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ICTs in the banking sector in the times of the COVID-19 pandemic: the customer's perspective

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Abstract

Motivation: The digitization of financial services has brought a noticeable decline in the importance of branch banking for customers wanting to contact their bank or receive financial services. The lack of personal contact with bank employees has become particularly significant during the pandemic, with remote modes of communication reducing the risk of contracting SARS-CoV-2.

Aim: The present study applies the Spearman's rank correlation coefficient and binomial logit model to determine the impact of the digitization of bank services and the COVID-19 pandemic on retail customers' needs for branch banking.

Results: The empirical research conducted demonstrated that the factors significantly positively influencing the need to use financial services provided by staff in bank branches were respondent experience in using bank advisory services and fear of interpersonal contact in the pandemic context. Meanwhile, variables with a negative effect were the use of the electronic banking platform, attitudes towards the use of the artificial intelligence technology in the banking sector, and perceptions of the advantages of remote communication with institutions in the pandemic context.

Keywords: digitization of banking services; consumer preferences; banking channels; artificial intelligence; COVID-19 pandemic
JEL: A13; G41; O33

1. Introduction

Technological progress has hugely impacted the way commercial banks do business (Frame & White, 2015, pp. 271–291), with the growing use of information and communication technologies (ICTs) increasing operational and cost efficiency (Forcadell et al., 2020, pp. 18–27) and financial services availability (İnel, 2019, pp. 549–556). The digital revolution has also affected banks' retail customers, influencing their financial decisions (Pousttchi & Dehnert, 2018, pp. 265–286). Recent changes in customer preferences regarding the channel of communication with their bank prompted researchers to apply different sets of criteria for assessing the level of customer satisfaction with bank services. Regarding branch banking, the analyzed determinants concerning the attitude and behavior of staff, the attractiveness of products offered, reactions to customer complaints, and the accessibility and convenience of using banking infrastructure (Bena, 2010, pp. 143–150). Meanwhile, studying customer adoption of banking channels in Hong Kong, Wan et al. (2005, pp. 255–272) showed that branch banking was used more often by senior customers. According to the authors of that paper, having personal contact with bank employees rather than relying on an electronic medium might have contributed to preferences for this channel, likely a function of perception of the accuracy of the information transmitted and the security of customer data. Therefore, it can be assumed that customer satisfaction surveys regarding traditional banking focus on the experiences of customers with the use of financial services in bank branches and the related relationships with employees of these institutions.

Modern banking's increasing employment of self-service technologies (SST) has produced a move away from the traditional "high-touch and low-tech" customer service model towards a "high-tech and low-touch" model, which substantially reduces the importance of human relationships (Wang et al., 2013, pp. 400–414). Consequently, factors that significantly affect the level of customer acceptance of and satisfaction with e-banking services — such as usefulness, compatibility, risk, and cost — largely concern the ICT solutions used rather than any interpersonal relationship (Ha et al., 2012, pp. 217–227).

Polasik & Wisniewski (2009, pp. 32–52) identified the following factors in Internet banking acceptance: perceived security, exposure to marketing campaigns, and experience with other banking products, with human relationships only considered to a small extent. Meanwhile, the Ayo et al. (2016, pp. 347–367) study identified the competence of e-service support staff, system availability, service portfolio, responsiveness, and reliability as the most important factors for the quality of e-services, with no reference to contact with bank employees. While Mbama et al. (2018, pp. 432–451) did consider employee-customer engagement when investigating the impact of digital banking channels on customer experience and the financial performance of the banks, this factor did not relate to using financial services at bank branches.

Meanwhile, researching customer preferences, Polasik & Piotrowski (2016, pp. 103–131) focused on the technological solutions employed by banks, demonstrating that the simultaneous implementation of financial innovation portfolios, a strategy employed by banks operating in Poland, aimed to increase customer satisfaction. However, this could also be seen as an example of an effective response from the banking sector to FinTech competition.

Accordingly, the extant literature indicates that customers using e-banking for its advantages — such as convenience, availability, low costs, and speed of service — are willing to sacrifice their interpersonal relationships with bank employees, a principal characteristic of branch banking. The banking sector's ongoing digitization, along with continuing changes to consumer behavior, is expected to further reduce the need for branch-level banking services (Kozlova et al., 2019, pp. 279–287).

As artificial intelligence (AI) is implemented at an increasingly large scale, the image of modern banking is changing (Hassani et al., 2020, pp. 433–446), with chatbots and robo-advisors entering the sphere once reserved for person-to-person contact (Ris et al., 2020, pp. 130–144). According to Jung et al. (2019, pp. 405–427), although there is great potential for robo-advisory in banking, the tool has yet to gain wide recognition among customers, potentially due to low trust in banks, high expectations of the transparency of financial services using AI, and limited interest in financial investments (Jung et al., 2018, pp. 367–380).

Notably, financial advisory services is an area of banking where personal contact with institutional employees remains significant (Cruciani, 2017). Customers do not treat advisors as mere vendors; instead, they appreciate their expertise (Cummings, 2017, pp. 97–117). Through knowledge transfer, financial advisors allow customers to better understand their financial situation and increase their financial self-awareness and financial literacy (Migliavacca, 2020, pp. 402–419).

The COVID-19 pandemic has considerably affected the behavior of bank customers, with concerns about SARS-CoV-2 infection from cash-handling considered by the literature (Huterska et al., 2021, pp. 1–18), along with the increasing share of cashless payments (Ağan, 2020, pp. 229–240; Dziawgo, 2021, pp. 1110–1120). Meanwhile, Baicu et al. (2020, pp. 534–556) indicated a reduced number of people using branch banking during the COVID-19 pandemic. It can therefore be assumed that customers perceived branch banking as a channel of communication that increased the risk of SARS-CoV-2 infection and e-banking instruments as offering superior health protection. Thus, the pandemic has highlighted another advantage of the banking sector's digital transformation.

This article aims to determine the impact of the digitization of bank services and the COVID-19 pandemic on retail customers' need to use branch banking. The paper uses primary data obtained in a survey covering a representative

sample of the Polish population. The data were analysed using Spearman's rank correlation coefficient and a binomial logit model.

This article fills a gap in the literature surrounding banking communication channels by considering interpersonal relations in its analysis. Although Filotto et al. (2021, pp. 366–375) examined factors limiting migration from traditional to e-banking, the importance of services provided by bank employees was not their analysis's main focus. Additionally, the extant literature has avoided determination of the impact on the phenomenon of technological advancements (represented by remote communication methods) or the attitudes of customers towards broad use of AI and robo-advisory in banking activities. Furthermore, extant studies date have not examined the impact of customer assessments of the compliance of banks with ethical standards or their need to use the financial services provided by bank employees at the branch level. To the best of the author's knowledge, this work is also the first to address the impact of the COVID-19 pandemic and social distancing on customer preferences for different banking communication channels in terms of interpersonal relations. Indeed, to date, studies covering the impact of the COVID-19 pandemic on the banking sector have focused on the stability of the sector (Abboud et al., 2021, pp. 1–46; Elnahass et al., 2021, pp. 1–32; Korzeb & Niedziółka, 2020, pp. 205–234) and the profitability of banks' business (Kozak & Wierzbowska, 2022, pp. 11–29; Xie et al., 2022, pp. 4801–4816).

In the subsequent section, a literature study is conducted on bank services acceptance and satisfaction factors. The next part of the work presents the description of survey research, the type of variables used in the analysis, and the research methods employed to verify the hypotheses. This is followed by demonstration and discussion of the results obtained using logit model estimation. The last part of the paper contains a conclusions, recommendations and suggestions for future study.

2. Literature review

All financial services were once provided by banks at their traditional physical locations. The development of information technology has led to banks providing a significant proportion of services remotely. Using financial services anywhere and at any time is convenient for customers, providing them with substantial independence from banking staff. The approach this paper proposes differs significantly from previous approaches, which focused on identifying determinants of satisfaction or adoption for separate channels of communication with banks. Instead, this work helps to determine whether customers using different channels of communication perceive a need for support from bank employees in the delivery of financial services. This empirical research will provide insight into whether customers' remote use of financial services through digital technologies significantly affects the need to use services provided by employees

in bank branches, as well as determining whether the shock of the COVID-19 pandemic may have accelerated the digitization of banks.

Considering the findings of Chaouali et al. (2017, pp. 57–67), and Sinha & Mukherjee (2016, pp. 88–100) on the use or intention to use e-banking services indicates the non-significance of factors concerning the behavior and attitudes of bank employees, the following hypothesis was adopted:

H1: There is a statistically significant and negative relationship between the frequency of customers' use of electronic banking services and their need to use financial services provided by bank branch employees.

The findings of Román & Ruiz (2005, pp. 439–445) and Hansen & Riggle (2009, pp. 151–166) regarding the benefits to customers and banks of competent and honest advisory services provided by bank employees informed the adoption of the following hypothesis:

H2: There is a statistically significant and positive relationship between customers' use of bank advisory services and their need to use financial services provided by bank branch employees.

Meanwhile, the findings of van Thiel & van Raaij (2019, pp. 150–170) indicate that implementing AI technology can positively influence the quality of banks' financial services, and studies by Dubey (2019, pp. 11–15) and Moșteanu (2019, pp. 123–134) demonstrated that analyzing customers' personal and financial data using AI allows banks to better tailor financial services to customers' needs because of the consequently more accurate understanding of their behavior and preferences. Considering these insights, the following hypothesis was adopted:

H3: There is a statistically significant and negative relationship between customers' positive assessments of the impact of artificial intelligence technology on the quality of banking services and their need to use financial services provided by bank branch employees.

Elsewhere, in research on the robo-advisory market in Poland, Warchlewska & Waliszewski (2020, pp. 97–114) revealed a high level of customer satisfaction regarding the use of automated financial advisory services. Meanwhile, van Thiel & van Raaij (2017, pp. 69–84) identified the most important attributes of hybrid and digital financial advice systems as assessed by customers of British and Dutch banks as credibility, accuracy, honesty, and helpfulness. Those papers informed the following hypothesis:

H4: There is a statistically significant and negative relationship between customers' preferences for robo-advisors over bank employees in bank advisory services and the need of those customers to use financial services provided by bank branch employees.

Hantrais et al. (2021, pp. 1–15) and Kim (2020, pp. 212–218) have recognized the COVID-19 pandemic as an accelerator of digitization. During the pandemic and its attendant social distancing, ICTs have been widely used for remote work, learning, social contact, and contact with public institutions. This has significantly improved people's quality of life during a time of hard-

ship for many societies. Broader use of digital technologies has also prompted changes in consumer behavior, including the use of financial services (Sheth, 2020, pp. 280–283), which is reflected in the following hypothesis:

H5: There is a statistically significant and negative relationship between customers beginning to recognize the advantages of remote communication with institutions (i.e., banks and public agencies) during the COVID-19 pandemic and those customers needing to use financial services provided by bank branch employees.

One cause of COVID-19 infection is non-compliance with social distancing (Kim & Crimmins, 2020, pp. 1–16), prompting concern for one's own health and that of others to dictate limiting interpersonal contact (Hossain et al., 2020, pp. 1–13). Notably, individual emotions are sometimes so strong that they trigger fear of COVID-19 (Huterska et al., 2021, pp. 1–18; Wakashima et al., 2020, pp. 1–13). For banks, an important consequence of this attitude may be customers refraining from using financial services involving direct contact with bank employees. Accordingly, the following hypothesis was formulated:

H6: There is a statistically significant and positive relationship between customers' fear of direct contact with bank employees as a consequence of the COVID-19 pandemic and the need of those customers to use financial services provided by bank branch employees.

The ethical behavior of banks has been the subject of research by Green (1989, pp. 631–634) and Bagus & Howden (2013, pp. 235–245), while Koslowski (2011) identified how the complex structure of financial products complicates valuation and promotes the temptation to act unethically towards bank customers. Meanwhile, Demirgüneş (2015, pp. 26–46) and Fichter (2018, pp. 69–84) demonstrated the significant impact of the ethical behavior of bank employees on customer satisfaction and trust in banks. Considering that the ethical behavior of bank employees is a frequently considered variable in research on the consumer-perceived ethicality of banks, the following hypothesis was formulated:

H7: There is a statistically significant and positive relationship between customers' assessments of banks' compliance with ethical standards and the need of those customers to use financial services provided by bank branch employees.

3. Methods

The article uses the results of a research project on the application of digital technologies in the banking sector in Poland. The data for this analysis were collected by a professional research agency—Interactive Research Center Sp. z o.o.—using the computer-assisted telephone interview method. A pilot survey conducted in September 2020 allowed the author to verify the comprehensibility and completeness of the questions in the questionnaire. The full-scale survey covering a sample of 911 Polish citizens aged 18–65 was conducted in October 2020. The selection of respondents for the sample was random-quota. The sam-

ple was representative of Polish society in terms of gender, age, and place of residence.

To achieve the paper's objective, the author focused on respondents with bank accounts. This condition was met by 862 respondents or 94.6% of the sample. This value corresponds to the percentage of people with a bank account reported by the Central Bank of Poland (NBP, 2021). Table 1 presents a specific set of variables relating to the 862 bank customers. In addition to the socio-demographic characteristics, the empirical study also included those that related to the experience of customers in using financial services, as well as their attitude toward the growing importance of AI in banking activity, their assessment of their bank's compliance with ethical standards, and how their behaviors and attitudes had been shaped by the COVID-19 pandemic.

Spearman's rank correlation coefficient identified explanatory variables that were statistically significantly correlated with the explanatory variable, while binomial logit model estimation allowed for the verification of the research hypotheses.

4. Results and discussion

A preliminary analysis of respondents' answers (Table 1) indicates that most were actively using e-banking services (68.7%) and had previously used financial advisory services in banks (68.4%). In most cases (66.7%), experiences with banks had allowed the respondents to positively assess the banks' actions in terms of their observation of ethical standards in relations with customers. Meanwhile, 64.5% of the respondents declared that they did not feel an absence of personal contact with bank branch employees. However, 67.2% preferred to use advisory services provided by bank employees rather than the services of robo-advisors. Elsewhere, 46.2% of respondents expected the implementation of AI technology to improve the quality of services. The need for social distancing principles to protect against COVID-19 had prompted most respondents (69.6%) to recognize the advantages of remote communication with institutions. However, for most respondents (76.8%), functioning in the pandemic context did not produce fear of direct contact with bank branch employees.

Table 2 presents the results of the analysis performed using Spearman's rank correlation coefficient. It was shown that there is a statistically significant correlation between the customers' declared need to use the service provided by a bank employee at a branch and the explanatory variables such as: *e_banking*, *financial_adv*, *ai_quality*, *robo_emp*, *cov_remote*, and *cov_fear*. It should be added that for the *financial_adv* and *cov_fear* variables, the correlation was positive, while for the other statistically significant variables it was negative.

The variables presented in Table 1 were also applied to the binomial logit model (Table 3), with the variable *branch_bank_service* adopted as the dependent variable (0–1) and the remaining variables treated as explanatory variables. Table 3 indicates that the variables significantly influencing customers' need to be

served by a branch employee were *e_banking*, *financial_adv*, *ai_quality*, *robo_emp*, *cov_remote*, and *cov_fear*.

The estimation conducted demonstrates that customers' need to be served by bank employees decreases as the frequency of using e-banking services increases. Therefore, there are no grounds to reject H1. This result aligns with the results of the Collier & Kimes (2013, pp. 39–51) study, which showed that satisfied users of SST have less need for human interaction, and studies by Meuter et al. (2005, pp. 61–83) and Nilsson (2007, pp. 367–381), which also indicated that SST adopters have less need for personal contact. However, the latter studies also demonstrated that SST adopters are generally younger, predominately male, better educated, and more open to technological innovation. In contrast, this study's binomial logit model did not indicate the statistical significance of the explanatory variables gender, age, or education level. The lack of statistical significance for explanatory variables related to the personal characteristics of respondents can be explained by the COVID-19 pandemic forcing a large part of the population to participate in the economy's digitization (Soto-Acosta, 2020, pp. 260–266). As an extreme phenomenon, the pandemic influenced the behavior and attitudes of individuals regardless of their gender, age, or education level. This explanation is supported by the statistical significance of the explanatory variable describing respondents' recognition of the advantages of using technological solutions enabling remote communication with institutions (*cov_remote*) in the pandemic context.

The estimated model features a significant, positive relationship between the *financial_adv* explanatory variable and the need for contact with a branch employee, providing no grounds for rejecting H2. These results also indicate that the need for direct contact with bank employees is more pronounced among respondents who have already used branch-based financial advisory services. This proves the high-value bank customers place on the knowledge provided by financial advisors, as well as potentially indicating the substantial importance and positive impact of interpersonal relations for bank advisory services.

The analysis also shows that the more the respondents are convinced that wider use of AI technology (*ai_quality*) can improve the quality of services provided by banks, the weaker their need to use services offered by bank branch employees, meaning there are no grounds for rejecting H3. This allows the conclusion that the banking sector's recent digitization, including the increased use of AI in customer service, may reduce the need for bank employees to provide financial services and promote a decline in direct customer service provided by bank branch employees.

Elsewhere, the estimations indicate that increased belief that AI solutions are superior to human capabilities negatively impacts the need for assistance from a branch employee, establishing that there are no grounds to reject H4. Respondents indicating a preference for advisory services provided by robo-advisors rather than those provided by bank employees were willing to resign from personal contact with a financial advisor. Notably, research has indicated that

if robo-advisors replace bank employees in the provision of advisory services — which are considered to be complex and to require expertise to analyze many economic phenomena — banks need to implement AI technologies and gain customer trust and support for new solutions (Ameen et al., 2020, pp. 1–14).

The study also demonstrates the statistical significance of two explanatory variables related to the COVID-19 pandemic and social distancing. In the constructed model, recognition of the advantages of remote communication with institutions in the COVID-19 pandemic context (*cov_remote*) reduced the probability of customers feeling the need to be assisted by a bank branch employee, indicating that there are no grounds for rejecting H5. This suggests that the COVID-19 — which has significantly and mostly negatively altered global socio-economic realities — has positively impacted broad adoption of ICTs, with the pandemic having provoked an acceleration of the transition towards digital societies (Hantrais et al., 2021, pp. 1–15; Mazali, 2018, pp. 405–411), ultimately producing the observed reduction in the need for personal contact with bank employees. Haapio et al. (2021, pp. 205–214) note, however, that the lack of face-to-face contact negatively affects the trust between the bank employee and the customer, and furthermore reduces the propensity of customers to make decisions regarding the investment of significant amounts of money.

Meanwhile, the results pertaining to fear of personal contact with bank employees indicate a positive impact on the need for assistance from a bank branch employee, indicating that there are no grounds to reject H6. These results should be interpreted through the lens of the effects that the COVID-19 pandemic has had on the functioning of societies and, especially, banks. Notably, the results of this study's survey of 862 customers of banks operating in Poland indicate that 55–65 year-olds — the oldest group surveyed — were the group with the highest percentage of respondents fearing personal contact with bank employees (Table 1). These findings correspond with those of the Kim (2020, pp. 212–218) study of the U.S. public, which showed that reductions in risky behavior during the pandemic, including reduced interpersonal contact, were more pronounced among older people than younger people. This was driven by compliance with social distancing regulations and health concerns and aligns with this study's findings that the highest percentage of respondents reporting a need to use branch-based services and the lowest percentage of respondents reporting actively using e-banking services were both observed for the oldest group of respondents (Table 1). Meanwhile, a study by Baicu et al. (2020, pp. 534–556) demonstrated that the COVID-19 pandemic had reduced the use of bank-branched financial services in Romania. Those findings suggest that the phenomenon has most strongly affected the elderly, for whom branch-based contact was considered the only or primary channel of communication with their bank. They were forced to limit their visits to bank branches, which may have heightened their perceived need for direct contact with a bank employee. That is, if a customer does not use remote forms of communication with

their bank — or uses them in a limited manner — direct contact is the only way to receive financial service.

In addition to variables concerning individual personal characteristics, another explanatory variable that proved statistically insignificant was the assessment of banks' compliance with ethical standards in their relations with customers, indicating that there are no grounds for rejecting H7. Extant literature on this topic (Herzog, 2019, pp. 531–543;Román, 2003, pp. 915–939) indicates that the business ethics of a bank is considered by customers when determining the degree of satisfaction with the services provided by these institutions. However, those studies recognized that assessing business ethics was important for customers considering or wanting to change banks or abandon branch-based banking services in favor of FinTech. In contrast, this study's respondents indicated their preference for a given communication channel within the bank whose services they were already using.

5. Conclusion

Several decades ago, physical contact with bank employees was an indispensable element of financial services. While the introduction of telephone banking maintained personal contact with bank employees, this remote form of communication does not promote customer-employee relations in the manner of branch-based services. Meanwhile, the widespread implementation of Internet and mobile banking has very clearly limited the direct service of customers by bank employees. Although electronic communication channels remain human-operated, customers are more often in control.

The main finding of the work is that the vast majority of customers of banks operating in Poland do not expect service in branches. This attitude is associated with a significant level of activity in the use of electronic banking and a positive assessment of the potential effects of applying artificial intelligence to banking. The ongoing process of digitization of the banking sector, combined with growing social acceptance of SSTs, will ultimately diminish any need for personal contact with bank employees and, subsequently, produce a decline in the number of physical branches. This perspective is supported by the results of research on the benefits of AI technology for the quality of the financial services provided to customers. Although customer experiences with AI in the banking context have not been fully satisfactory thus-far, broader use of such technologies is expected (Mhlanga, 2020, pp. 1–14). Notably, this paper's results indicate that bank customers expect improvements in the quality of services provided as a consequence of such technology being implemented, with effective implementation potentially reducing customers' needs for branch-based services.
This paper's analysis also indicates that financial advisory services is one area in which customers still perceive advantages in direct contact with bank employees, a finding consistent with that of Waliszewski (2016, pp. 13–23). However, this situation may change as banks make greater use of AI technology

in the provision of advisory services (Arslanian & Fisher, 2019). In fact, as this research indicates, customers who are inclined to use robo-advisors to choose saving or investment products or raise capital do not feel a significant need for direct contact with bank employees. However, this does not mean that customers will completely relinquish the services provided by bank branches, with Buvat et al. (2018) demonstrating that, in the advisory services context, consumers prefer interactions combining AI with human factors. For example, branch-based contact could be replaced by personal contact with bank employees via instant messaging.

Meanwhile, the COVID-19 pandemic's near-universal introduction of social distancing and lockdown principles has substantially reduced interpersonal contact and complicated physical access to many institutions, including bank branches. Fear of personal contact with bank employees due to probable fear of SARS-CoV-2 infection might have contributed to responses of some respondents to questions regarding the need for personal contact with branch employees. However, this conclusion should not overshadow the study's indication that the vast majority of respondents felt neither anxiety nor the need for direct contact. Additionally, it should be noted that the vast majority of respondents actively used electronic banking, a contact channel that significantly reduces the risk of contracting SARS-CoV-2.

Ultimately, a positive consequence of the COVID-19 pandemic is increased openness to new technologies, with this study demonstrating that changes in the use of modern information technologies are positively perceived by Polish society. This enables the general conclusion that the COVID-19 pandemic has accelerated broader digitization, with one consequence potentially being the greater public acceptance of using digital technologies for bank services. Strengthened digital financial inclusion during the pandemic period was also observed in other countries (Banna & Alam, 2021, pp. 504–523; Bechlioulis & Karamanis, 2022, pp. 1–18; Khatun et al., pp. 253–267).

The literature studies conducted in the paper and the results of the logit model estimation indicate the need for changes involving both theoretical models of acceptance of or satisfaction with the use of banking services, as well as the analysis of the practical aspects of their implementation. It is clear that in the case of research on e-banking services and bank services using artificial intelligence algorithms, the focus is on the technological aspects of the solutions; however, more consideration should be given to variables relating to the need for interpersonal relationships and emotions surrounding the use of ICTs.

5.1. Research limitations

The results presented in the paper apply to Polish society. This limitation, in the author's opinion, does not significantly reduce the cognitive value of the results and conclusions contained in the work. This is related to the fact that the digitization of the financial services process, the increasingly widespread

replacement of human labor by information technology, as well as the impact of pandemics on consumer behavior, are global phenomena.

5.2. Future study

The increasing use of artificial intelligence is a manifestation of the ongoing process of digitization in the area of financial services. The use of these technologies reduces direct human relations. Still, humans are responsible for the development, deployment, and use of artificial intelligence algorithms; humans also experience the effects of algorithms. It is therefore worth investigating what consumers' attitudes are toward solutions that correspond to the Trustworthy AI concept.

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Appendix

Table 1.
Characteristics of variables and the structure of responses obtained in CATI (N=862)

Variable	Variable description	Response scale	%
branch_bank_service (Y)[1]	expectation of service from a bank employee in a branch	0 — no	64.5
		1 — yes	35.5
gender	gender	0 — female	50.2
		1 — male	49.8
age_group	age group	1 — 18–24	8.0
		2 — 25–34	24.1
		3 — 35–44	25.3
		4 — 45–54	19.6
		5 — 55–65	23.0
education	education level	1 — primary and below	2.1
		2 — lower secondary and basic vocational	16.9
		3 — secondary	40.6
		4 — higher	40.4
e_banking[2]	frequency of using e-banking services (internet and/or mobile banking)	1 — no or less than once a year	10.7
		2 — several times a year	0.9
		3 — several times a month	19.7
		4 — a few times a week	42.4
		5 — several times a day	26.3
financial_adv	use of bank advisory services related to savings, investment, or obtaining financing in the form of a loan	0 — no	31.6
		1 — yes	68.4
ai_quality	the use of artificial intelligence technologies by banks will increase the quality of services provided	1 — definitely not	7.1
		2 — rather not	15.2
		3 — it's hard to say	31.5
		4 — rather yes	34.3
		5 — definitely yes	11.9
robo-emp	favoring the use of financial advisory services provided by a robo-advisor rather than by a bank employee in the case of mortgage loans or stock market investments	1 — definitely not	36.1
		2 — rather not	31.1
		3 — it's hard to say	18.7
		4 — rather yes	11.3
		5 — definitely yes	2.8
cov_remote	the COVID-19 pandemic made me see the advantages of remote communication with institutions (banks, public agencies)	1 — definitely not	4.9
		2 — rather not	13.0
		3 — it's hard to say	12.5
		4 — rather yes	35.6
		5 — definitely yes	34.0
cov_fear[3]	the COVID-19 pandemic made me afraid of physical contact with bank employees	1 — definitely not	31.2
		2 — rather not	45.6
		3 — it's hard to say	8.6
		4 — rather yes	10.9
		5 — definitely yes	3.7

Variable	Variable description	Response scale	%
ethics	banks operating in Poland comply with ethical standards in relations with their customers	1 — definitely not	3.2
		2 — rather not	11.3
		3 — it's hard to say	18.8
		4 — rather yes	56.4
		5 — definitely yes	10.3

Notes:

[1] The highest percentage of answers 5 (definitely yes) was in the 55–65 age group.

[2] The highest percentage of answers 1, 2 and 3 was in the 55–65 age group.

[3] The highest percentage of answers 4 and 5 was in the 55–65 age group.

Source: Own preparation.

Table 2.
Spearman's rank correlation coefficient results

Variable	*branch_bank_service* (Y)
gender	−0.028
age_group	0.042
education	0.044
e_banking	−0.102***
financial_adv	0.090***
ai_quality	−0.111***
robo_emp	−0.092***
cov_remote	−0.238***
cov_fear	0.058*
ethics	−0.009

Notes:

*** statistically significant at the 1% level; ** statistically significant at the 5% level; * statistically significant at the 10% level.

Source: Own preparation using SPSS software.

Table 3.
Logit model results

Variable	Coefficient	Std. error	Z	p-value
const.	1.2956	0.6572	1.971	0.0487**
gender	−0.0048	0.1509	−0.0324	0.9741
age_group	−0.0404	0.0639	−0.6327	0.5269
education	−0.0994	0.0989	−1.004	0.3152
e_banking	−0.1510	0.0700	−2.156	0.0311**
finanial_adv	0.5027	0.1711	2.937	0.0033***
ai_quality	−0.1549	0.0737	−2.099	0.0358**
robo_emp	−0.1386	0.0715	−1.937	0.0528*
cov_remote	−0.2800	0.0626	−4.471	<0.0001***
cov_fear	0.1202	0.0695	1.729	0.0838*
ethics	0.0952	0.0838	1.137	0.2556

Notes:

*** statistically significant at the 1% level; ** statistically significant at the 5% level; * statistically significant at the 10% level.

Source: Own preparation using SPSS software.