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THE IMPACT OF ARTIFICIAL INTELLIGENCE ON SHAPING THE FUTURE OF BANKING CUSTOMER ENGAGEMENT

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Abstract

Artificial intelligence is a powerful technology of humankind and the primary driver of revolutionizing the banking industry. "How AI will shape the future of banking customer engagement" describes the fundamental research question. The rise of customer expectations in the modern digital world makes it imperative for banks to rethink how they engage with their customers. This paper addresses how incumbents can take advantage of AI capabilities towards a rethought customer engagement by reimagining their role in the new banking ecosystem. It explores relevant literature, and primary research relies on guided industry expert interviews and consumer insights through a survey.

Title: The impact of Artificial Intelligence on shaping the future of banking customer engagement

Keywords: Artificial Intelligence, Machine Learning, Digital Banking, Open Banking, Incumbent Banks, Big Techs, Fintech’s, Customer Engagement

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1. INTRODUCTION

Banks, since their foundation, have always found a way to embrace the leading-edge technology innovations to help provide a better experience to the end-customer. Hence, in the 1960s, banks introduced Banking ATMs, followed by electronic and card-based payments in the '70s. 24/7 online banking marks the beginning of the 21 century, and after the appearance of smartphones, a new "banking on the go" through mobile banking defines the last decade's banking landscape (Biswas 2020). The author's perspective is that AI will define the following years of banking forever. Thus, in this thesis, the central research question is:

How AI is shaping the future of banking customer engagement

The author relies on relevant literature reviews primarily based on books, reports, company surveys, and articles and conducts semi-structured interviews with industry experts to address this question. Hence, this paper begins by offering a unique view of how a new banking landscape arises - driven by current trends such as mobile banking, open banking, and the continuous disintermediation of banking activities by incoming players like fintech and big techs. To the best of the author's knowledge, this thesis is the first to present the impact of AI transforming the customer interaction between customers and banks. Consequently, how AI will play a central role in this transformation enhances the second focus of this thesis. In addition, the end-users will dictate the success of AI adoption within this industry. For that reason, this thesis also relies on a consumer survey based on a diverse sample because one of the main challenges for banks will be to offer a tailored customer experience, considering multiple differences across different generations of users. Lastly, the ultimate purpose of this paper is to provide a clear call to action for the incumbent's point of view by rethinking their customer engagement, framing the impact on the new AI banking ecosystem, and what might be their biggest challenges. The report's organization follows this structure: methodology, findings, conclusion, limitations, and further research.

2. METHODOLOGY

"How AI will shape a new era for seamless customer journeys" was the main research question of a joint research project focused on the retail industry. Hence, this individual study aims to provide a comprehensive understanding of how AI shapes the future of banking customer engagement.

The research divides into two parts: on the one hand, it was imperative to analyze the main trends within the banking industry, and on the other hand, the reasons why AI is shaping the future landscape. Overall, the following research questions guided the study: 1) What are the main trends in the banking industry?; 2) What can incumbent banks gain by exploiting AI capabilities?; 3) What should incumbent banks do to embrace AI capabilities?; 4) The hurdles of AI implementation – Can incumbent banks do it? Furthermore, to collect data, this thesis approached two methodologies: quantitative and qualitative.

The **quantitative method** combines a survey to obtain primary data on consumer insights about their banking engagement, and meaningful reports took secondary data from consultancy companies, such as McKinsey, Deloitte, PwC, Roland Berger, EY, and Oliver Wyman. The author's survey collected 137 in November 2021, and the sample is diverse in terms of age, gender, nationality (80% were Portuguese against 20% foreign), level of education, and employment status. **Appendix 1** shows the survey's details. The author tries to have a diverse group because banks serve a diverse customer base, after all. Almost everyone has access to a bank account, even though there are many differences in customer perceptions between digital natives and older generations. The logic to analyze the quantitative data is applied by referring to the survey section (Sx) and the related question (Qx), which presents the results as follows: cf Sx | Qx).

Moreover, the **qualitative method** combines interviews with experts from the banking industry and technology providers and other extant scientific literature. The literature review was done

mainly through books, reports, and credentialed articles. To complement the author's research and answer the secondary research questions, the author interviewed a panel of two experts from a digital bank - Openbank; from a sizeable incumbent bank – Santander; (Chief Data Scientist and a Wealth Management Executive) and two experts at CxO level from software providers (CISCO and Anixter). **Table 1** shows their profile description, and the entire interview is transcripted in **Table 2** in the appendix. The author would send the questions before the actual interview, and a semi-structured approach takes place to address the questions interviewers consider to be more relevant, and that is, not all of them answer the same questions. The same logic applies to the previous one when analyzing the qualitative data. The author refers to the interview (Ix) and the corresponding text passage (| xx) when presenting the results, as follows: (cf. Ix | xx).

3. FINDINGS

3.1 A New Digital Banking Landscape Arising

The covid-19 pandemic contributed to social lockdowns worldwide, having severe implications on how customers interact with banks. Almost 60% of banks closed or shortened opening hours of branches, demanding banks out of necessity, to reinvent themselves with new measures /functions to tackle covid limitations, such as increasing the limit of contactless payment or introducing fully digital onboarding processes (Deloitte 2020). Considering the author's survey, guided interviews, and literature review, the most significant trends in 2021 are the digital banking revolution, mobile banking, open banking, banking-as-a-service (BaaS), and the disintermediation of traditional financial services by new players.

3.1.1 Digital Banking

Digital banking is no longer an option (Avery 2014), and there is an apparent demand for a bank to accelerate innovation, provide better choices and services to retail consumers and corporate/institutional banking clients alike (Wright 2021). Digital banking is the digitization

of every level, from front- to back-end, of banking, and it represents the most prevalent trend in the financial services industry today, with online deposits, mobile apps, and e-bill payments fundamentally becoming the norm (Phaneuf 2021). Digitalization of a bank is a must because clients demand it, and banks need it to address or serve those clients at scale. Besides, it enables a more accurate segmentation, especially when aligned with the power of technology, data science, and AI (cf.I3|1.1). It is expected significant consumer demand for digital banking, on which by the end of 2021, there will be almost 2.7 billion users of digital banking globally (Nick 2021). The digital banking transformation started with limited online banking services before advancing into a digital-only market, offered by both incumbent banking institutions and digital banks only. It refers to the most basic banking operations, such as bill payment or account transfers through their website platform (Phaneuf 2021). Hence, 98% of the author's survey contestants claimed that their bank offered online banking services (cf S2 | Q6).

3.1.2 Mobile Banking

Mobile banking refers to the ability to execute banking tasks through mobile channels, either with tablet or smartphone, arising from online banking, which includes every banking digitally feature through the internet (Phaneuf 2021). By the end of 2021, there will be 2.6 billion mobile banking users globally (Nick 2021). Hence, 75% of the author's survey contestants claimed that their primary channel to access their bank account is through mobile, followed by the internet (17%) and branch (4%) (cf S2 | Q4). Mobile technology has been a critical driver for innovation within the banking industry because it simultaneously changed the "how, what, where, and when" of banking (Chaouali 2017). The banking world reached the point where simply having a mobile app is not enough for banks to attract and keep customers. Special tools and features – such as the ability to put temporary holds on cards, view recurring charges, or scan a fingerprint to log into an account – are becoming increasingly necessary (Meola 2021).

3.1.3 Open Banking

The world of banking started to reshape with the revised payment services directive (**PSD2**) enforced in 2018, along with other two regulations: strong customer authentication (SCA) and customer secure communication (CSC), under the European banking authority. A revolution arises from this directive: **Open banking**. It is one of the most notable acts of regulation that aims to open innovation and data sharing to democratize access to the customer's financial data and services (BTR Hub 2020). Besides improving consumer protection and increasing security overpayments through SCA, the directive helps to level the playing field between banks and third-party providers (**TPPs**) through opening application programming interfaces – **APIs**, allowing banks for uncomplicated data transmission within financial institutions third parties. Overall, experts perceived it as a significant opportunity to disrupt traditional banks' business model (Roland Berger 2019). In Europe, by 2021, there were 497 TPPs registered (Tink 2021). It includes two disruptive types of TPPs: account information service providers (AISPs) and payment initiation service providers (PISPs) (Nick 2021). By giving customer's consent to their trusted TPPs to access information about income, expenses, savings, loans, and other details that may rest with their bank or financial service provider, financial institutions operating as such entities are authorized to either access the user's payment account to retrieve the customer's data or initiate a payment to a specific destination. These operations allowed disruptive applications in the banking world, such as mobile phone wallets or wireless payments (Roland Berger 2019).

3.1.4 Banking-as-a-Service (BaaS)

The rise of BaaS in banking is similar to what is happening with the F1 world, driven by open partnerships and third parties. Ferrari supplies the engine used in Alfa Romeo's f1 car, and Honda supplies engines to teams with no manufacturing capabilities, such as Red Bull (Saleem 2021). The same logic applies to the finance world on which banks can instead choose to stay

compliant, giving TPPs access to customer data and services, enabling them to explore BaaS opportunities by exposing more services and data assets than what is available in the customer's account, via APIs in real-time (Tink 2021). **Figure 1** shows how it works. BaaS represents an opportunity for banks to reach more customers and reduce their typical high acquisition cost, ranging from $100 to $200, up to $5 to 35$. Furthermore, banks can also achieve incremental revenue growth by launching BaaS business models (Oliver Wyman 2021).

3.1.5 Digital Ecosystems are Disintermediating Traditional Banking Services

APIs will allow banks to offer their services in open and easily integrated ways, allowing the entry of new competitors (American Banker 2017). Nonbanking businesses, financial technology (fintech), including neobanks, and technology giants are the new players aiming to reshape the banking industry landscape upside down (Biswas 2020). Many forces believe that some banking sectors/ niches and even incumbent banks are out of use. Some of these players are more often becoming the intermediary between the client and the product that comprehends its actual needs (cf.I3|1.2). Traditional banks did not need to speed for innovation (Tink 2021). Oppositely, the new generation of players introduces new functionalities to enhance a more compelling customer journey (Biswas 2020), offering superior capabilities in “convenience” and “mobile app” user experience (cf S2 | Q9; S3 | Q2).

Neobanks are fintech firms that offer apps, software, and other technologies to streamline mobile and online banking (Walden 2021). Also referred to as "challengers banks," they have a clear advantage of modern IT infrastructure, which often is already API based, as well as superior data analytics capabilities that they can leverage to grow their customer base (Roland Berger 2019). The author's survey shows that 56% have a bank account in *Revolut* (cf S3 | Q1). However, to become a prominent player, they need "to get out of the niche of being the bank for the students leaving abroad and those who want a straightforward, inexpensive debit card." Hence, most neobanks like *Revolut* will have a tremendous challenge to expand their range of

financial offers to their clients (cf I3 | 3.2), such as mortgages or credit (Fintech Magazine 2020). It might present an opportunity for traditional banks with a large customer base to leverage open banking to understand their clients better and address their real needs (Roland Berger 2019).

Furthermore, **big techs** have gained tremendous leverage by collecting enormous amounts of data within their networks with an established customer base, low customer acquisition, and in-house capabilities to scale innovative technologies such as AI (Biswas 2020). Almost 60% of the people surveyed consider "very likely" or "likely" for big techs becoming their bank in the future (cf S3 | Q3). In part, it is due to their significant innovations in numerous areas such as payment, wealth management, lending, or crowdfunding (Inn 2016). Indeed, it may well be that the players with the slightest financial market knowledge become the banking relationship experts in the open banking future landscape (Roland Berger 2019). However, customers on this sample still do trust the most in large traditional banks (77%), followed by neobanks (13,1%) and only 1.5% in big techs (cf S3 | Q4).

Hence, it is unlikely that FinTech's or big techs will ever have the capillarity, the depth that banks have today. They have reached critical mass in some niche activities through a B2B service. In order to approach more clients, some experts believe that B2B2C will better enhance that by trying to approach large incumbent banks such as BBVA or Santander and trying to incorporate those services into these banks (cf I3 | 2.2). Furthermore, some experts are still not convinced that big tech companies fell into banking as their core service due to high regulation for banking services (cf I2 | 2.2). However, this does not diminish the chances of some players continuing to explore these opportunities. Google, for example, partnered with 8 US banks to launch a collaborative mobile bank account-focused, primarily customer-centric approach to provide their users with better ways of money management, personalized financial insights, and budgeting tools (Finextra 2020). A clear example of a powerful partnership by combining

Google's expertise in creating intuitive experiences with the reputation and security of traditional banks, on which 84% of the sample is "Satisfied" or "Very Satisfied" with their level of security (cf S2 | Q9). The critical question for further discussion is whether incumbent banks should compete or partner with newcomers to fully thrive under a deliberate ecosystem strategy and enhance new opportunities, such as AI, by unlocking the true power of data.

3.2 Transforming the banking landscape with AI

3.2.1 A New Era for Banking Customer Engagement Powered by AI

In this section, the author will address the core research question of this thesis: "How AI is shaping the future of banking customer engagement? ". Incumbent banks are "obliged" to rethink how they engage with their customers, and this section will break through the reasons why this may happen now, the customer and bank's added value from these changes, and how banks should address it from the author's perspective.

3.2.1.1 Why now?

FinTech's and big tech companies are undoubtedly the main ones responsible for **raising customer expectations**, and customer's demand the same level of consistency, safety, convenience, and personalization from Apple, Google, or Amazon services for banking services (Violet 2020) when it used to be the incumbents to set the standard (Deloitte, 2017). The author's survey emphasizes that precisely "security," "convenience," and "customer experience" are among the main priorities when choosing a bank (cf S2 | Q9). Hence, most **consumers' habits** towards banking activities are also changing. The survey also shows that 42% do not use cash very often, and 10% never use cash. Besides, the preferred payment method is either mobile or card instead of cash (cf S2 | Q1; Q2). Thus, up to 45% of consumers will no longer use physical bank facilities (McKinsey, 2020d), and the author's survey shows that 23% "never went in the last two years" (cf S2 | Q3). Disintermediation, addressed in **chapter 3.1.5**, also gives customers reasons to look at these new players as valid alternatives to the banks.

Furthermore, the technology available today enables some of the newest applications of AI, setting the stage for a new era for front-end customer engagement.

3.2.1.2 How Can AI Improve Customer Banking Engagement?

Considering the author's survey, guided interviews, and the literature review, what customers expect from their banks is personalized offers, a fast pace of innovation capacity, real-time response to their needs, and by having a frictionless and omnichannel experience.

Personalization has become the core of any customer interaction, primarily due to what leading tech companies have offered in recent years. For example, Netflix can present its customers with a tailored dashboard of movies and series, on which they recommend highly personalized offers to their customers, based on AI/ML through previous historical data (cf I1 | 2.1). So, banks should attend the same level of customer experience by reminding customers of important dates based on previous purchases and even recommending valuable propositions (e.g., reminder to buy flowers for valentine's day). Alternatively, the bank's mobile app should provide, as Netflix does, a personalized dashboard according to customer needs or preferences (e.g., a tailored dashboard for customers with a propensity to invest in stocks or bonds by emphasizing the latest stock market news). To highlight this fact, almost 71% of the inquiries from the author's survey considered "Very Important" or "Important" the capacity of banks to provide personalized bank alerts (cf S4 | Q2). Hence, a fundamental shift over customer expectations concerns the **speed of innovation**. The real power of AI towards customer banking engagement is about how fast some of these interactions can be, with, for example, a request for an increase of a customer credit limit, and conceived in a matter of seconds through a chatbot, supported by **real-time** analysis according to their risk profile (Violet 2020). 87% of the survey's sample considered as a fundamental asset for banks to provide real-time actions. (cf S4 | Q2). Moreover, "the best client engagement, it is the one that the client does not even acknowledge" (cf I3 | 6.3), and many banking activities are becoming invisible, which some

interfaces go beyond the bank's channels (Violet 2020). It is what Apple did with payments, an existing banking operation, by turning into a one-click action through biometrics technology within Apple Wallet (cf I1 | 2.1), making it smoother, intuitive, and with fewer steps to their customers – a **frictionless experience**. Besides, 83% of the survey's sample considered at least "important" for banks to have biometrics capabilities (cf S4 | Q2). Furthermore, customer engagement will gain from **omnichannel** interactions within banking. It will allow customers to move across multiple channels (e.g., web, mobile app, branch, call center), and within a single journey, banks are capable of attending customers actions by recognizing their context instantly, without interruption or either to start all over again (cf I2 | 1.1). According to the author's survey, 83% of the sample believes that AI will be an essential driver for a bank's success in the near future (cf S4 | Q1). Therefore, the impact of AI reshaping customer engagement in the banking landscape is undeniable, but the end-users are the only ones capable of dictating its success. It depends on assessing their experiences through AI, which can be positive or negative (Shanin 2021). The author provided a framework in **figure 2** on how it could be a future customer interaction with an AI bank.

3.2.1.3 What Can Incumbent Banks Gain by Exploiting AI Capabilities?

The applications of AI in the banking industry and its value chain are countless, as mentioned in the group research project, but this section highlights the AI capabilities towards customer engagement within banks. Considering the author's survey, guided interviews, and literature review, what banks can gain by exploiting AI technologies is better efficiency, more access and scale, foster innovation, and higher customer lifetime value (CLV).

Banks should achieve better **efficiency** in acquiring clients through ML propensity models because, according to experts, it increases the conversion ratio four times (cf I3 | 4.2). Hence, banks can provide better customer actions (cf I4 | 1.3). In addition, other AI technologies such as virtual assistants can help banks achieve high levels of efficiency. "Erica" (Bank of America)

is the most advanced virtual assistant enabling to answer multiple common questions in customers' inquiries by helping banks to address higher **scalability** without deteriorating customer engagement. It will become an irrefutable trend, with almost a third of US consumers using intelligent speakers daily (Kinsella 2020), and in 2024, there will be 8.4 billion devices with voice assistants, almost the same as the global population (Juniper Research 2020). Likewise, AI also enables **increased access** to potential customers. It mainly depends on third parties, optimizing keywords within search engines like Google. However, banks could internally move specific clients from retail banking to wealth management by insights provided from data science and AI/ML capabilities (cf I3| 4.2).

Additionally, intelligent and personalized offers mentioned in the previous section may not deliver direct sales but "makes clients feel that their experience is unique, which is the ultimate goal of a digital experience" (cf I3 | 4.3). Deposits grew 84% faster in banks with higher customer satisfaction scores (McKinsey 2019), and a satisfied customer generates up to 2.4 times more revenue than a neutral customer (Kriss 2014). Although the bank's key performance indicators (KPIs) focus on growth and profitability, unlike tech or fintech companies, the most common KPI enhanced user experience. Nevertheless, the exploitation of AI enables banks to develop **faster innovation cycles** of products (Wright 2021), typically from digital-native companies, enabling banks to launch new features much faster (Biswas 2020). Overall, better customer engagement enables banks to achieve higher loyalty and conquer trust among customers, **increasing CLV** (cf I3 | 4.3).

3.2.1.4 How Should Incumbent Banks do it?

To the author's best knowledge, this section aims to provide significant insights on how banks should address a new era for banking customer engagement powered by AI. Hence, banks must adopt a customer-obsession culture by reaching a data-driven approach that embeds customer journeys in a collaborative ecosystem and redesigns it towards an omnichannel experience.

Intrinsically, data infrastructure, "with committed data science workers who can structure a clear data lake" (cf I3 | 5.1), thriving to capture consumable data points, in order to have a one funnel view of their customers across all channels, journeys, and products (Violet 2020). Hence, "To ensure centralized data, on which banks can use it across different teams/ departments" (cf I1 | 3.1), a **data-driven approach** must take place, and it will dictate whether they are capable of making use out of AI technologies and of truly understanding how customers engage with the bank. Banks must also rethink their approach towards customers because they would often considerer their products offerings before the actual customer itself (cf I1 | 1.2). Once banks have the proper data backbone within their organizational structure, they can move from standardized products to **understanding their customers** to create integrated and intelligent propositions (Harvard 2016). According to McKinsey, this means knowing what to offer by anticipating customer needs, knowing when to offer by comprehending their behaviors (e.g., historical purchase) and context (e.g., sources of income, occupation), and finally knowing which channel to offer considering their preferences (e.g., preferred channel, the best time to contact).

Furthermore, it is time to finally address the open question from chapter 3.1.5 on whether banks should partner with newcomers such as fintech's or big tech companies. The answer among industry experts tends to embrace the idea of "**partner to win the game**" (cf I1 | 4.1; cf I3 | 6.3). However, the new open banking ecosystem implies that incumbent banks must define a **clear core strategy** before moving towards any partnership strategy. On the one hand, by pointing out which capabilities can and should be developed in-house and on the other hand, which areas or pain points within their customer journey (e.g., onboarding, features beyond banking, or closing account) may improve through strategic partnerships. Therefore, many incumbent banks are migrating to external cloud infrastructure to minimize this hurdle (cf I4 | 2.2), provided by big tech companies such as AWS (Amazon), Azure (Microsoft), or Google

Compute Engine (Spoiala 2015). It is straightforward the benefits this could bring for incumbents, such as more access and scale already mentioned previously, but also the lowering costs (e.g., less or "zero" operations) and risks (e.g., better data) (Violet 2020). By contrast, in-house, having **appropriate AI talent** within the organization must be one of the main priorities for incumbents if they intend to embrace the power of AI capabilities (cf I4 | 2.2). Additionally, banks must ensure a **one-stop-shop concept** such as WeChat (cf I3 | 4.2) by embracing an omnichannel experience to their customers, as mentioned previously. To conclude, a definitive answer may not be straightforward because there might be some complications of AI implementation that can impact a bank's decisions on "partner to win" or not. The following section will address these hurdles.

3.2.2 Hurdles of AI Implementation for Banks – Can Incumbents do it?

The previous sections emphasize the importance of AI implementation for banks to rethink their competitiveness strength, especially when it comes to incumbent banks. After reviewing relevant literature and conducting guided interviews, this thesis concludes that there are still many barriers that can slow down incumbent's AI implementation, mainly due to their **heavy legacy in terms of organizational culture** (cf I2 | 3.2). These will impact incumbents by lacking a clear AI strategy, a weak technology infrastructure, fragmented data backbone, an obsolete operating model, substantial regulatory compliance, and an outmoded talent strategy. As mentioned before, the bank's culture needs to adopt a data-driven focus (Pugna 2019) to address the **accessibility and quality of historical data** (cf I4 | 3.1 ; cf I3 | 5.1). To have clean, curated, and well-maintained – "consumable" data sources (cf I3 | 5.1; cf I1 | 3.1) to feed ML algorithms (cf I4 | 3.1), it is required for any large-scale AI initiative (Meunier 2018) for data-processing needs and to perform real-time analysis (Biswas 2020). By not having consumable historical data, ML algorithms cannot find the patterns that can help optimize business and allow banks to deliver at-scale personalization (cf I4 | 3.1). Besides, the lack of

transparency due to difficulties explaining some of these ML results based on their inputs has contributed to blocking AI transition to the so-called AI "black box" (Meunier 2018). However, due to **regulatory compliances** in the industry, banks are "obliged" to implement a specific type of AI named interpretable ML, allowing customers to obtain an explanation for every decision taken by the algorithm, which may not occur in other non-so heavy regulated industries (cf I4 | 3.1). Access to data may be arduous for banks that usually have a **fragile IT architecture** (Ryll 2020) and **weak technology infrastructure**, especially for incumbent firms with data sources fragmented/ disconnected across separated business and technology teams, while analytics focused on unilateral use cases (cf I1 | 4.1). Also, there might be additional difficulties in making that technology infrastructure friendly enough to share APIs with third parties (cf I1 | 3.1), which is fundamental to enhancing a collaborative banking ecosystem. Besides, banks **lack a clear AI strategy** and have struggled to leverage AI capabilities across their organizational structure because most of them failed in switching their vision to "AI-first" (McKinsey 2018). Moreover, limited knowledge to set clear objectives and ensure a continuous improvement process (Kim 2021) demands a shift in mindset and corporate culture (cf I2 | 3.2). At the same time, senior management leadership cannot understand their organization's future AI ambitions (Ryll 2020) and tend to rely on outsourcing TPPs for critical activities that should be developed in-house to ensure competitive differentiation (Sven 2021). Another major limitation is the **shortage of talent** required for the "AI-first" strategy (Kim 2021), constituting incumbent teams. In most cases, big tech companies such as Google or Facebook reveal more capable of attracting a lot of talented AI employees than incumbent banks (Gibney 2016) ; (cf I4 | 2.1), offering researchers up to ten times their academic salaries (McKinsey 2020).

4. CONCLUSION

The thesis enhances the transformation of the banking landscape characterized by the rise of customer expectations influenced by numerous technological advancements that increase digital banking adoption through mobile and online banking. The open banking revolution unlocks new commercial opportunities by using account information services to create personalized customer experiences to address specific needs rather than taking a one-size-fits-all approach. Besides, digital ecosystems are disintermediating traditional financial services through open banking, APIs, banking-as-a-service (BaaS), allowing new players such as fintech and big techs to challenge incumbent banks' markets. The author's survey shows that these players appeal to significant value-added for younger generations such as Millennials and Gen Z populations. Therefore, incoming players reshaped the banking stage by providing more convenient and fast-powered digital platforms with superior customer experience, turning the easy banking customer journey into an exciting experience. Consequently, with the world of banking rapidly shifting towards open APIs, one of the main challenges for banks is how they will interface with their customers and TPPs in the future.

"**How AI is shaping the future of banking customer engagement?**" was the central research question. Hence, AI plays and will continue to play a critical role in this transformation. On the one hand, it allows banks to gain more efficiency (e.g., reduce customer acquisition), increase access and scale for potential customers, and bring higher trust and loyalty levels. On the other hand, ultimately, consumers will benefit from the new era of banking customer engagement. The "bank of the future" will match customers' savvy expectations through "hipper" personalized offers, new features weekly due to a fast pace of innovation capacity, real-time response to their needs, having a frictionless journey, and omnichannel experience.

Bill Gates once stated that "Banking is necessary. Banks are not." It is undeniable that banking activities will continue to make part of customers' daily lives, probably even more invisible.

However, the second part of the statement touches on one crucial point addressed in this thesis: the future of the banking landscape and its actors. The author provides four possible scenarios: 1) Fintech's and Incumbents partnering together to tackle big techs ascendence in financial services; 2) Incumbents embracing new value propositions similarly to fintech; 3) Fintech's bringing their expertise in financial products aligned with distribution capacity and loyal customer base of big techs or 4) Specialized partnerships between incumbents and big techs (e.g., Google partnership with eight US banks). However, incumbents might have tremendous challenges to thrive in a new collaborative banking ecosystem. Such as the lack of speed to innovate, heavy legacy in culture, siloed data structures, weak technology infrastructure, fragile IT infrastructure, the right fit talent, or even compliance and regulatory processes. To the author's best knowledge, defining a clear AI strategy is the biggest challenge for incumbents and any future bank to embrace the new banking era. Only by then will banks be able to unlock the true power of AI capabilities and provide unparallel value to their customers.

5. LIMITATIONS & FURTHER RESEARCH

This section aims to identify specific limitations from the research paper that impacted the quality of the findings and the ability to effectively answer the critical research question.

Firstly, **geographical disparities:** The new era of banking customer engagement addressed in this paper focuses on global banking scope, but there might be regional boundaries. Regarding regulation, for example, this thesis mentioned a vital driver to kick off the open banking revolution: PSD2. However, this directive only applies to the EU and EEA region, despite its importance for the global banking landscape. Then, different market trends, development of AI technologies, cloud infrastructure, AI talent, and even customer expectations (and concerns) may change according to the differences among banking ecosystems across geographies. The challenge to address in the future is whether banks can propose a unified and universal value proposition to their customers in an ever more global world. Secondly, **the banking customer**

target scope: This paper primarily focuses on how AI transforms banking for a retail consumer. However, there are multiple relationship labels within banks and their customers. This thesis does not approach the effects on customer engagement powered by AI for small- or medium-sized businesses that represent a different customer, with different needs, expectations, and overall, totally different interactions within banks. Third, there are **methodological constraints:** In the guided interviews, there is a clear gap in not having expert insights from a traditional bank (incumbent) and from consultancy companies such as any big 4, which might add more value to this thesis discussion. The consumer survey also presents its limitations by 137 answers collected that cannot be considered a representative sample size to address the global banking landscape. To the best of the author's knowledge, there is an **evident lack of appropriate documents** enhancing the AI-added value to the bank's customers and the implications for the banking ecosystem. Even though this thesis enhances the impact of AI towards a new era for customer engagement, this will never happen appropriately without the alignment of other layers of the bank's capability stack. So, the author proposes **further research** on 1) how incumbent banks can build AI analytical powered decision layers with the same level of maturity as the ones provided by fintech and big techs. 2) How can they strengthen the core of their technology infrastructure and data backbone. 3) How can banks take advantage of the open banking revolution through BaaS to rebuild their outmoded operational model. 4) What might be the first steps for incumbent banks to rethink their entire organizational culture towards more agile and flexible, like incoming players. 5) Revaluate the state-of-the-art AI adoption on a two-year basis in banking services because it is only the beginning of a new era for customers to interact with their bank of the future.

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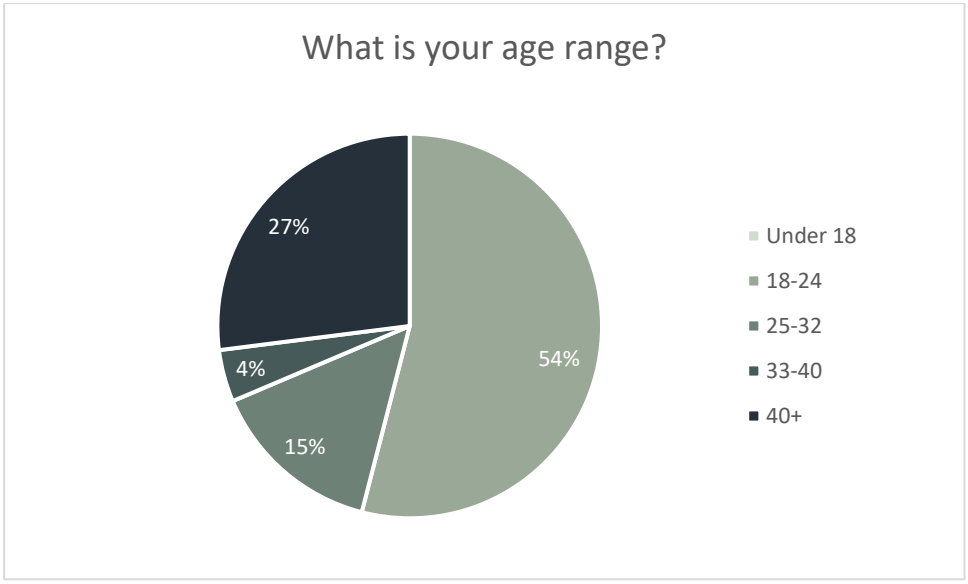
APPENDIX

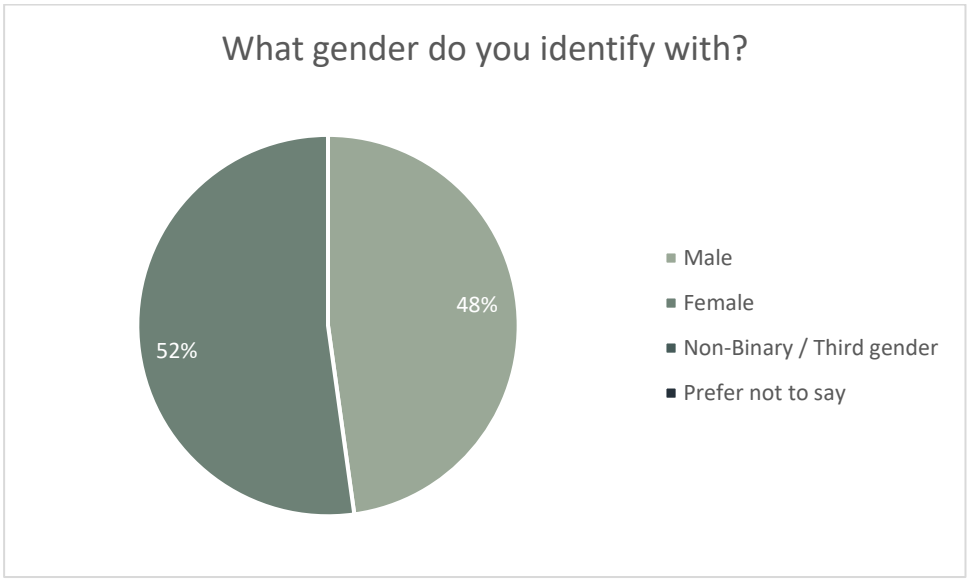
Appendix 1. Consumer's Survey

Section 1 (S1):: "About you"

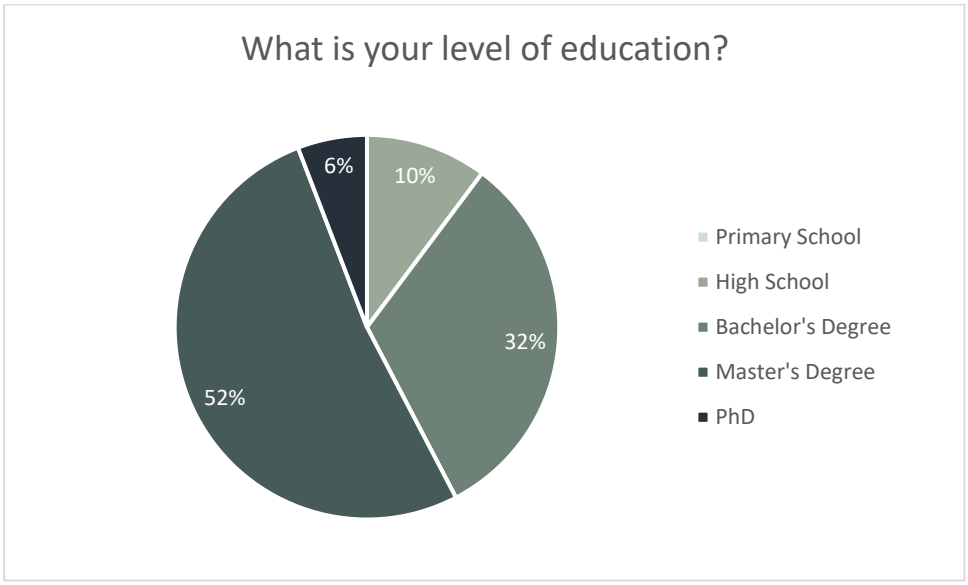
1.1



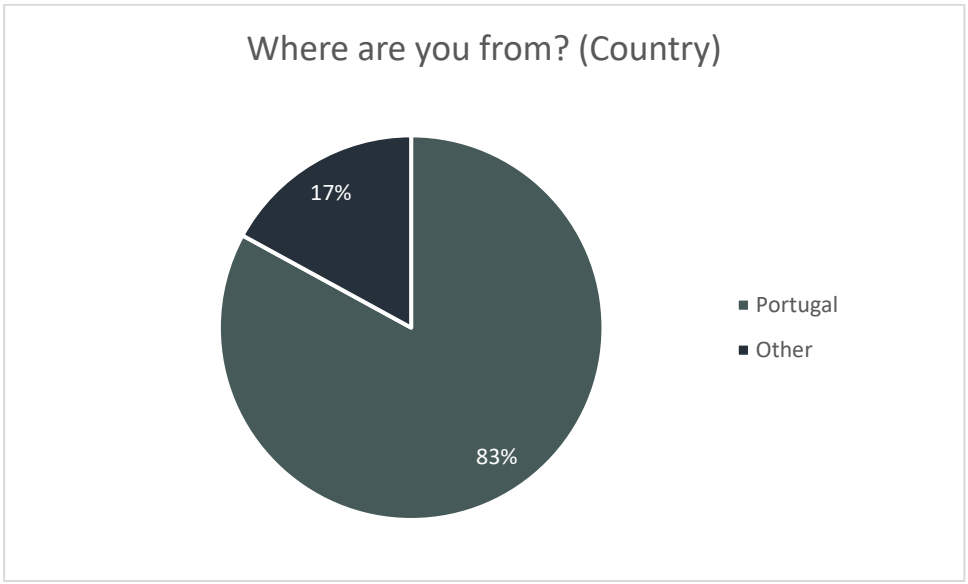
1.2



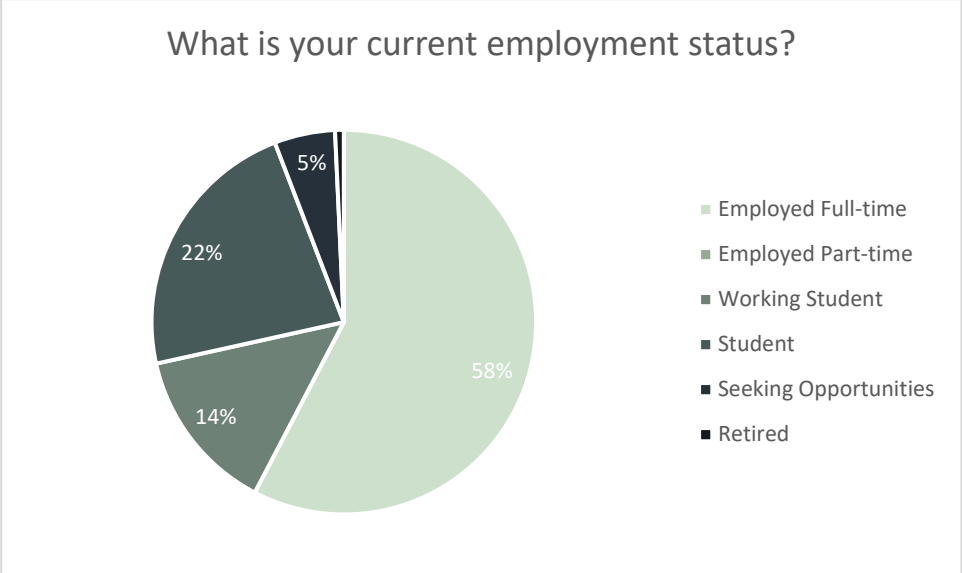
1.3


What is your level of education?
6%
10%
32%
52%
Primary School
High School
Bachelor's Degree
Master's Degree
PhD

1.4

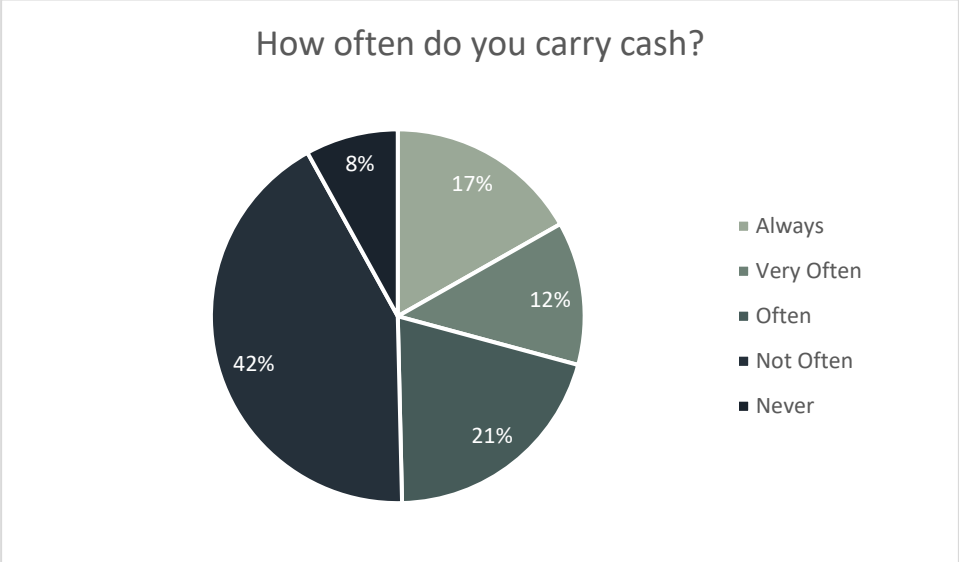

Where are you from? (Country)
17%
83%
Portugal
Other

1.5

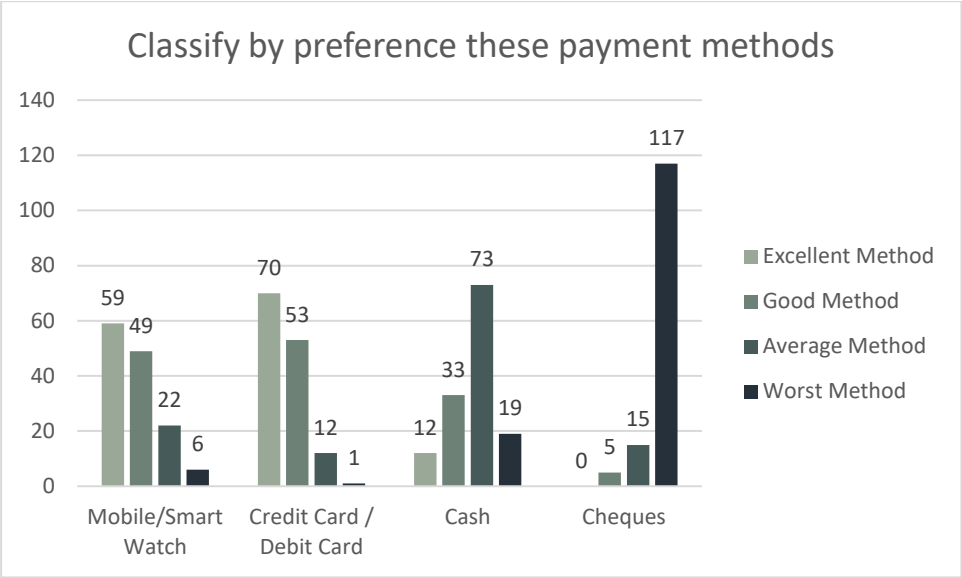


Section 2 (S2): "Your Banking Experience"

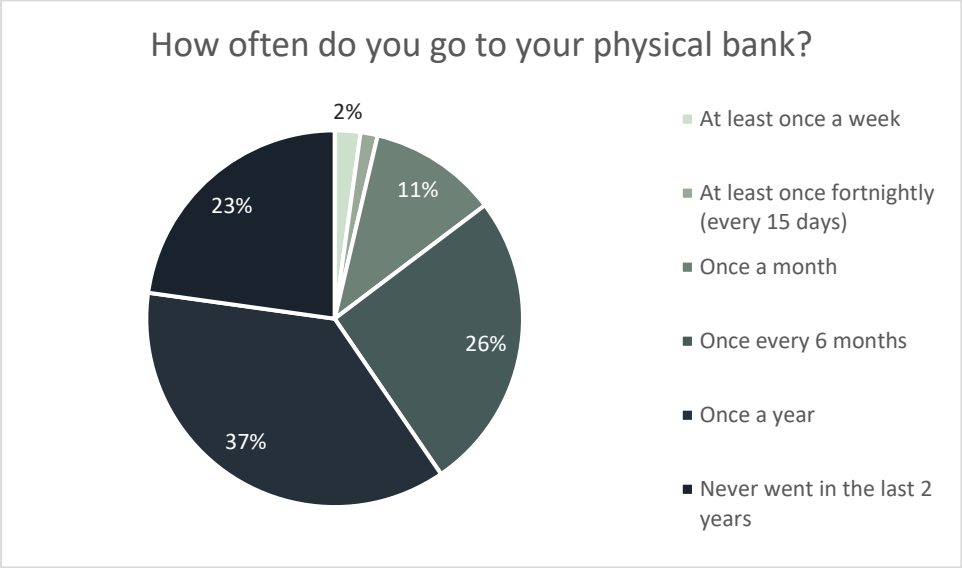
2.1



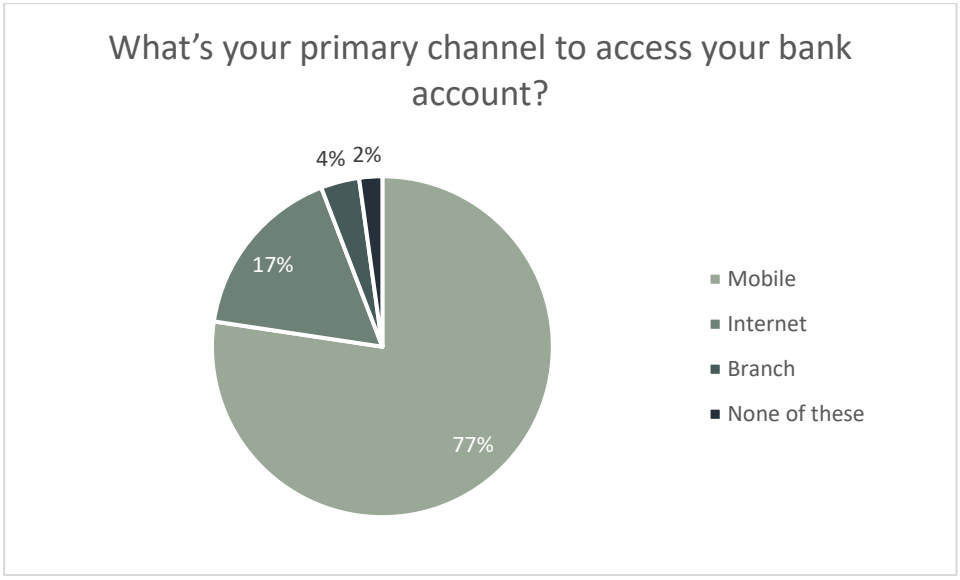
2.2


Classify by preference these payment methods
140
120
100
80
60
40
20
0
59
49
22
6
70
53
12
1
12
33
73
19
0
5
15
117
Mobile/Smart Watch
Credit Card / Debit Card
Cash
Cheques
Excellent Method
Good Method
Average Method
Worst Method

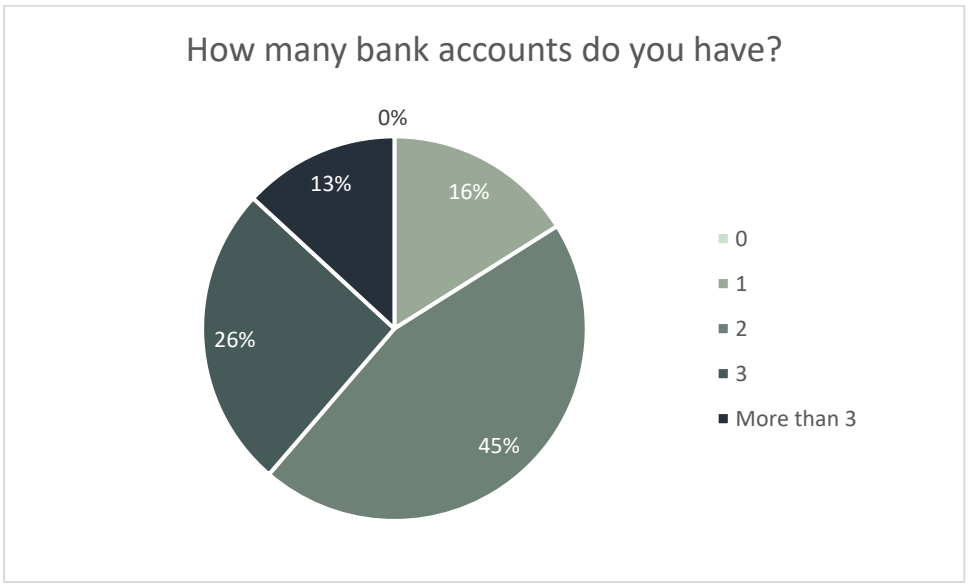
2.3


How often do you go to your physical bank?
2%
11%
26%
37%
23%
At least once a week
At least once fortnightly (every 15 days)
Once a month
Once every 6 months
Once a year
Never went in the last 2 years

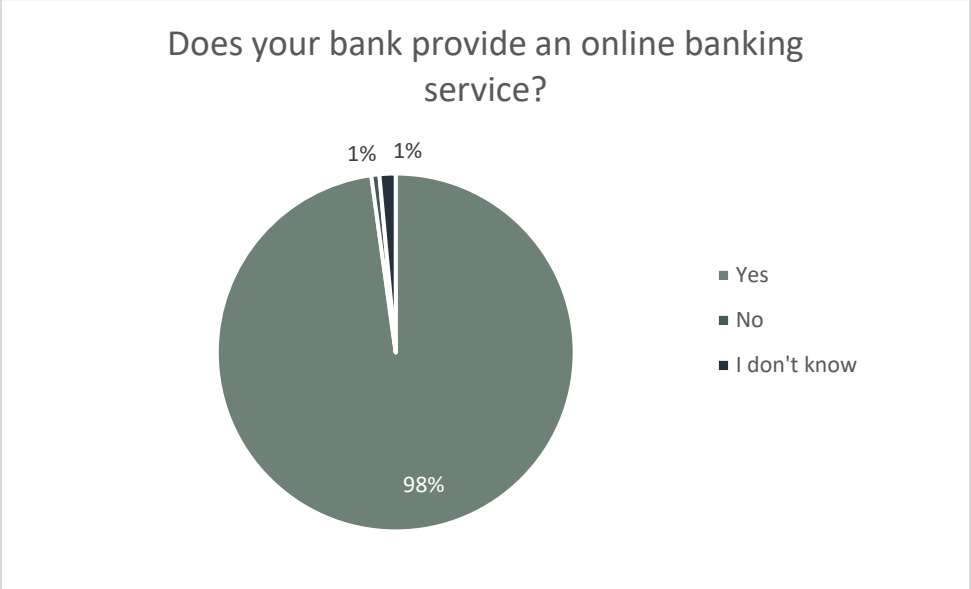
2.4


What's your primary channel to access your bank account?
4%
2%
17%
77%
Mobile
Internet
Branch
None of these

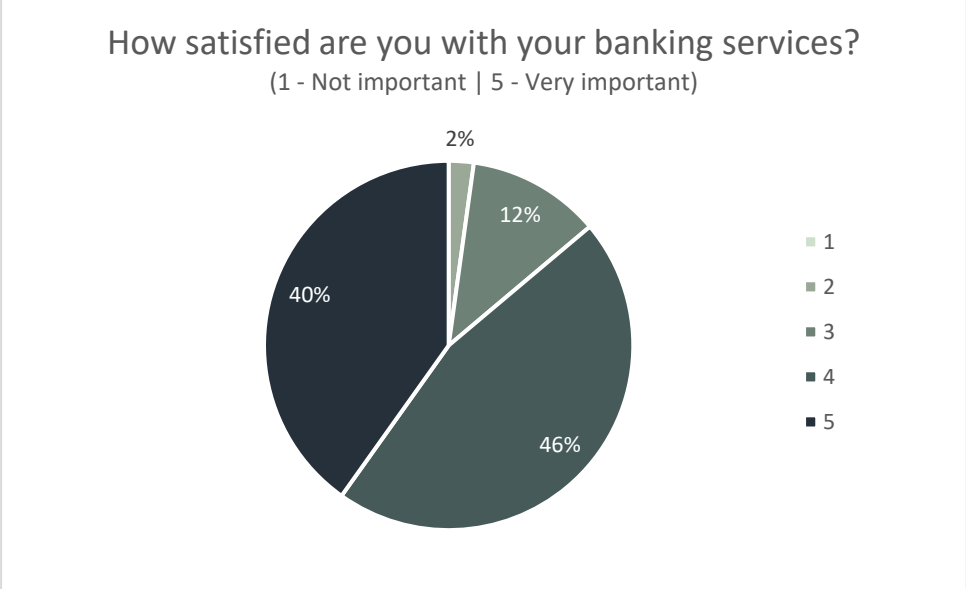
2.5


How many bank accounts do you have?
0%
13%
16%
26%
45%
0
1
2
3
More than 3

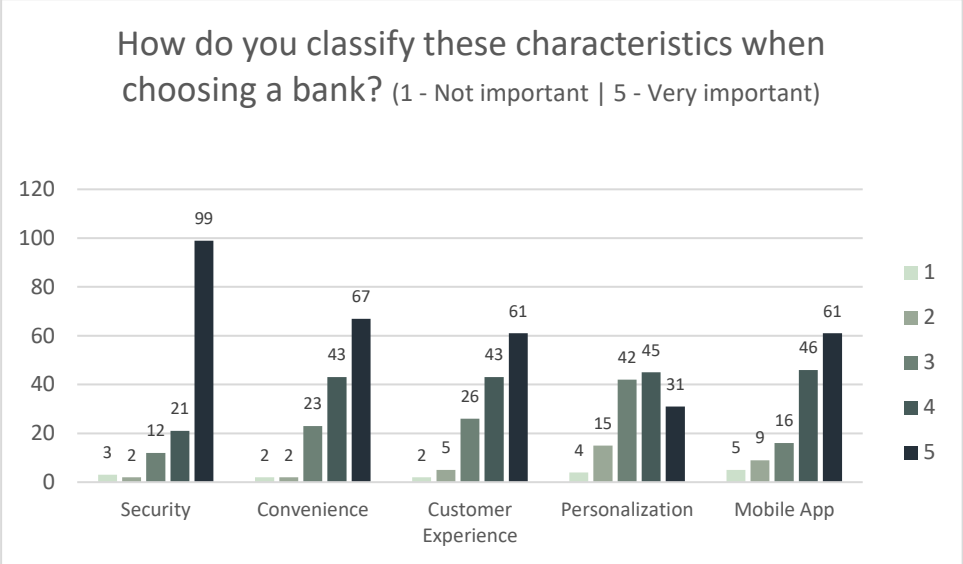
2.6


Does your bank provide an online banking service?
1%
1%
98%
Yes
No
I don't know

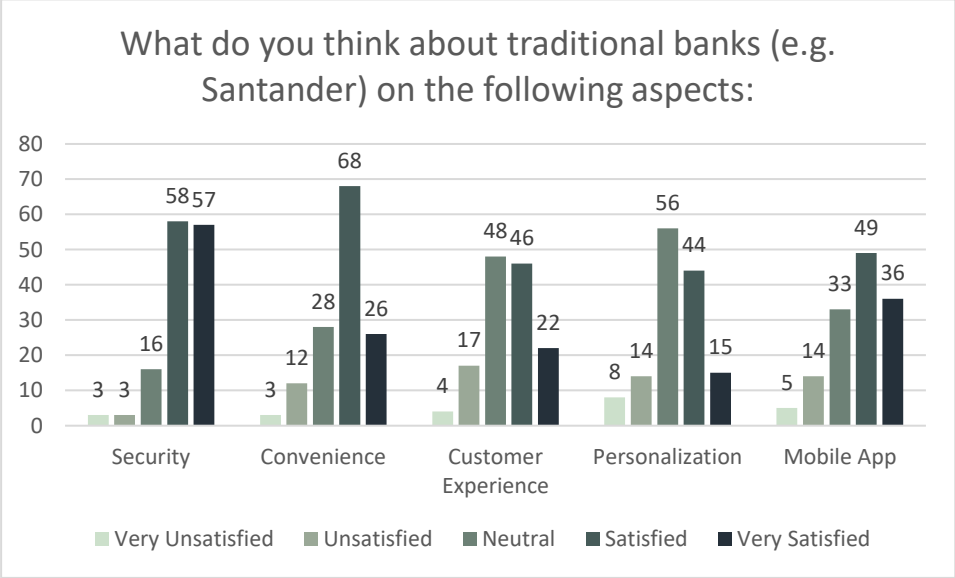
2.7


How satisfied are you with your banking services?
(1 - Not important | 5 - Very important)
2%
12%
40%
46%
1
2
3
4
5

2.8

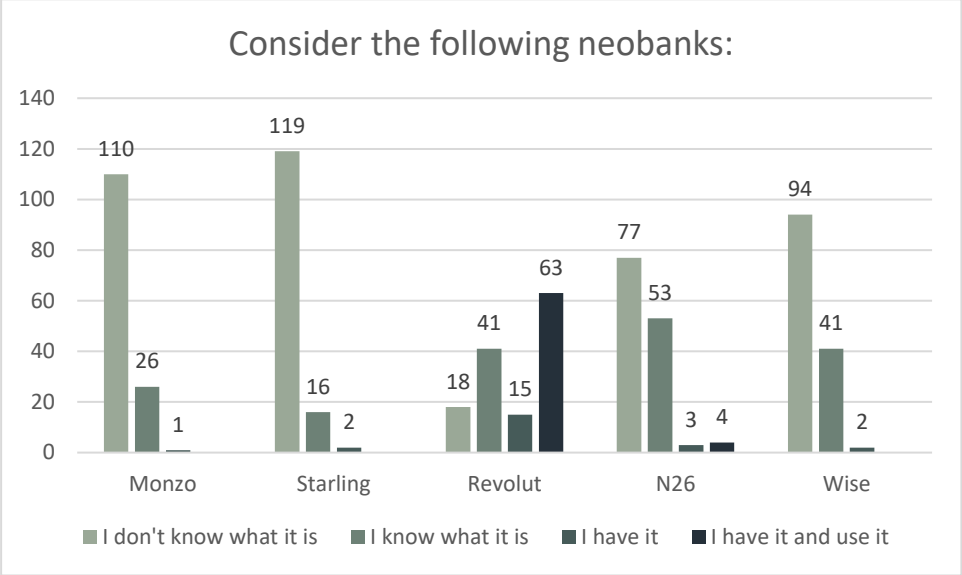

How do you classify these characteristics when choosing a bank? (1 - Not important | 5 - Very important)
120
100
80
60
40
20
0
99
67
61
61
46
45
43
43
42
31
26
23
21
16
15
12
9
5
4
3
2
2
2
2
5
Security
Convenience
Customer Experience
Personalization
Mobile App
1
2
3
4
5

2.9

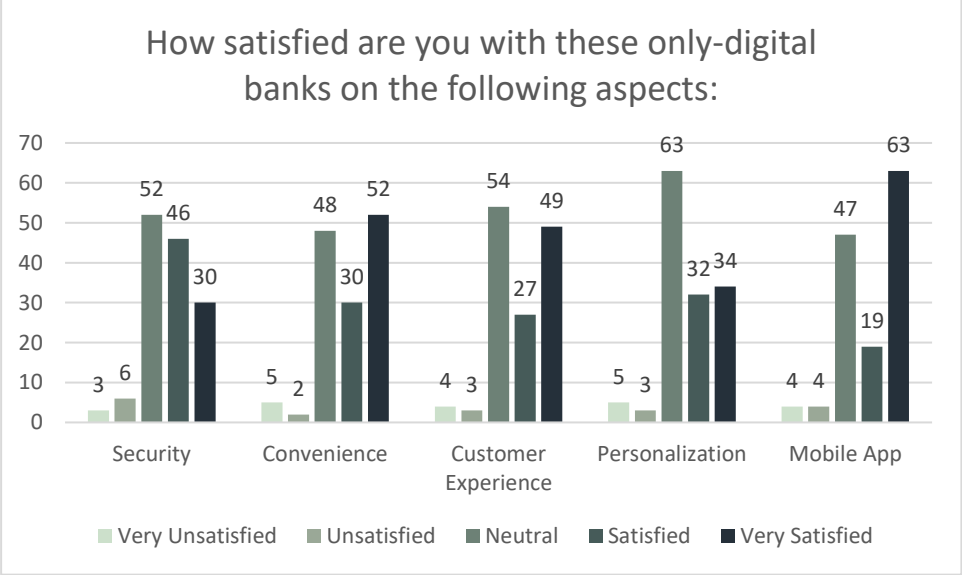

What do you think about traditional banks (e.g. Santander) on the following aspects:
80
70
60
50
40
30
20
10
0
68
58
57
56
49
48
46
44
36
33
28
26
22
17
16
15
14
14
12
8
5
4
3
3
Security
Convenience
Customer Experience
Personalization
Mobile App
Very Unsatisfied
Unsatisfied
Neutral
Satisfied
Very Satisfied

Section 3 (S3): "A New Banking Landscape Arising"

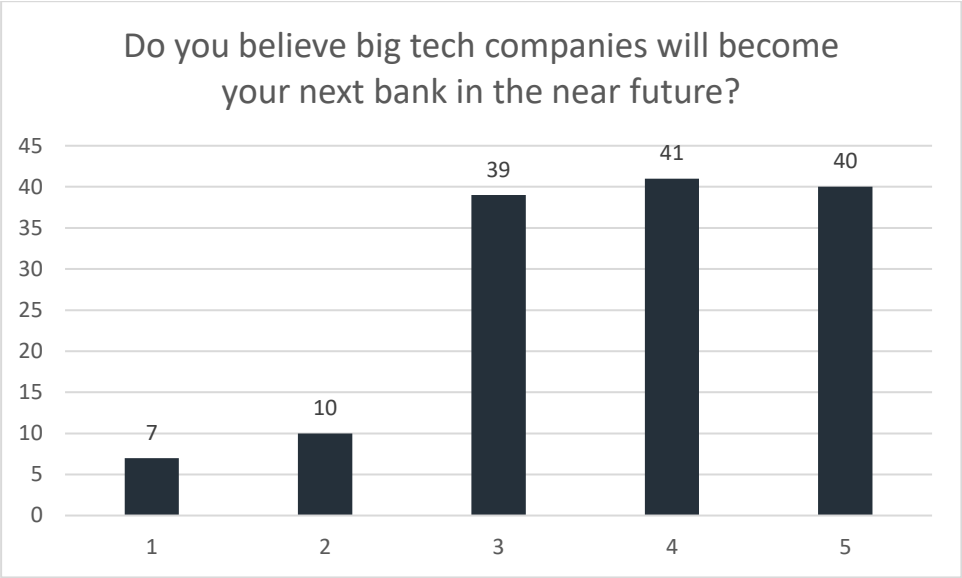
3.1



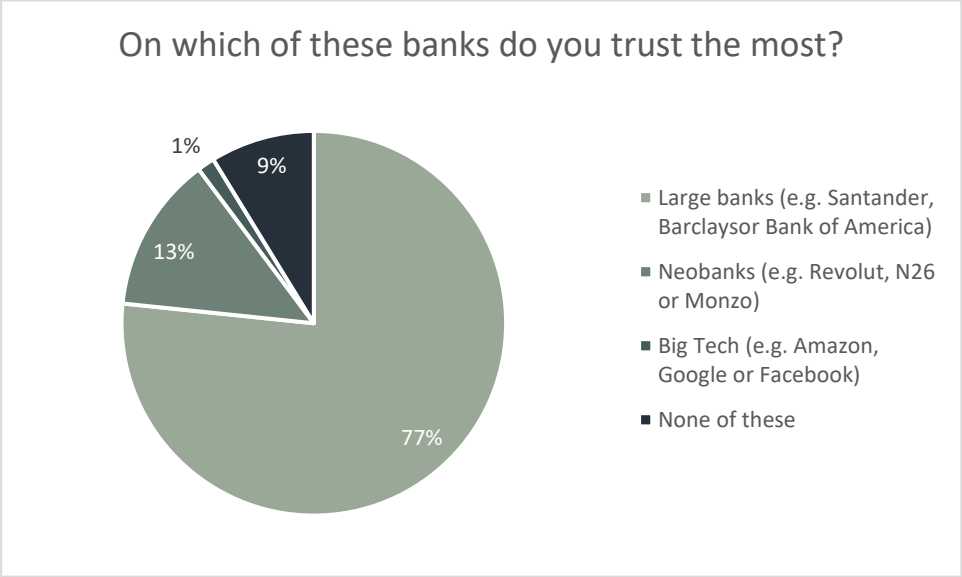
3.2



3.3

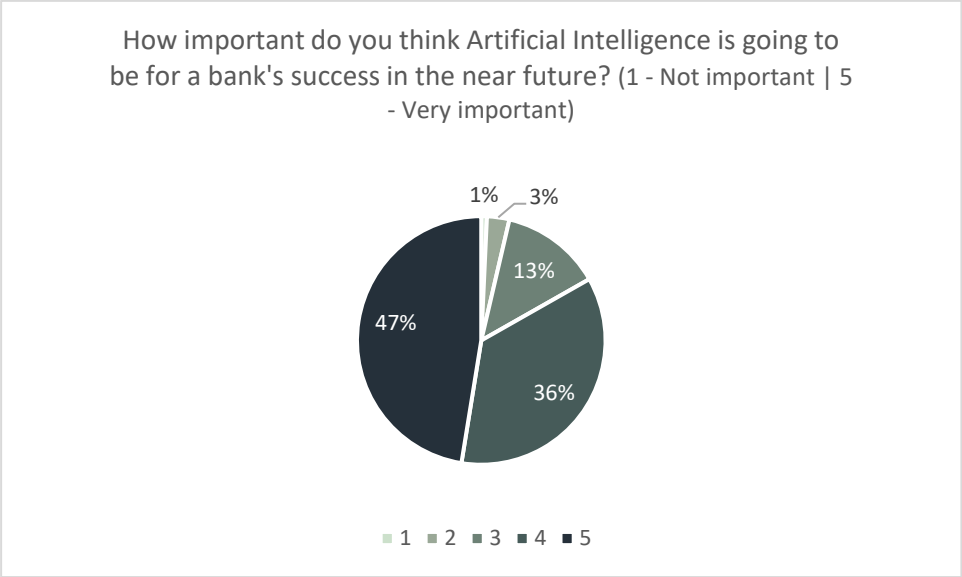

Do you believe big tech companies will become your next bank in the near future?
45
40
35
30
25
20
15
10
5
0
7
10
39
41
40
1
2
3
4
5

3.4

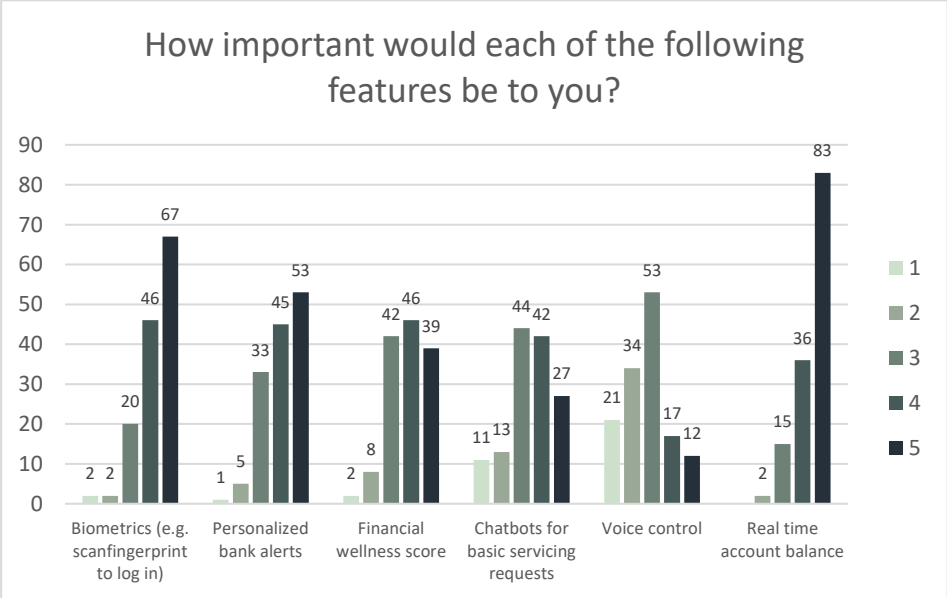

On which of these banks do you trust the most?
1%
9%
13%
77%
Large banks (e.g. Santander, Barclaysor Bank of America)
Neobanks (e.g. Revolut, N26 or Monzo)
Big Tech (e.g. Amazon, Google or Facebook)
None of these

Section 4 (S4): "A New Customer Experience Arising"

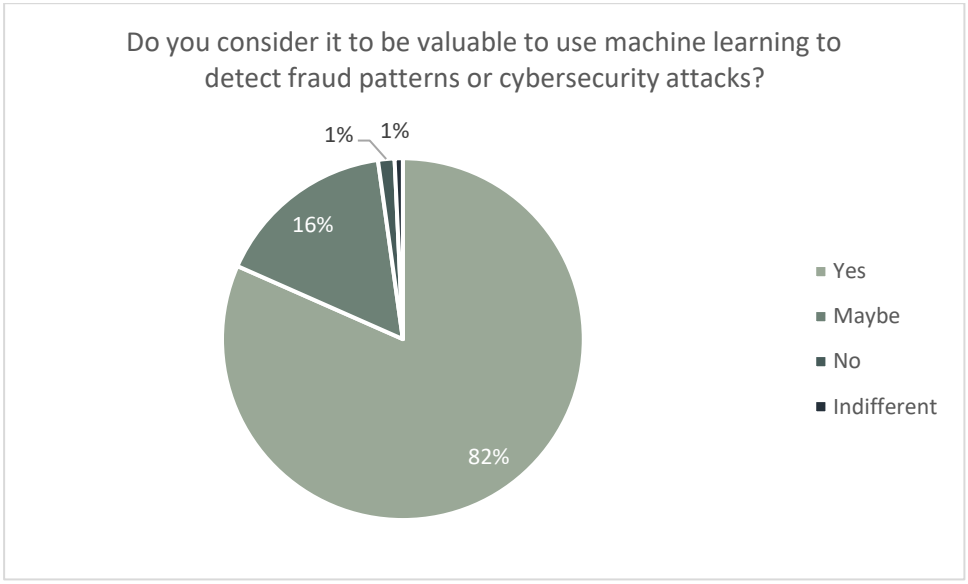
4.1



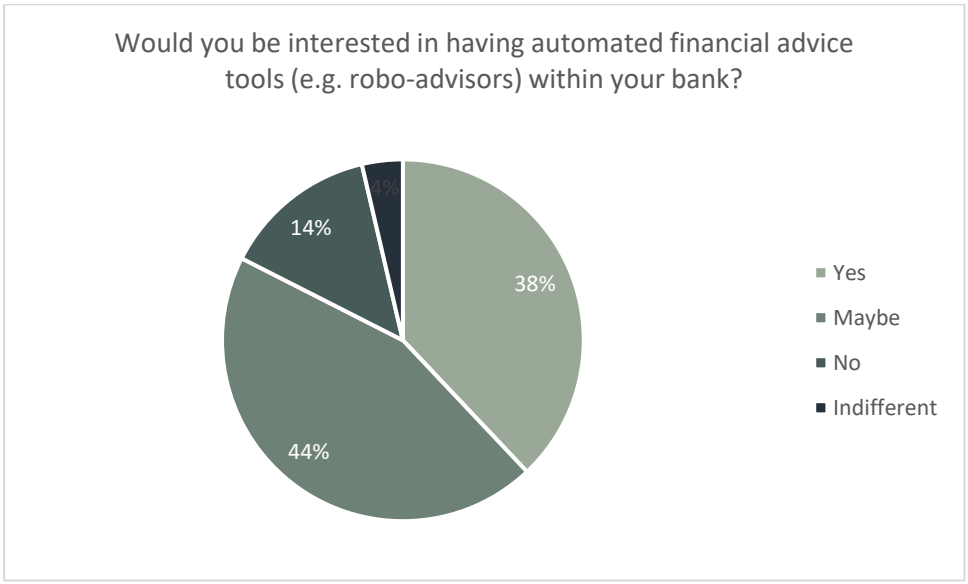
4.2



4.3


Do you consider it to be valuable to use machine learning to detect fraud patterns or cybersecurity attacks?
1%
1%
16%
82%
Yes
Maybe
No
Indifferent

4.4


Would you be interested in having automated financial advice tools (e.g. robo-advisors) within your bank?
14%
38%
44%
Yes
Maybe
No
Indifferent

4.5

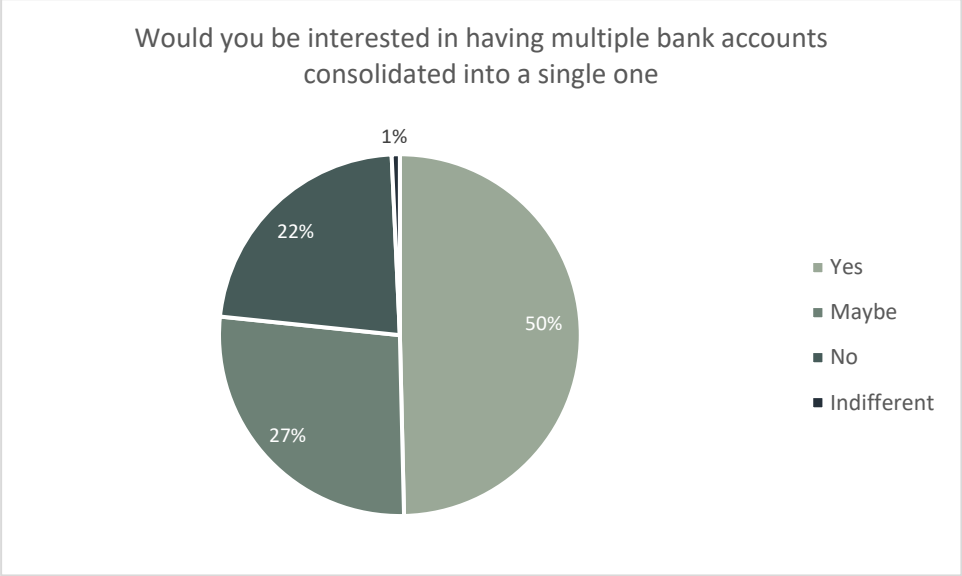


Table 1. Profile description of the industry experts (Interviews)

	Gonzalo Pradas	**Daniel Villatoro**	**Pedro Cantinho**	**Sandra Bamansa**
	Openbank	Openbank	Anixter International	CISCO
Who	Wealth Management Executive	Chief Data Scientist	Sales VP EMEA – Supply Chain Solutions	Partner Account Manager
Why	Built a pioneering digital wealth business in digital bank born out of an incumbent (Santander), serving its clients through 4 different channels (web, mobile, contact center, and branch), and brings	Expert on Distributed Artificial Intelligence and Behavioural Modelling while applying social network analysis, big data tools and geospatial mining	C-level position at Anixter International. A leading global distributor of Network & Security Solutions, Electrical & Electronic Solutions, and Utility Power Solutions.	C-level position at CISCO. A world-leading IT company that provides hardware, software, and service offerings are used to create Internet solutions

	the best of traditional wealth management services by applying innovative, transparent and client-oriented mindset strategies		Provides intelligent full-line solutions to empower, resilient systems that sustain business infrastructures	that make networks possible

Table 2. Interviews transcript

Interview 1 & 2 – Pedro Cantinho / Sandra Bamansa | Semi-structured interview (Phone call) **Notes:** Some parts of the interview were deleted because they didn't explicitly address some of this thesis's core points
1. How are you seeing the banking industry changing? What trends are you seeing emerging in banking and financial services?
1.1 Sandra: AI would be the game-changer on the financial services, banking on this case, and across every other industry. Besides, **Cybersecurity** it's the main priority for most banks, but once again, not only banks are affected by this issue. But for your thesis purpose, what I see the most fundamental changes in banking will occur in the customer experience spectrum. More precisely, the ability of banks to provide **omnichannel interaction** for customers. An example could be considered a customer that wants to open a new credit line for consumption. Imagine you, Gustavo, start to do it through your mobile phone, but then you want to continue in a branch for any reason. Each customer's interaction should be accountable on the bank's history record somehow, enabling you to continue your operation in the branch in the same step you stopped before, without interruption or either to start all over again. And the same applies if you want to do the same through the website instead of mobile. And once again, the interface should recognize your context instantly. This will enable a **smoother and frictionless single journey experience for customers**. **1.2 Pedro:** Besides the omnichannel experience that Sandra mentioned, I would also add the need for banks to switch their approach towards customers. What I mean is that, before, banks would consider the product offerings before the customer. It should be precisely the opposite, with banks in their strategy privileging customer needs and expectations first and then adapting their products offerings. After knowing their customer, banks will make tailored offers to address the customer end need.
2. How fintech's are going to be a game-changer?
2.1 Pedro: Ohhh, definitely. I think that's another major trend. This is how the entering of fintech and big techs companies into the financial services world is reforming the entire customer experience. Look what Apple did in payments with apple wallet, for example? They transformed an existing action (payments) into one-click action!!! But not only through a direct effect on banking activities. Leading tech companies reshaped their entire business model towards providing compelling customer experiences! Look at Netflix, for example! Now on your dashboard, you have personalized offers based on your previous movies/series that you have watched! That's AI/ML working here towards your data as a user and making you valuable recommendations. Each user has its own different dashboard and recommendations! And this will also force banks to do the same – a **customer obsession approach**, but in this case through banking (or not) offers. **2.2 Sandra:** I think an excellent point to mention, it's about regulation! Because banking it's a regulated industry-providing customers with money. You look it by Apple credit card - it's backed by Goldman Sachs. I am still not convinced they fell to banking as their core services, but instead continue taking advantage of some banking niches,

such as payments. How many apple products can people be rejected for? Close to zero, but that changes as soon as you have a credit card! Because Apple doesn't control it anymore!

3. The hurdles of AI implementation – Can banks do it? Why not?

3.1 Pedro: I think by far the most considerable challenge concerns data! To have the capacity to build an entire data infrastructure, capable of capturing valid data (consumable), and then knowing how to use and exploit it, that's really difficult! The first step is to ensure **centralized data**, aggregating either internal or external data sources, on which banks can use it across different teams/departments. Besides, in the case of partnering with third parties, as we mentioned before, which I believe is the only way to go, a big challenge arises on **making technology infrastructure friendly** enough to share it through APIs.

3.2 Sandra: I also add the tremendous task of changing the entire **organizational culture**, a consequence of everything Pedro mentioned before! To partner with others in this particular industry will require this shift in mindset and corporate culture. Starting with the internal capabilities of their employees. One example I can give you from Cisco is that developed **Cisco Networking Academy**, an IT skills and career-building program precisely to prepare the future workforce for what it comes in the future! Check out this afterward!

4. What should banks do to embrace this new AI world of banking?

4.1 Pedro: Firstly, data data data! What I've mentioned before. Without having access and good data, everything else will fall apart. Then, partner to win the game – there might be some complications to implementing the speed of innovation, forces of heavy legacy / siloed data structures, traditional culture, or even compliance/regulatory processes. For that reason, banks should consider their approach towards the ecosystem. Should they partner or compete? In my opinion, banks would need to have a partnership strategy, especially towards some areas on which they clearly gain leverage in doing so, features beyond banking, onboarding processes, etc. It depends on each case! above everything should partner with fintech or big techs! Only then banks will be capable of knowing their client needs, expectations indeed and making strategic moves/actions towards this direction – tailored actions in real-time, through the proper channels (either a mobile, website, or either physically).

Interview 3 – Gonzalo Pradas | Semi-structured interview (Teams call)

1. How are you seeing the banking industry changing? What trends are you seeing emerging in banking and financial services?

1.1 The first is **digitalization**: digitalizing a bank/FS is a must because clients need it, and banks need it to address or serve clients with a scale. Digitalization destroys many of the barriers that traditional banking had, mainly regarding segmentation. Segmenting clients based on whatever the bank decides. Segmentation of one is what technology, data science, and AI enable you.

1.2 Eliminating intermediaries. They are many forces that believe that some banking sectors/ niches, banks are out of use. Instead of banks, they put a different type of intermediary between the client and the product that the client needs. For example – Cryptocurrency. It's not the banks are out of use, and it's sort of revolution that clients have a flawed perspective of banks.

2. How fintech's are going to be a game-changer?

2.1 They are today, but they are replacing banks, but what banks should do is work with them!! Wechat in Chat (check the video from the New York Times) – explains how it's so successful. Chinese customers can do every single action they will perform in one day through WeChat without logging out – getting an uber, buying food, ordering inside the restaurant – It's an **omnichannel experience** – through what? Summing to your platform, mini services, mini-apps but in one app.

2.2 In Openbank, what we do in Wealth management is get the best of many fintech of the wealth space. Then, we add to our app landscape to putting in front of the clients. Banks can either fight them or work with them. FinTech will never have the capillarity, the depth that banks have today. What fintech can do is jump into a bank and put their services to the clients of that bank specifically. Bitpanda – big fintech in Europe – started with crypto, and now it's doing brokerage. They will reach the critical mass that they can have in all the countries they are in Europe. They have done this through a B2B service. How can they approach more clients? B2B2C – Going to BBVA, Santander, etc. – and trying to incorporate those services into these banks.

3. Where do you see the open banking heading? Do you see the PSD2 directive as a game-changer for the banking revolution?

3.1 You have explained it really well! Because people, when talking about open banking they go directly to banking-as-a-service. But open banking is PSD2 first, then they share the APIs. What do you need to know is that clients typically give their data to people that they rely on and they trust. There are not many fintech's that they trust. Why? Because fintech's are not trustable? No, because many fintech's are specialized in a very niche product or service.
I will give you an example of Openbank – a digital bank from Santander. Our cards have the Openbank logo in front of the card and the flame of Santander in the back. As a client, when it comes to Wealth, you are giving the money to a third one to manage for you, which is sacred. Openbank is not the trustable point because here it's Santander as a group. Fintech obviously has a % of clients that trust them. Still, a significant % of the population in your market will be more willing to trust a large bank such as Santander.
3.2 Another interesting point regarding their limited offers is that most of these neobanks do not concede credits or mortgages. Do you think you, Gustavo, want to have Revolut or a "revolut" or to have 3/4 "revoluts" alike? One for each product or service that you need. My opinion is that you will want one bank of reference. Our experience is that clients need a vast catalog of products and services to that bank of reference. What you value from "revolut" is the easiness, the usability. That comes for every bank that wants to embrace digitalization. Revolut will be a prominent player if they get out of the niche of being the bank for the students leaving abroad and those who want a straightforward, inexpensive debit card. But whenever you want to buy a house and need a mortgage, Revolut will need to provide mortgage offers. They have an enormous challenge. Are u going to focus on delivering a comprehensive product catalog to make yourself the bank of reference? In the case of N26, they will focus on providing an optimizing investments platform. That is an excellent step toward becoming an actual large bank that can have millions of clients.

4. What can Banks gain by exploiting AI capabilities/technologies? And in which particular areas of their value chain?

4.1 The significant part of data science, machine learning, and AI is **growth – client acquisition** and second **client engagement**.
4.2 In regards to **client acquisition**. Conversion or acquisition in the digital world is the most transparent way of acquiring clients, and it is costly. And because you know what you pay. Being an expensive part of the journey, the conversion rate enhancement you can produce thanks to propensity models is 4 times the same as not using it. So you multiply by 4 the conversion rate thanks to propensity models. Propensity models have many perks but have one negative thing to start with. Until the companies have some experience in acquiring new clients forget about this kind of model. How to do it?
You can also go with digital marketing and use the AI of others, Google, for example. What you can do is test every day with new clients, but that's relatively narrow, and it takes time. To bring new clients (new money), you are very dependable on third parties in a digital world. For example, in our bank, we had many advancements in the last 18 months working with Google to optimize keywords (in search). Also, the flow from that keyword to our onboarding but depends mainly on Google. Internally what we can do is to push clients from retail banking to wealth management, for example. When we talk about omnichannel, we are talking about the one-stop-shop concept, such as WeChat. There are so many benefits to an omnichannel platform.
One action could be, top 100 by assets in the client book that does not hold investments. I've started to sit with every one of them (physical meeting) to inform them about new opportunities in wealth management offers. How do we define the top 100 clients? Based on data science filters and propensity models. It is not about having a large amount of money. But based on many different filters defined in-house. For example, for clients who use the app every day within a month but do not have Wealth, we move it towards a more exposure positioning in the landscape of the mobile app. In the end, it is all based on data, all based on what we can see and the AI that we can put today it has learned with the data itself – from thousands of clients. But also, how many channels, ways, vectors that I can execute everything on top. A clever app that allows me to go or not "on the go" while walking through the app.

4.3 But regarding the **engagement part**, AI is critical! In any sales campaign, we make some offers to our clients based on their cluster. A cluster of robot users, potential funds buyers, etc. How can we develop this client? And we can use the campaign of funds, for example. From a user experience perspective, u can also do the same. If there is a cluster of clients, the first thing they do when they enter the app is to go to "wealth"- and then they move to the highest movers of the markets during that day, and then go their portfolio. What I will do is to change the landscape/structure of the app.
Or I will introduce tailored banners to address these specific clusters of customers. This does not deliver sales but makes clients feel that their experience is unique > which is the ultimate goal of a digital experience. So in that engagement part, you have two ways. The first delivers direct sales, and the other provides a better customer experience that delivers higher loyalty, trust, and activity within the bank's relationship.

5. The hurdles of AI implementation – Can banks do it? Why not?

5.1 It's going to sound too simplified, but I am convinced. The main challenge is to structure the data. Imagine IKEA or El Corte ingles. They have the data. Why do they not skillfully use the data to acquire new clients? El Corte Ingles

they do pretty bad with data. Because they have 5/7/10 different applications. Each department/store was built without the context of building an all-data lake in which every piece of data is structured (centralized in a way that can be used). The main challenge of all the banks' data is not to have the best AI gurus and experts but instead to have deep, committed data science workers who can structure a clear data lake. Hence, from there, it is straightforward! And what happens to banks is to have a lot of different applications with different data, which becomes really difficult. Before everything, banks will need to have the data in a consumable way (usable).

6. What do u think will change the most in the future of banking activities?

6.1 Lending money or paying doesn't change the action itself. What is changing is the entire user experience. If I am in an online shop and try to order. When it comes to payment, I use apple pay. Although apple needs a card issuer on the other side, Apple is an actor in the payment industry. For any specific product/service in banking, the most significant advances will be on the user experience. You will have many third parties involved in your actions/operations. Still, for you, your experience only requires your mobile phone.
6.2 Coming back to data, whenever my bank asks me for data, I don't give it back, and it seems weirds. Still, because I assume, there is no added value to share your data with some providers. But whatever eases up my experience makes it faster and more straightforward, I believe most advances will be seen. If it's 3 taps, let's try to make it in 2 or 1 (apple pay, for example).
6.3 Regarding **the best client engagement**, it is the one that the client doesn't even acknowledge. I am not saying that you are tricking the client, but in the example of apple pay, it's so smooth that you don't even realize apple makes part of it. The way we are still engaging in banks is "dear Gustavo, can I bother for 5 minutes". We are not at the center of your hand as Apple. Even though we are present in daily actions from our clients, we still have so much road to drive to achieve that level of engagement some big techs can carry. And that's what I believe for the following years we will have to do. Align and work together with the googles, apples, etc., but we have to go that way.

Interview 4 – Daniel Villatoro | Semi-structured interview (Email)

Notes: The author has send the questions beforehand, and Daniel answer those through a written email

1. What can Banks gain by exploiting AI capabilities/technologies? And in which particular areas of their value chain?

1.1 : In Openbank we are **customer-centric obsessed**. Our developments are focused in improving customer experience and quality of interactions with the bank in the most efficient way. It is obvious that all banks have taken advantage of Machine Learning for **Fraud Management**. Past experience combined with ML models allows us to find behavioural patterns that allows us to avoid fraudulent behaviour, and warn our customers when anomalous operations are detected. In this initiative, it becomes very important to reduce the number of false positives in order not to alert customers in excess, as they can easily loose trust in our alert system. For future developments we are trying to obtain a threshold of warning configured per customer, as we assume that certain customers might prefer more false positives than others.

1.2 Other areas where Machine Learning is applied is in **Credit Scoring**, as classical approaches to this task implies using generic scorecards that determine customer likelihood to return money given very few variables; ML approaches allows us to find patterns using thousands of variables that goes deeper into behavioural monetary patterns than sociodemographic variables, and measure both intentionality and capability to repay.

1.3 Finally, as a big initiative, customer experience is also adapted using AI models, optimizing **customer propensity to products** and handling **churn management** efficiently in order to determine what would be the next best action to offer customers.

2. What should banks do to embrace AI capabilities? What is Openbank doing it so far?

2.1 In order to embrace AI capabilities**, the most important asset is talent**! Big Tech companies such as Facebook, Amazon, or Google have invested big in hiring the best talent from the most important universities and AI departments. The application of AI in business is a recent trend and we are truly in an environment with scarce resources in terms of experts applying these techniques. We have a dedicated team of 30 data scientists and data analysts, with good algorithmic expertise and applicability experience in banking.

2.2 On the other hand, access to technology has been a stopper for many companies as it resulted in expensive dedicated infrastructure also maintained by hard-to-find specialists. **Access to cloud-infrastructures** is minimizing this gap and now it results affordable to have the technical capability. All our infrastructure is AWS hosted.

3. The hurdles of AI implementation – Can banks do it? Why not?
3.1 I would say that the most important asset is **access to historical data**, to fuel the functioning of ML models; with no historical data, algorithms are not able to find the patterns that can help optimize business. Banks have traditionally been required to store data under regulatory constraints, and this has become a collateral asset for a AI driven transformation. Moreover, being Banking a regulated business, we have to implement an specific type of AI called Interpretable Machine Learning, which allows customers to obtain an explanation for every decision taken by an algorithm (much different than the strategies implemented in other non-regulated businesses). This methodology avoids us to use state of the art ML techniques (such as Deep Learning) but it results extremely useful as we can combine our predictive capabilities with the explanation about that prediction as an argument to start adapting customers experience with a sense.

Figure 1: How BaaS works, based on (BTR Hub 2020)

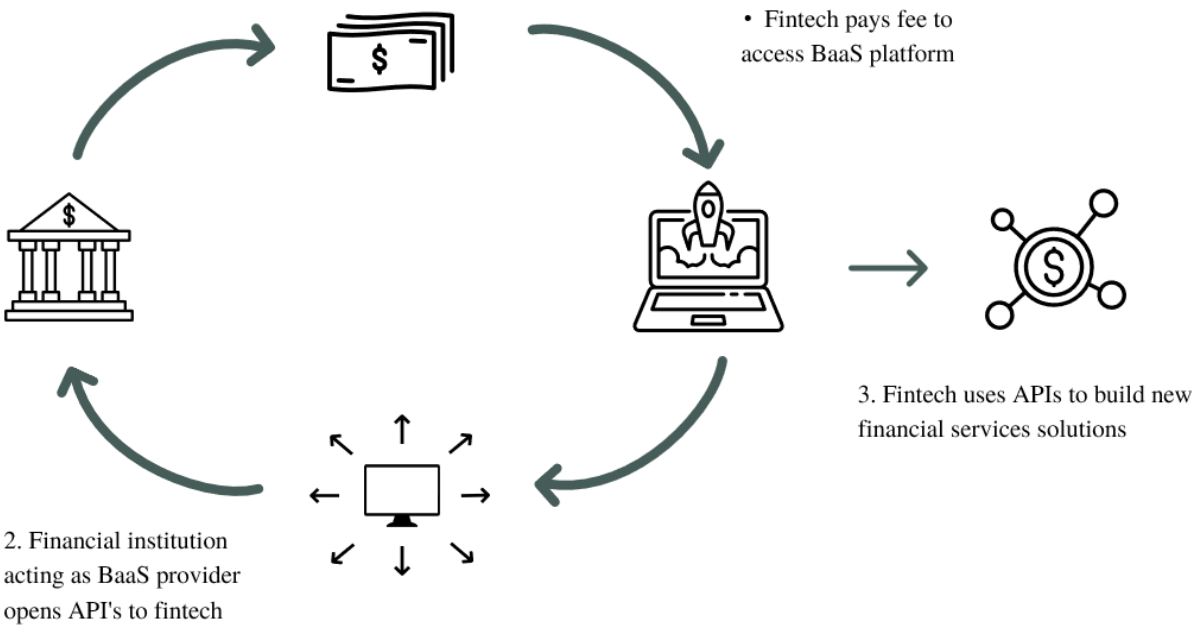


Figure 2: How AI transforms banking for a retail customer, based on (Biswas 2020)