- [ ] Under 18
- [ ] 18-24
- [ ] 25-34
- [ ] 35-44
- [ ] 45-54
- [ ] 55-64
- [ ] 65+

2. Are you

- ( ) Male
- ( ) Female
- ( ) Other

3. Using mobile banking enables me to do my banking transactions quicker

- ( ) Strongly disagree
- ( ) Disagree
- ( ) Somewhat disagree
- ( ) Neither agree nor disagree
- ( ) Somewhat agree
- ( ) Agree
- ( ) Strongly agree

4. Using mobile banking enhances the efficiency of my banking activities

- ( ) Strongly disagree
- ( ) Disagree
- ( ) Somewhat disagree
- ( ) Neither agree nor disagree
- ( ) Somewhat agree
- ( ) Agree
- ( ) Strongly agree

5. Using mobile banking makes it easier to do my banking transactions

○ Strongly disagree                          ○ Somewhat agree

○ Disagree                                   ○ Agree

○ Somewhat disagree                          ○ Strongly agree

○ Neither agree nor disagree


6. Mobile banking is useful

○ Strongly disagree                          ○ Somewhat agree

○ Disagree                                   ○ Agree

○ Somewhat disagree                          ○ Strongly agree

○ Neither agree nor disagree


7. Mobile banking is easy to use

○ Strongly disagree                          ○ Somewhat agree

○ Disagree                                   ○ Agree

○ Somewhat disagree                          ○ Strongly agree

○ Neither agree nor disagree


8. Using Mobile Banking does not require a lot of mental effort

○ Strongly disagree                          ○ Somewhat agree

○ Disagree                                   ○ Agree

○ Somewhat disagree                          ○ Strongly agree

○ Neither agree nor disagree


9. Learning to use mobile banking is easy

○ Strongly disagree                          ○ Somewhat agree

○ Disagree                                   ○ Agree

○ Somewhat disagree                          ○ Strongly agree

○ Neither agree nor disagree


10. It is easy to become skillful in using mobile banking

○ Strongly disagree                          ○ Somewhat agree

○ Disagree                                   ○ Agree

○ Somewhat disagree                          ○ Strongly agree

○ Neither agree nor disagree

11. Mobile Banking fits well with the way I like to manage my finances

○ Strongly disagree          ○ Somewhat agree

○ Disagree                   ○ Agree

○ Somewhat disagree          ○ Strongly agree

○ Neither agree nor disagree

12. Using Mobile Banking fits into my working style

○ Strongly disagree          ○ Somewhat agree

○ Disagree                   ○ Agree

○ Somewhat disagree          ○ Strongly agree

○ Neither agree nor disagree

13. I like to try new technology

○ Strongly disagree          ○ Somewhat agree

○ Disagree                   ○ Agree

○ Somewhat disagree          ○ Strongly agree

○ Neither agree nor disagree

14. I like to adopt new innovation

○ Strongly disagree          ○ Somewhat agree

○ Disagree                   ○ Agree

○ Somewhat disagree          ○ Strongly agree

○ Neither agree nor disagree

15. Mobile Banking is compatible with my lifestyle

○ Strongly disagree          ○ Somewhat agree

○ Disagree                   ○ Agree

○ Somewhat disagree          ○ Strongly agree

○ Neither agree nor disagree

16. Considering the possibility of monetary loss associated with Mobile Banking, how risky do you consider mobile banking to be?

○ Very Risky                 ○ Somewhat Safe

○ Risky                      ○ Safe

○ Somewhat Risky             ○ Very Safe

○ Undecided

17. Considering the possibility of harm to you resulting from the misuse of important personal and financial information due to the use of Mobile Banking, how risky do you consider mobile banking to be?

○ Very Risky                          ○ Somewhat Safe

○ Risky                               ○ Safe

○ Somewhat Risky                      ○ Very Safe

○ Undecided

18. Considering the possible loss of privacy because of information collected about you as you use mobile banking, how risky do you consider mobile banking to be?

○ Very Risky                          ○ Somewhat Safe

○ Risky                               ○ Safe

○ Somewhat Risky                      ○ Very Safe

○ Undecided

19. How risky do you rate Mobile Banking

○ Very Risky                          ○ Somewhat Safe

○ Risky                               ○ Safe

○ Somewhat Risky                      ○ Very Safe

○ Undecided

20. Mobile Banking is trustworthy

○ Strongly disagree                   ○ Somewhat agree

○ Disagree                            ○ Agree

○ Somewhat disagree                   ○ Strongly agree

○ Neither agree nor disagree

21. Mobile Banking serves the present and future interests of users

○ Strongly disagree                   ○ Somewhat agree

○ Disagree                            ○ Agree

○ Somewhat disagree                   ○ Strongly agree

○ Neither agree nor disagree

22. Mobile Banking keeps its promises and commitments

○ Strongly disagree             ○ Somewhat agree

○ Disagree             ○ Agree

○ Somewhat disagree             ○ Strongly agree

○ Neither agree nor disagree

23. Overall, I trust Mobile Banking

○ Strongly disagree             ○ Somewhat agree

○ Disagree             ○ Agree

○ Somewhat disagree             ○ Strongly agree

○ Neither agree nor disagree

24. I intend to use mobile banking regularly in the future

○ Strongly disagree             ○ Somewhat agree

○ Disagree             ○ Agree

○ Somewhat disagree             ○ Strongly agree

○ Neither agree nor disagree

25. I will frequently use mobile banking in the future

○ Strongly disagree             ○ Somewhat agree

○ Disagree             ○ Agree

○ Somewhat disagree             ○ Strongly agree

○ Neither agree nor disagree

26. Assuming that I have access to mobile banking apps, I intend to use it

○ Strongly disagree             ○ Somewhat agree

○ Disagree             ○ Agree

○ Somewhat disagree             ○ Strongly agree

○ Neither agree nor disagree

27. I will use mobile banking for my banking needs

○ Strongly disagree             ○ Somewhat agree

○ Disagree             ○ Agree

○ Somewhat disagree             ○ Strongly agree

○ Neither agree nor disagree

28. I am confident of using Mobile Banking even if there is no one around to show me how to do it

○ Strongly disagree                                    ○ Somewhat agree

○ Disagree                                             ○ Agree

○ Somewhat disagree                                    ○ Strongly agree

○ Neither agree nor disagree

29. I am confident of using Mobile Banking even if I have only the online instructions for reference

○ Strongly disagree                                    ○ Somewhat agree

○ Disagree                                             ○ Agree

○ Somewhat disagree                                    ○ Strongly agree

○ Neither agree nor disagree

30. I am confident of using Mobile Banking even if I have just the online "help" function for assistance

○ Strongly disagree                                    ○ Somewhat agree

○ Disagree                                             ○ Agree

○ Somewhat disagree                                    ○ Strongly agree

○ Neither agree nor disagree

31. I am confident in using Mobile Banking if I have sufficient time to complete the transactions

○ Strongly disagree                                    ○ Somewhat agree

○ Disagree                                             ○ Agree

○ Somewhat disagree                                    ○ Strongly agree

○ Neither agree nor disagree

32. I am happy to download Mobile Banking Apps

○ Strongly disagree                                    ○ Somewhat agree

○ Disagree                                             ○ Agree

○ Somewhat disagree                                    ○ Strongly agree

○ Neither agree nor disagree

33. I am happy to download Shopping Apps

○ Strongly disagree                                    ○ Somewhat agree

○ Disagree                                             ○ Agree

○ Somewhat disagree                                    ○ Strongly agree

○ Neither agree nor disagree

# Appendix 2 – Distribution Email

**From:** Ronan Kieran
**Sent:**
**To:**
**Subject:** Ronan Kieran - College Survey


Dear All,


As you may or may not be aware, I'm currently completing a MSc in Management in College and as part of this I need to complete a survey.


This survey forms part of my Thesis at National College of Ireland. The questionnaire has been designed to investigate Irish Consumer's adoption of mobile banking apps in Ireland.


Your participation is voluntary, if you do not wish to participate you may simply discard the survey.

The survey consists of 35 questions and will take approximately 4 minutes of your time and contribution will help make the survey a success and is greatly appreciated. The information provided will be confidential and used only for purpose of this study.

Please click the button to take the survey.


https://www.surveymonkey.com/r/MscBank

Many thanks in advance

# Appendix 3 Data Analysis Tables

## Perceived Usefulness Tables

**Mann Whitney Test**

**Ranks**

| | Are you | N | Mean Rank | Sum of Ranks |
|---|---|---|---|---|
| Perceived Use Composite Score | Male | 55 | 56.03 | 3081.50 |
| | Female | 62 | 61.64 | 3821.50 |
| | Total | 117 | | |

**Test Statistics[a]**

| | Perceived Use Composite Score |
|---|---|
| Mann-Whitney U | 1541.500 |
| Wilcoxon W | 3081.500 |
| Z | -.925 |
| Asymp. Sig. (2-tailed) | .355 |

a. Grouping Variable: Are you

**Independent T Test**

**Group Statistics**

| | Are you | N | Mean | Std. Deviation | Std. Error Mean |
|---|---|---|---|---|---|
| Perceived Use Composite Score | Male | 55 | 24.33 | 5.121 | .691 |
| | Female | 62 | 24.89 | 4.926 | .626 |

**Independent Samples Test**

| | | Levene's Test for Equality of Variances | | t-test for Equality of Means | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | F | Sig. | t | df | Sig. (2-tailed) | Mean Difference | Std. Error Difference | 95% Confidence Interval of the Difference Lower | Upper |
| Perceived Use Composite Score | Equal variances assumed | .037 | .849 | -.602 | 115 | .548 | -.560 | .930 | -2.401 | 1.282 |
| | Equal variances not assumed | | | -.601 | 112.145 | .549 | -.560 | .932 | -2.406 | 1.286 |

# Perceived Ease of Use

**Mann Whitney Test**

### Ranks

| | Are you | N | Mean Rank | Sum of Ranks |
|---|---|---|---|---|
| Perceived Ease of Use Composite Score | Male | 55 | 51.88 | 2853.50 |
| | Female | 62 | 65.31 | 4049.50 |
| | Total | 117 | | |

### Test Statistics[a]

| | Perceived Ease of Use Composite Score |
|---|---|
| Mann-Whitney U | 1313.500 |
| Wilcoxon W | 2853.500 |
| Z | -2.151 |
| Asymp. Sig. (2-tailed) | .031 |

a. Grouping Variable: Are you

**Independent T Test**

### Group Statistics

| | Are you | N | Mean | Std. Deviation | Std. Error Mean |
|---|---|---|---|---|---|
| Perceived Ease of Use Composite Score | Male | 55 | 22.11 | 4.400 | .593 |
| | Female | 62 | 23.48 | 4.644 | .590 |

### Independent Samples Test

| | | Levene's Test for Equality of Variances | | t-test for Equality of Means | | | | | | 95% Confidence Interval of the Difference | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | F | Sig. | t | df | Sig. (2-tailed) | Mean Difference | Std. Error Difference | Lower | Upper |
| Perceived Ease of Use Composite Score | Equal variances assumed | .061 | .805 | -1.638 | 115 | .104 | -1.375 | .839 | -3.037 | .288 |
| | Equal variances not assumed | | | -1.643 | 114.487 | .103 | -1.375 | .837 | -3.032 | .282 |

**Post Hoch Test**

## Multiple Comparisons

Dependent Variable:   Perceived Ease of Use Composite Score
LSD

| (I) Age | (J) Age | Mean Difference (I-J) | Std. Error | Sig. | 95% Confidence Interval | |
|---|---|---|---|---|---|---|
| | | | | | Lower Bound | Upper Bound |
| 18 - 24 | 25 - 34 | -1.576 | 2.394 | .512 | -6.32 | 3.17 |
| | 35 - 44 | -.444 | 2.329 | .849 | -5.06 | 4.17 |
| | 45 - 54 | 1.583 | 2.340 | .500 | -3.05 | 6.22 |
| | 55 - 64 | 1.850 | 2.487 | .458 | -3.08 | 6.78 |
| | 65 + | 3.417 | 2.852 | .234 | -2.24 | 9.07 |
| 25 - 34 | 18 - 24 | 1.576 | 2.394 | .512 | -3.17 | 6.32 |
| | 35 - 44 | 1.132 | 1.180 | .339 | -1.21 | 3.47 |
| | 45 - 54 | 3.159[*] | 1.200 | .010 | .78 | 5.54 |
| | 55 - 64 | 3.426[*] | 1.467 | .021 | .52 | 6.33 |
| | 65 + | 4.993[*] | 2.026 | .015 | .98 | 9.01 |
| 35 - 44 | 18 - 24 | .444 | 2.329 | .849 | -4.17 | 5.06 |
| | 25 - 34 | -1.132 | 1.180 | .339 | -3.47 | 1.21 |
| | 45 - 54 | 2.028 | 1.065 | .059 | -.08 | 4.14 |
| | 55 - 64 | 2.294 | 1.358 | .094 | -.40 | 4.99 |
| | 65 + | 3.861 | 1.949 | .050 | .00 | 7.72 |
| 45 - 54 | 18 - 24 | -1.583 | 2.340 | .500 | -6.22 | 3.05 |
| | 25 - 34 | -3.159[*] | 1.200 | .010 | -5.54 | -.78 |
| | 35 - 44 | -2.028 | 1.065 | .059 | -4.14 | .08 |
| | 55 - 64 | .267 | 1.376 | .847 | -2.46 | 2.99 |
| | 65 + | 1.833 | 1.961 | .352 | -2.05 | 5.72 |
| 55 - 64 | 18 - 24 | -1.850 | 2.487 | .458 | -6.78 | 3.08 |
| | 25 - 34 | -3.426[*] | 1.467 | .021 | -6.33 | -.52 |
| | 35 - 44 | -2.294 | 1.358 | .094 | -4.99 | .40 |
| | 45 - 54 | -.267 | 1.376 | .847 | -2.99 | 2.46 |
| | 65 + | 1.567 | 2.135 | .465 | -2.66 | 5.80 |
| 65 + | 18 - 24 | -3.417 | 2.852 | .234 | -9.07 | 2.24 |
| | 25 - 34 | -4.993[*] | 2.026 | .015 | -9.01 | -.98 |
| | 35 - 44 | -3.861 | 1.949 | .050 | -7.72 | .00 |
| | 45 - 54 | -1.833 | 1.961 | .352 | -5.72 | 2.05 |
| | 55 - 64 | -1.567 | 2.135 | .465 | -5.80 | 2.66 |

*. The mean difference is significant at the 0.05 level.

# Compatibility with Lifestyle

## Mann Whitney Test

### Ranks

| | Are you | N | Mean Rank | Sum of Ranks |
|---|---|---|---|---|
| Lifestyle Comp Score | Male | 54 | 57.07 | 3082.00 |
| | Female | 62 | 59.74 | 3704.00 |
| | Total | 116 | | |

### Test Statistics[a]

| | Lifestyle Comp Score |
|---|---|
| Mann-Whitney U | 1597.000 |
| Wilcoxon W | 3082.000 |
| Z | -.428 |
| Asymp. Sig. (2-tailed) | .668 |

a. Grouping Variable: Are you

## Independent T Test

### Group Statistics

| | Are you | N | Mean | Std. Deviation | Std. Error Mean |
|---|---|---|---|---|---|
| Lifestyle Comp Score | Male | 54 | 28.98 | 5.200 | .708 |
| | Female | 62 | 29.50 | 5.175 | .657 |

### Independent Samples Test

| | | Levene's Test for Equality of Variances | | t-test for Equality of Means | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | 95% Confidence Interval of the Difference | |
| | | F | Sig. | t | df | Sig. (2-tailed) | Mean Difference | Std. Error Difference | Lower | Upper |
| Lifestyle Comp Score | Equal variances assumed | .049 | .826 | -.537 | 114 | .592 | -.519 | .965 | -2.431 | 1.394 |
| | Equal variances not assumed | | | -.537 | 111.675 | .592 | -.519 | .966 | -2.432 | 1.395 |

## Post Hoc Test

93

## Multiple Comparisons

Dependent Variable:   Lifestyle Comp Score

LSD

| (I) Age | (J) Age | Mean Difference (I-J) | Std. Error | Sig. | 95% Confidence Interval | |
|---|---|---|---|---|---|---|
| | | | | | Lower Bound | Upper Bound |
| 18 - 24 | 25 - 34 | .283 | 2.716 | .917 | -5.10 | 5.67 |
| | 35 - 44 | 1.186 | 2.646 | .655 | -4.06 | 6.43 |
| | 45 - 54 | 3.621 | 2.654 | .175 | -1.64 | 8.88 |
| | 55 - 64 | 4.300 | 2.821 | .130 | -1.29 | 9.89 |
| | 65 + | 4.667 | 3.236 | .152 | -1.75 | 11.08 |
| 25 - 34 | 18 - 24 | -.283 | 2.716 | .917 | -5.67 | 5.10 |
| | 35 - 44 | .903 | 1.346 | .504 | -1.76 | 3.57 |
| | 45 - 54 | 3.339* | 1.362 | .016 | .64 | 6.04 |
| | 55 - 64 | 4.017* | 1.664 | .017 | .72 | 7.32 |
| | 65 + | 4.384 | 2.298 | .059 | -.17 | 8.94 |
| 35 - 44 | 18 - 24 | -1.186 | 2.646 | .655 | -6.43 | 4.06 |
| | 25 - 34 | -.903 | 1.346 | .504 | -3.57 | 1.76 |
| | 45 - 54 | 2.435* | 1.217 | .048 | .02 | 4.85 |
| | 55 - 64 | 3.114* | 1.547 | .047 | .05 | 6.18 |
| | 65 + | 3.481 | 2.215 | .119 | -.91 | 7.87 |
| 45 - 54 | 18 - 24 | -3.621 | 2.654 | .175 | -8.88 | 1.64 |
| | 25 - 34 | -3.339* | 1.362 | .016 | -6.04 | -.64 |
| | 35 - 44 | -2.435* | 1.217 | .048 | -4.85 | -.02 |
| | 55 - 64 | .679 | 1.561 | .665 | -2.42 | 3.77 |
| | 65 + | 1.045 | 2.225 | .639 | -3.36 | 5.46 |
| 55 - 64 | 18 - 24 | -4.300 | 2.821 | .130 | -9.89 | 1.29 |
| | 25 - 34 | -4.017* | 1.664 | .017 | -7.32 | -.72 |
| | 35 - 44 | -3.114* | 1.547 | .047 | -6.18 | -.05 |
| | 45 - 54 | -.679 | 1.561 | .665 | -3.77 | 2.42 |
| | 65 + | .367 | 2.422 | .880 | -4.43 | 5.17 |
| 65 + | 18 - 24 | -4.667 | 3.236 | .152 | -11.08 | 1.75 |
| | 25 - 34 | -4.384 | 2.298 | .059 | -8.94 | .17 |
| | 35 - 44 | -3.481 | 2.215 | .119 | -7.87 | .91 |
| | 45 - 54 | -1.045 | 2.225 | .639 | -5.46 | 3.36 |
| | 55 - 64 | -.367 | 2.422 | .880 | -5.17 | 4.43 |

*. The mean difference is significant at the 0.05 level.

# Attitude to Risk

## Mann Whitney Test

### Ranks

| | Are you | N | Mean Rank | Sum of Ranks |
|---|---|---|---|---|
| Risk Comp Score | Male | 55 | 64.05 | 3522.50 |
| | Female | 62 | 54.52 | 3380.50 |
| | Total | 117 | | |

### Test Statistics[a]

| | Risk Comp Score |
|---|---|
| Mann-Whitney U | 1427.500 |
| Wilcoxon W | 3380.500 |
| Z | -1.522 |
| Asymp. Sig. (2-tailed) | .128 |

a. Grouping Variable: Are you

## Independent T Test

### Group Statistics

| | Are you | N | Mean | Std. Deviation | Std. Error Mean |
|---|---|---|---|---|---|
| Risk Comp Score | Male | 55 | 19.05 | 6.491 | .875 |
| | Female | 62 | 17.48 | 6.495 | .825 |

### Independent Samples Test

| | | Levene's Test for Equality of Variances | | t-test for Equality of Means | | | | | 95% Confidence Interval of the Difference | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | F | Sig. | t | df | Sig. (2-tailed) | Mean Difference | Std. Error Difference | Lower | Upper |
| Risk Comp Score | Equal variances assumed | .017 | .897 | 1.306 | 115 | .194 | 1.571 | 1.203 | -.812 | 3.953 |
| | Equal variances not assumed | | | 1.306 | 113.362 | .194 | 1.571 | 1.203 | -.812 | 3.953 |

# Trust

## Mann Whitney Test

### Ranks

| | Are you | N | Mean Rank | Sum of Ranks |
|---|---|---|---|---|
| Trust Comp Score | Male | 54 | 58.04 | 3134.00 |
| | Female | 61 | 57.97 | 3536.00 |
| | Total | 115 | | |

### Test Statistics[a]

| | Trust Comp Score |
|---|---|
| Mann-Whitney U | 1645.000 |
| Wilcoxon W | 3536.000 |
| Z | -.011 |
| Asymp. Sig. (2-tailed) | .991 |

a. Grouping Variable: Are you

## Independent T Test

### Group Statistics

| | Are you | N | Mean | Std. Deviation | Std. Error Mean |
|---|---|---|---|---|---|
| Trust Comp Score | Male | 54 | 21.41 | 4.363 | .594 |
| | Female | 61 | 21.34 | 4.750 | .608 |

### Independent Samples Test

| | | Levene's Test for Equality of Variances | | t-test for Equality of Means | | | | | 95% Confidence Interval of the Difference | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | F | Sig. | t | df | Sig. (2-tailed) | Mean Difference | Std. Error Difference | Lower | Upper |
| Trust Comp Score | Equal variances assumed | .196 | .659 | .074 | 113 | .941 | .063 | .854 | -1.630 | 1.756 |
| | Equal variances not assumed | | | .074 | 112.837 | .941 | .063 | .850 | -1.621 | 1.747 |

# Behavioural Intention

## Mann Whitney Test

### Ranks

| | Are you | N | Mean Rank | Sum of Ranks |
|---|---|---|---|---|
| Beh Comp Score | Male | 54 | 56.11 | 3030.00 |
| | Female | 61 | 59.67 | 3640.00 |
| | Total | 115 | | |

### Test Statistics[a]

| | Beh Comp Score |
|---|---|
| Mann-Whitney U | 1545.000 |
| Wilcoxon W | 3030.000 |
| Z | -.578 |
| Asymp. Sig. (2-tailed) | .563 |

a. Grouping Variable: Are you

## Independent T Test

### Group Statistics

| | Are you | N | Mean | Std. Deviation | Std. Error Mean |
|---|---|---|---|---|---|
| Beh Comp Score | Male | 54 | 41.30 | 7.417 | 1.009 |
| | Female | 61 | 41.64 | 8.569 | 1.097 |

### Independent Samples Test

| | | Levene's Test for Equality of Variances | | t-test for Equality of Means | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | 95% Confidence Interval of the Difference | |
| | | F | Sig. | t | df | Sig. (2-tailed) | Mean Difference | Std. Error Difference | Lower | Upper |
| Beh Comp Score | Equal variances assumed | 1.659 | .200 | -.228 | 113 | .820 | -.343 | 1.504 | -3.323 | 2.637 |
| | Equal variances not assumed | | | -.230 | 112.948 | .818 | -.343 | 1.491 | -3.297 | 2.610 |