

The Impact of Artificial Intelligence on Consumer Behavior in Banking Systems

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Abstract: In the age of digitalization, applications of artificial intelligence have so far been introduced in a wide range of fields. With its promising benefits, this burgeoning trend has proven to be highly effective and efficient in several areas, especially in the banking sector, as it offers business solutions in both front-end and back-end tasks and processes making it possible to significantly save time, work smartly and more efficiently and improve the overall customer experience. The purpose of this paper is to outline the possibilities of implementing artificial intelligence applications in banks, point out their utility and usefulness, and shed the spot on their impact on customer behavior and how they could potentially improve their business as a whole. Customer opinions and feedback regarding the implementation of this rapidly emerging technology were considered in this research paper in order to arrive at the aforementioned premises and ultimately admit that if this wave of AI is missed, businesses and banks in particular may soon be overtaken by it.

Keywords: Banking system, Consumer behaviour, Costumer service, Financial services, IVR, Machine learning, NLP, NLU,

1 Introduction

Nowadays, artificial intelligence, the basis of all computer learning, has become an unbearable part of our modern life and has managed to enter all fields, including customer services [1]. It is now seen as the future of all complex decision making. Understanding how AI works is an important task for any business organization that aims to predict consumer behavior or, more importantly, to correctly understand their expectations.

Moreover, using AI for customer service actually has a huge impact on reducing the costs associated with the human resources needed in any organization. Financial services, for example, are now trying to rely on this technology because of the various benefits it offers [1].

For the banking industry, AI technology offers great opportunities to improve customer experience, democratize financial services, improve cybersecurity and consumer protection, and strengthen risk management. Moreover, because of the

speed with which this new technology is evolving, banks, in this case, have no other choice but to keep up with this upward trend, because otherwise they risk being overwhelmed by the numerous and enormous events in the years to come. There are many examples of banks already relying on this technology in the present [2].

In Europe, countries like Germany, France, and the UK are at the front of AI experimentation and implementation, and even the European Commission is currently funding AI-related projects from 2021 to 2027, due to the intense global competition of this trend, especially in the financial sector [2]. However, as we know, any promising new technology comes with a set of drawbacks that need to be highlighted and are crucial to manage and maintain. As the banking sector is a critical sector that requires a high level of security to ensure customer safety in all transactions, the implementation of such innovative technology requires a high level of maintenance as well as very specific and secure regulations and legacy.

1.1 Objectives

The main objective of this research is to highlight the importance of implementing Artificial Intelligence solutions in order to improve customer services mainly in the financial sector such as banking systems and facilitate the consumer experiences. The set of data that this research will be based on was collected through a survey distributed among people in several countries such as Angola, Tunisia, Moldova, Hungary and Jordan.

1.2 Research Questions

The research question of the present paper is to understand how (AI) actually works and whether it is accessible, understandable and usable by every consumer, regardless of age, gender or educational background. The main objective is to highlight the importance of its implementation in financial services in general and the various benefits it can bring. The paper highlights the use of AI in customer service for banks, and it will show how banks are now relying on AI when it comes to customer services. It will, on the other hand, also point out the different advantages and disadvantages that come with it.

The research formulated five hypotheses, namely

- H1: The age determines which devices are used for banking services
- H2: The age determines data security behaviour.
- H3: The employment status determines data security behaviour.
- H4: The preference of new technologies is significantly influenced by the complicatedness of customer services.
- H5: The younger generation thinks differently on human or machine consciousness.

After the introduction section, the paper defined the research aims and objectives, then it gives the literature review and defines the relevant terms. Then it introduces the research methodology and, in a chapter, analyses the results and discusses the findings. Finally, conclusions are drawn about the consumer attitude toward AI in the banking sector.

2 Theoretical Background

2.1 Artificial Intelligence (AI)

During the peak of science, in a period known as the “Golden Age of Science Fiction,” the world witnessed the birth of new disruptive technologies, one of which, just like many people suggested, would be able to match human abilities at performing different tasks. Although it seems like a very complicated term, artificial intelligence can be simply defined as “non-biological intelligence” [3].

When it comes to pointing out the precise moment at which AI started, it becomes difficult due to the wide number of possibilities that exist. However, one that stands up against the others is the one attributed to a brilliant student named Alan Turing, from King’s College, in 1935, Cambridge, UK [4]. Seven decades ago, Turing [5] raised the question as to whether machines would be able to think, a question which himself later described as “meaningless”. This question led to the creation of the ‘Imitation Game’ and the ‘Turing Test’ which was used to analyze whether intelligence could be the base to distinguish humans and machines [5, 6].

According to Wooldridge [4], understanding what Artificial Intelligence is really about can be a bit confusing, and safe to say, difficult. But, before becoming the much celebrated and enthusiastic area that it is nowadays, just two decades ago, Artificial Intelligence was seen as a niche area with some questionable academic reputation [4]. Nowadays, despite some failures that continue to occur, which is normal when we consider the variety of services that they operate, AI is well-known for having a high predictive success, and, for this reason, its techniques are now considered to be important in the literature [7].

Throughout the years, many theories were created to explain the goal of AI and how it will affect our future. The so-called AI’s long-term goal, which can be traced in many science fiction movies, books, and so on, consists of building machines that, just like humans, would be able to perform intelligent action such as being conscious, autonomous, and self-aware [4]. Although these statements may sound amusing, so far there is no unanimity regarding the feasibility of such things nor desirability in the mainstream of AI research [4]. On the other hand, today’s mainstream media is more focused on finding ways to create machines that can perform specific tasks that currently would require not only human brains but also, probably, human bodies, for which, as it stands, conventional computing techniques fail to provide [4]. Despite the

number of AI researchers that believe that the time has come to pursue general AI, it is important to note that, if this were really to be achieved, there are concerns that it would also lead to superintelligence [8]. Bostrom [9] states that any intellect that greatly exceeds the cognitive performance of humans in virtually all domains of interest can be defined as superintelligence.

According to Tegmark [3], based on the current development of AI, and if it continues progressing, in the future, we might reach a point where AI could potentially succeed human intelligence [3]. On the other hand, Bostrom [9] argues that there isn't a clear understanding of how machines can match or even surpass human intelligence levels. An extensive review of the literature shows that despite the countless dystopian scenarios created in an attempt to predict humanity's future in an era of AI, it is still uncertain what the future will look like, how machines and humans will compare in the future.

2.2 Implementation of AI for Consumer Service

During the last couple of years, more and more customer-focused artificial intelligence services have been implemented [10]. Companies have been implementing Artificial Intelligence at a pace never seen before. Mainly due to the fact that it helps them improve customer services in many different areas such as predicting future trends, providing proactive support, and rapid growth [11].

Artificial intelligence has been implemented in some of the most important sectors such as financial sector, healthcare, education, retail, transportation, and communication industries [10].

AI is rapidly transforming the healthcare system where the implementation of AI systems such as x-rays and ultrasound scans, has proven to be better than a person at identifying abnormalities [4]. Thanks to AI, companies nowadays can access customers data in a way that was not possible before [12]. For companies, this data collection has proven to be extremely valuable since it allows them to improve their decision-making process. A study conducted by [13] shows that customers, when dealing with low-complexity tasks, are more likely to use AI customer services instead of humans due to their great problem-solver ability in these circumstances.

Nowadays, due to the current changes in all sectors driven mainly by the advances in information technology and high competition from the Fintech companies, banks have been challenged to re-evaluate their competitive advantages [14]. However, it is safe to say that the banking industry has been taking great advantage of AI. For instance, banks nowadays have a better understanding of their customer's life thanks to the increase in the amount of data stored in servers [12]. For that reason, banks have a better knowledge about their customer preferences, their spending habits, and, therefore, are able to identify those willing to spend more than others. They are also able to improve customer experiences and promote products efficiently to the right customers. Nonetheless, this has

allowed banks to have many more business opportunities [12]. AI has facilitated distance banking through processes such as internet banking, payments, transactions, lending and so on, they have become more efficient with implementation and development of artificially intelligent computers that perform transaction banking tasks, consequently changing the role of distance banking [14].

Another important implementation of AI in banking for customer services are the Chatbots, which according to Eeuwen et al., [15] are software programs that can be used for commercial purpose and can communicate with users in a natural language via chat. Chatbots perform different functions in a similar way as humans [16].

3 Methodology

The current research is based on real data and real feedback of using customers service in banking system, where they have the opportunity to express their opinions and previous experiences with AI in banking facilities. Respondents in the research were accessed through convenient type sampling, they were asked to fill in an online questionnaire. The questionnaire consisted of four parts. Each part contained different questions regarding the aim on realizing the data for overviewing the vision. In total the questionnaire had 16 questions including open and closed type questions as well. It means that there were multiple choice questions and questions which gave the possibility to the respondents to share their own opinion. The research used primary data collected via the questionnaire. The research applied both qualitative and quantitative elements since the questionnaire had closed and open-ended questions. The survey aimed to learn more about the behaviour of consumer's attitude depending on their experience when dealing with AI solutions in customer service.

The survey targeted to reach at least 100 respondents and focused on gathering information about the respondents' experiences. The goal was to find out nowadays' impact of AI solutions in customer service in the banking sector, which AI solution eases on the life of consumers in getting their answer to the issue. The research aimed to explore the issue at present, so the time horizon seemed more cross-sectional for the moment. Non-probability sampling with snowball and availability methodology was applied. The reason behind our choice is that the survey was shared by private messages and by posting it on feed on social media.

The survey was totally anonymous. For participating in it there was no need for the participant to identify themselves. There was no timing for answering. The survey wished to access people over 18 who use banking services more actively. Research is designed to achieve an open view data. Through the dataset compiled, the authors aimed to extract and analyse the patterns that might exist between the different variables and determine whether characteristics such as age range or

professional status influence opinions and responses regarding the impact of AI in banking systems.

Result and Discussion

The survey was distributed in several countries in electronic form (Jordan, Tunisia, Moldova and Angola). Altogether 105 responses were collected and all of them were valid. Since the sample is not representative, and collects data from different countries, generalization for population cannot be done, but the common behavioral pattern and the attitude of the respondents can be analyzed. The demographic profile of respondents is shown on Table 1.

Table 1
Demographic Characteristics

	Percentage (Of Sample)
Gender: → Male	57.1%
→Female	40%
→others	2.9%
Age Group: →18-25	49.5%
→26-34	31.4%
→35-45	9.5%
→Older	9.5%
Frequency of using smart technologies: →Always	87.6%
→Often	10.5%
→Rarely	1.9%
→Never	0%

More than half of the respondents (57.1%) was male and 40% was female and only 2.9% of the respondents did not specify their gender, which is a relatively balanced gender distribution. Regarding the age groups, almost half of the respondents (49.5%) were between 18 and 25, while the second largest group was comprised of people between 26 and 34 (31.4%). Only 9.5% of the respondents were between 35 and 45 and the same percentage was older than 45. Most (51.4 %) respondents are students, 34.3% are currently working while 12.4 % are unemployed, and finally, a few (1.9 %) are retired. This means that most of the respondents belong to the young generation, who either work or study, and the responses rather reflect their attitude and behaviors.

Furthermore, respondents were also presented with a series of devices in which, as shown on Figure 1 smartphones are the most used devices by respondents.

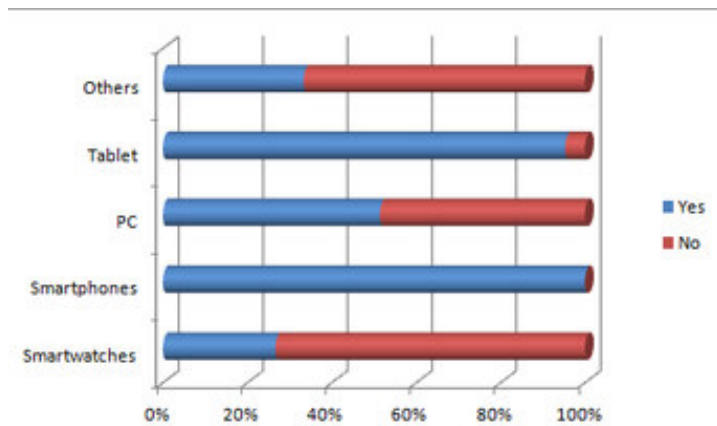


Figure 1
Devices frequently used (Source: developed and edited by authors)

Figure 1 also shows that after smartphones, tablets are the most used devices by them while smartwatches are the least used smart device they use. Most of them (87.6 %) always use smart technologies, none of them responded “never” to the use of smart technology, while only 1.9% said they rarely used it. All the participants use smartphones as seen on Figure 1 and almost all of them (100/105) use personal computers on regular basis, however, none of them use other platforms other than websites or applications.

When it comes to platforms that are mostly used for accessing financial services, respondents are more inclined towards mobile applications (53%) as presented on Figure 2 although a big part of them usually uses both services (42%).

Platform used for financial services

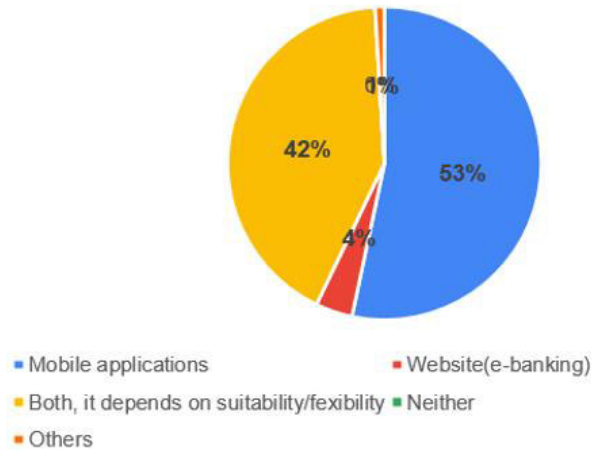


Figure 2

Platforms used for financial services (Source: developed and edited by authors)

However, 53 % uses only mobile applications, while only 4% uses only website possibilities for financial services. If the percentage of users who take advantage of online platforms of financial services, the 42 % of users of mobile apps and websites need to be added up, resulting in a 99% saturation. Consequently, almost everyone who uses online financial services happen to meet AI in banking services.

As AI is rapidly improving and digitalization is spreading at a drastic rate even in the financial and banking services, the question of human consciousness is frequently in the focus. Figure 3 presents respondents' opinion on consciousness being uniquely human. According to the results half of the respondents believe that consciousness is truly uniquely human (49%), while 18% disagree with the statement and are convinced that consciousness is not exclusively human and 38% of respondents either do not know and are dubious.

Is consciousness uniquely human?

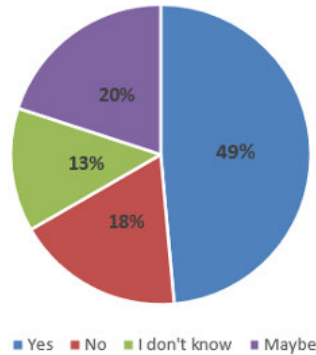


Figure 3

Respondents answer about consciousness being uniquely human (Source: developed and edited by authors)

Next to the question of consciousness belonging to humans, respondents were asked to give their opinion whether there is a possibility for computers to achieve consciousness. There was a close division of opinions with most respondents believing that it may be possible (39%) and a close percentage stating that it is not possible (31%) with the percentage representation shown on Figure 4. Even in this case 30% of respondents could not decide or have some doubts regarding the issue.

Is it possible for computers to achieve consciousness?

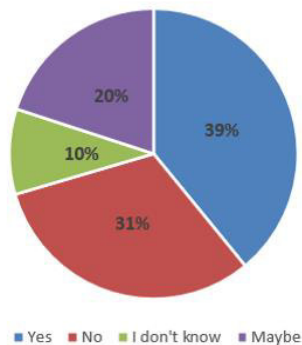


Figure 4

"Is it possible for computer to achieve consciousness?" (Source: developed and edited by authors)

Altogether 49.5 % of the sample believes that AI is a force for good, 8.6 % thinks that AI will be a force for evil, and 41.9 % thinks that this statement is

complicated. Some of them replied with “AI may help a lot, in facilitating daily life, but it has been contributing to unemployment!” and “There's always two sides (good/evil) and consciousness will always play along with both, alternating from time to time/moment to moment... in addition, the intentions behind the developers of any AI project may be good and at the same way, may be evil. It's all behind human nature after all”.

Nonetheless, regarding the impact of new technologies in customer services, specially how they help customers in the financial sector, Figure 5 shows how customers see these technologies effectiveness in solving their problems. Respondents were asked to rate on a Likert scale how strongly they agree or disagree with the statement. 36 and 19 respondents agree and strongly agree that new technologies in customer service help facilitate the process of problem-solving, while 11 of the respondents were neutral about this statement. However, 35 respondents disagree or strongly disagree with the statement, they might be the customers who are satisfied with the already used online services and are not fully open to new solutions.

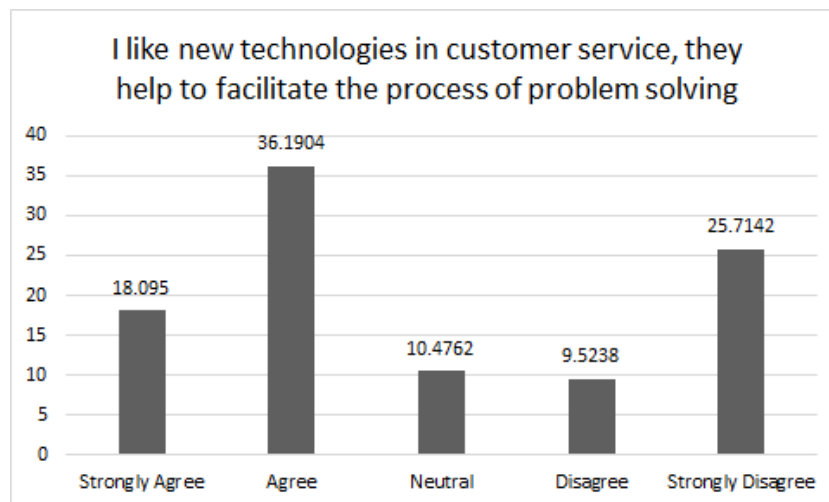


Figure 5
Statements vote (person) (developed and edited by authors)

As to whether the usage of very developed customer services makes it harder for customers to deal with, Likert scale was also used to rate how respondents experience the usage of new technologies. Figure 6 shows that 28 and 31 respondents strongly disagree and disagree with the fact that they do not prefer very developed customer service as it makes everything complicated. It implies that only 19 out of the 105 respondents (18%) are anxious or experience anxiety when technological innovations are introduced in banking services.

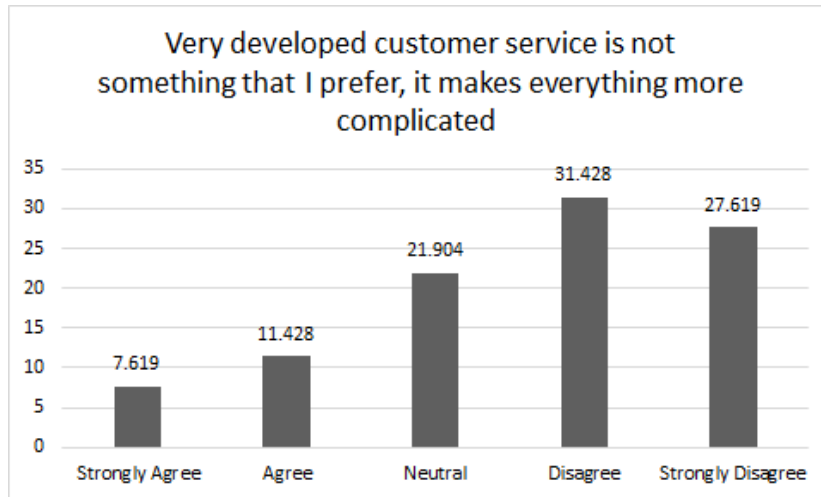


Figure 6

Customer's response about very developed customer service (Source: developed and edited by authors)

Moreover, as it is shown on Figure 7 respondents were asked about convenient customer services solutions for financial services (multiple responses were possible). While even now 56.2% of the respondents still call the customer service office when some help is needed 47.6% of the responses would choose chat-bot to find solutions to the arising problems. So, the use of the denominated AI – chat-bot – came second as the most frequently used convenient customer service in case of financial services. Website browsing came third with 44.8% and personal contacts - friends - are still good sources for finding help (21.9%).

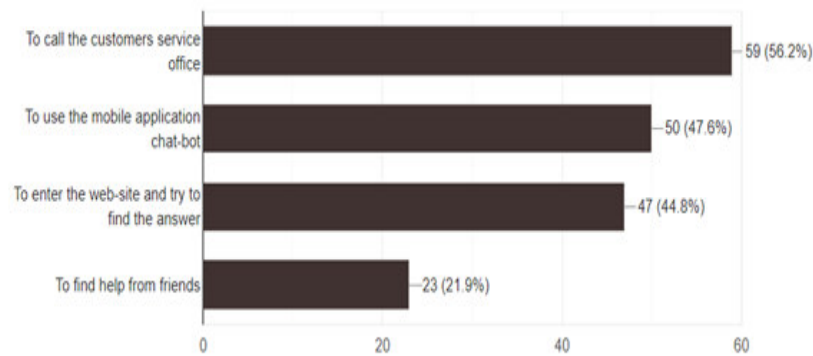


Figure 7

Convenient customer service solutions for financial services (Source: developed and edited by authors)

The results show that human-to-human (H2H) interactions are still preferred by customers, they seem to favor a more human to human conversation when it comes to convenient customer services solution for financial services. Over the form and platform of customer services – office, chat-bot, website or fried, the mode and medium of customer service delivery is of high importance.

Figure 8 presents the percentage of different AI solutions that respondents already experienced in case of financial services. Almost two thirds of the respondents (65.7%) experienced Natural Language Processing (NLP) and thus it seems to be the most common among customers.

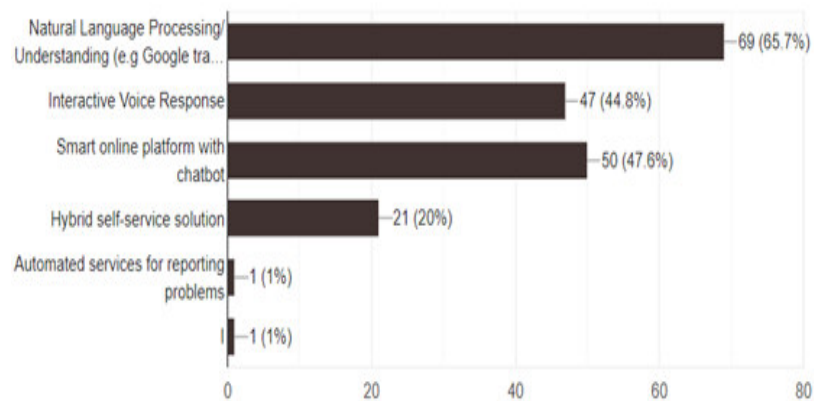


Figure 8

AI solutions previously experienced by customers (Source: developed and edited by authors)

The Natural language processing (NLP) which is used in customer service as chatbots for banks, as previously mentioned, had the most votes by our sample. The second and third most frequently experienced AI solutions were interactive voice responses with 44.8%, followed by hybrid self-service solution with 20%. Chat-bot results were the same as in the previous question.

Following the method and media of AI solutions, questions on AI data security were posed. As it is presented on Figure 9, respondents were asked about how much they trust AI data security. Respondents were expected to evaluate from ‘no trust at all’ to ‘fully trust’ on a Likert scale. Results show that the majority of respondents (50.5%) gave a 3 out of 5 for the data security trust. The responses call for further research in the future in cyber security since respondents either trust in banks and financial service providers regarding data security or do not care about data security in these cases.

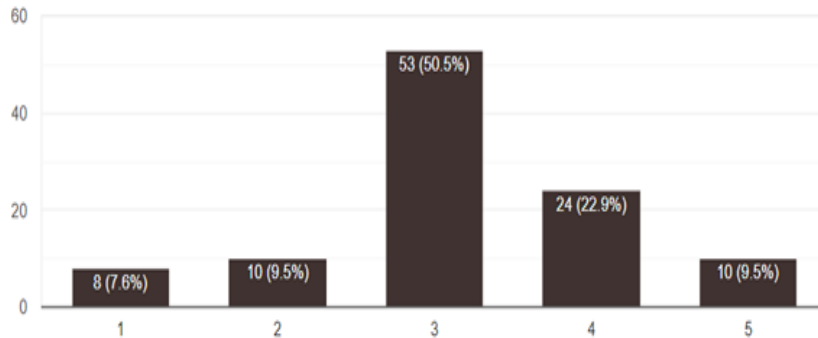


Figure 9
Customers trust on AI data security (Source: developed and edited by authors)

It also shows that only 9.5 % of respondents totally trusted data security while 22.9 % trust AI data security. A lower percentage of customers did not trust AI data security, 7.6% and 9.5% marked the negative options. Apart from customer experience, respondents were asked to rate how much impact AI might have on the banking systems. As shown in Figure 10, majority of customers (47.05%) disagrees with the idea that AI would have a negative impact on customers services. At the same time 26.47% could not decide – probably interested in good customer services and not the technological innovations -, while 26.48% believe that AI can have a negative impact on banking services and would result in more complicated services and processes.

AI cause more complicated issues and have a negative impact on customer service (%)

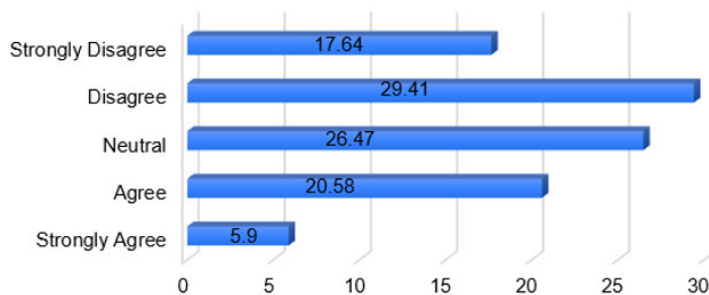


Figure 10
AI impact in banking system (Source: developed and edited by authors)

This corresponds to the previous question shown on Figure 6 when respondents were asked about very developed customer services. More or less the same percentage of people gave similar responses for negativity.

It was also found regarding AI implemented in banking systems that 37.14% of the respondents were neutral about whether it “creates more jobs than it destroys” while 26.67% disagreed and 18.1% strongly disagreed with this statement. 36.19% of the respondents agreed, and even 12.38% strongly agreed with the statement that AI will “help facilitate customer services” while 35.23 % of them were neutral.

36.19 % of them strongly disagreed with the statement that “over the next ten years AI that is implemented in the banking system will have no overall impact” while 26.67 % also disagreed adding up to 62.86% of the respondents. Two-thirds of the respondents believe that banking systems services will change due to AI technology. 36.19 % of them were neutral for AI being disruptive to employment rates, while 40% believe that IA will be disruptive to employment. 45.71% of the surveyed do not believe that AI will cause complicated issues and will have a negative impact on bank’s customer service while 27.62% of the respondents think that a negative impact will come. Finally, 30.47% and 21.9% of the respondents agree and strongly agree respectively that AI will cause an increase in unemployment rates in the short term.

Chi-squared tests were run to find relationships between the age groups and the devices used by the respondents, but the results showed a p-value of 0.723, which means that these data are independent from each other and there is no relationship between them. We also found out that the P-value = 0.521 for the relation between age groups and data security which also means that these variables are independent. Thus, it can be stated that at present the age is not a determining factor in devices usages and data security questions. Consequently, H1 and H2 were rejected.

After running chi-squared test on the relationship between how much respondents trust AI security and employment status, the P-value turned out to be 0.8. In this case, there is no relationship between these two variables, which also mean that even the fact that the respondents are students or are employed, trust and security concerns are dealt with in each age group and by everyone suing banking services. This means that H2 is rejected.

We also found that the P-value for the relationship between these statements “I like new technologies in customer service, they help to facilitate the process of problem-solving” and “Very developed customer service is not something that I prefer, it makes everything more complicated” equals 0.737. This translates to that these statements are also independent, so H4 is rejected.

Upon testing whether different age groups think differently about human and machine consciousness, the Chi-squared test showed a result of P-value to be

0.0114. It means that there is a relationship between the age group and the statement “Humans—the human brain, the human mind, and human consciousness—are all completely mechanistic, and eventually will be replicated by machine”. The results showed that younger age groups (18-25) agree more with this statement than the older groups, consequently H5 could not be rejected.

Conclusions

The purpose of this study was to explore and understand how the implementation of artificial intelligence applications in banks directly affect customers behavior as well as to highlight current interrelations between AI and humans.

We found that the majority of customers accept AI as a force of good and although most of them believe that artificial intelligence is helpful in daily life tasks, there is a fear that it has been contributing to unemployment. Furthermore, customers also believe that new technologies provided by AI have a great impact on customer service with an understanding that it is helping to ease the process of problem solving. One may argue that more developed technologies are better for use and easier to deal with, customers perceived this as being true.

Regarding financial services, we found that the majority of customers prefer to call the customer service, whereas the other part favors the use of mobile application i.e., chat box.

We propose that bank facilities should consider the implementation of Natural Language Processing in customer service as customers strongly favoring this service. There is also a great believe that implementing AI in banking systems creates more jobs than destroying it.

In the course of the research five hypotheses were formulated and only in one of the cases a significant relationship could be detected, namely hoe people from different age think about human and machine consciousness. Further research need to be conducted to reveal more relationships regarding the usage of AI in banking services and its impact on unemployment for example.

These findings possess a great implication for how banks should seek to provide services to their customers, and most importantly how they could take advantage of artificial intelligence to further improve customer relationship as well as customer satisfaction. Nonetheless, knowing that Artificial Intelligence is strongly dependent on new technology, developments put a limitation on our research, as we believe that future studies will have to be conducted in order to highlight the different promising technologies that should be implemented by financial companies. Also, further analysis and verification of the implications of this paper in the near future can be done.

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