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The analysis of the impact of digital product innovation and human resources specialists on intention to use artificial intelligence in financial banking system

THE ANALYSIS OF THE IMPACT OF DIGITAL PRODUCT INNOVATION AND HUMAN RESOURCES SPECIALISTS ON INTENTION TO USE ARTIFICIAL INTELLIGENCE IN FINANCIAL BANKING SYSTEM

Nicoleta Valentina Florea[1]*, Gabriel Croitoru[2], Georgiana Radu (Cârstea)[3], Daria Florea[4]

[1)2)34)] *Valahia University of Târgovişte, Târgovişte, Romania*

Abstract

Artificial Intelligence in the banking system is constantly developing, especially among young customers. Innovation of digital products has an important role in the use of banking services, but human resources specialists in the banking system also have such a role, due to their expertise, knowledge and involvement in explaining the benefits of using Artificial Intelligence and digital products in the banking financial system. In this article, the Technology Acceptance Model (TAM) was used to show the impact of internal variables (the role of human resources specialists in the banking system) and external variables (Artificial Intelligence and innovation of digital products), TAM-specific PU and PEU, on the intention to continue using Artificial Intelligence in the banking financial system. The results indicated that innovative digital products and the role of human resources in the use of Artificial Intelligence, PU and PEU have a positive and direct impact on the intention to use Artificial Intelligence in the financial system. All research hypotheses have been fulfilled, indicating that Artificial Intelligence has an important role in the Romanian banking financial system among young consumers. The paper contributes to the development of the banking financial system by using Artificial Intelligence, highlighting the importance of human resources, TAM and PLS-SEM specialists in this field.

Keywords

Artificial Intelligence, innovative digital products, human resources specialists, TAM, PLS-SEM, intention to use Artificial Intelligence in the banking sector, banking young customers

JEL Classification

D53, E27, G17, G21, C15.

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* Contact author, **Nicoleta Valentina Florea** – floreanicol@yahoo.com

Introduction

We live in the era of relationships, and the relationship with customers is a special one, based on knowing their needs. Customer relationship management (CRM) plays an important role in the success of any company. Good CRM practices involve all functions of the organization, all hired specialists and top management, and success is not achieved immediately, nor is it an easy task (Knox S.K. et al., 2007, p.14). CRM is a multi-faceted process, mediated by a set of information technologies, which focuses on two-way exchange with its customers so that the firm knows their needs, desires and purchasing behavior (Jha L., 2008, p.1). Thus, CRM helps organizations understand and anticipate the needs of current and potential customers. CRM has as its philosophy "know your customer and what they buy", based on the company's orientation by relationships with its current and potential customers and their needs (Raab G. et al., p.6). Many initiatives of different companies have failed due to the limitation and isolation of IT systems and software without taking into account their alignment with the customer-centric company strategy (Jha L., 2008, p.1). In other words, without customer orientation (customer centricity) performance cannot be achieved and competition cannot be surpassed (Fader P., 2012, p.97). Clients are of all types, all wanting to achieve a solution to their problems and achieving rational goals (Christopher M. et al., 2002), and relationship marketing refers to building and developing sustainable relationships with customers (Hennig-Thurau T., Hansen U., 2013, p.1) through its employees who have unique knowledge and experiences (Florea, Stegaroiu, 2014). Long-term and profitable relationships are the goal of any institution based on implementing a successful CRM (Werro N., 2015, p.51), and its systems are designed to help firms sell more products and services to customers, meeting their needs (Webb N., 2016, p.6). Thus, the role of employees in the banking financial system is to provide high-performance products and services at the right time and place, using traditional or virtual sales, based on artificial intelligence and the offer of innovative digital products. Thus, the purpose of the article is to use the TAM model to indicate the impact of internal variables (the role of human resources (HR) in the banking system) and external variables (innovative digital products), TAM- specific PU and PEU, on the intention to use Artificial Intelligence (AI) in the banking financial system (SFB). The structure of the article is as follows: in chapter 1 the specialized literature is presented, and also the research hypotheses and the conceptual model of the analysis are established. Section 2 presents the research methodology, especially on research design and context, consisting of the process of data collection and analysis. The results and research discussions are presented in section 3, and in the final part are presented the theoretical and managerial contributions of the article; The limits and future research proposals and directions are also presented.

1. Review of the scientific literature

1.1. The offer of innovative digital products and the intention to use AI in the financial banking system

Among consumers, especially young ones, new digital products have a positive effect on the intention to use AI in the financial banking system (FBS). AI and chatbot-based technology are expected to revolutionize customer service in banking (Alt & Ibolya,

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2022). Banks use AI to provide digital products and advice to their customers (Ryzhkova et al., 2020), so banks and consumers perceive AI in a positive manner. AI is a very important technique in any field, but also in banking institutions that use the tools based on new technologies to transform their business and improve performance (Tiwari & Saxena, 2021). Among 799 respondents from five Asian countries, it emerged from the analysis that Perceived Utility (PU) and AI had an important influence on the intention to adopt AI in the banking sector (Noreen et al., 2023). A study conducted in 2023 indicated that the offer of innovative financial products plays an important role in increasing the market share of the banking institution (Rabbani et al., 2023), but also its own efficiency, social influence, risk and fear that are important predictors of the intention to adopt AI in e-banking (Kamboj & Joshi, 2021; Saha & Kiran, 2022). New online products and services have emerged and been used by customers: digital payments, P2P e-banking, real-time payments, Fintech portals and cryptocurrencies (Jena, 2023). Due to the pandemic period, many customers had to adopt digital solutions, quickly and by those with modest incomes (Billore & Billore, 2020).

Thus, the following research hypotheses were developed:

H1a- Innovative digital products have a positive effect on PU,

H2a- Innovative digital products have a positive effect on PEU,

H1- Innovative digital products have a positive effect on the Intention to use AI in FBS.

1.2. The role of HR in customers' use of e-banking products and the intention to use AI in the banking financial system

Specialists in the banking sector have a positive attitude in implementing AI in the workplace, but also as solutions offered to customers to improve routine operations (Ryzhkova et al., 2020). Staff in the banking sector are of particular importance, especially when offering their customers personalized products, depending on education level, revenue, degree of understanding of risk, security or data privacy (Gigante & Zago, 2023). All staff through the legislation in force can provide customers with personalized services, smart wallets, real-time problem solving, decision making and customer satisfaction, process automation, improving data security, cybersecurity, transactional security, digital financial inclusion, information on loss of human contact in some operations, creativity and adaptability to new technologies, restrictions, or requirements operational (Ghandaour, 2021) demonstrating that they have a positive impact on PU. The global financial crisis has led to the use of AI in various activities, especially in the banking sector, but also to the determination of risk activities by banking staff. Thus, HR in the banking financial sector was able to determine the areas of banking financial risk, such as risk in lending activity, liquidity risk, operational risk and other such areas in order to learn from these aspects and create appropriate strategies and win-win relationships (Milojevic & Redzepagic, 2021). The use of AI (ATMs, virtual assistants and chatbots) has led to a reduction in technical inefficiencies in banks. In India, a study of 47 commercial banks indicated that the use of AI led to a reduction in technical inefficiencies by 11% due to internal factors and appropriate decision-making (Mor & Gupta, 2021). A research conducted in the banking sector has

shown the important role of HR in contact with customers and their positive attitude in using and adopting new technologies. The study indicated a number of benefits such as: new customer experiences, efficiency and a better perspective on customers, but also some challenges related to requirements and regulations in the field, the effort related to the maintenance of new technologies and the complexity of processes. Thus, a hybrid approach, based on the use of talented HR with skills in using new technologies (tech-savvy talent) in banks and digital processes will lead to front-to-back solutions (Wittmann & Lutfiju, 2021). To survive in the digital age, banking professionals provide customers with new experiences, satisfaction and retention, leading to increased profitability (Shakina et al., 2021), loyalty, engagement and trust in banks using digital products and services (Bhattacharya & Sinha, 2022), transparency, social influence, awareness (Bharti et al., 2023). Thus, the following hypotheses have been proposed:

H1b- The role of HR in using e-banking products has a positive effect on PU,
H2b- The role of HR in using e-banking products has a positive effect on PEU,
H2- The role of HR in the use of e-banking products has a positive effect on the Intention to use AI in FBS.

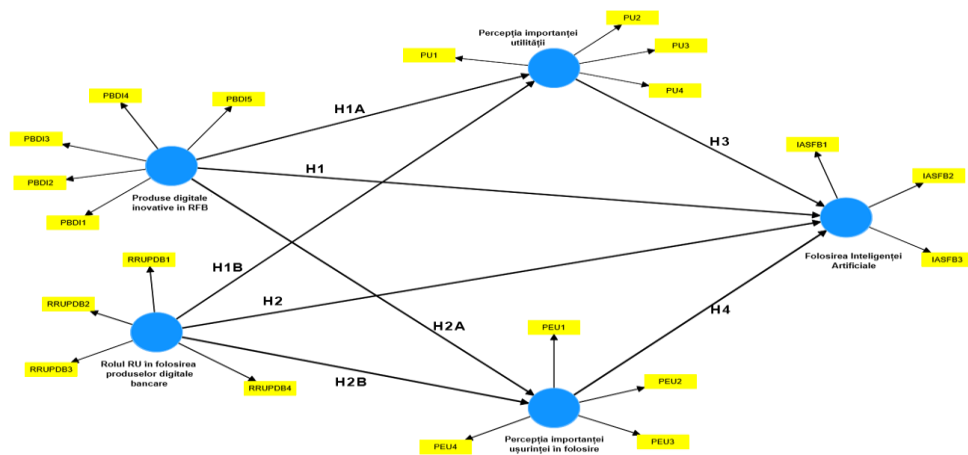### 1.3. PU and PEU and the intention to use AI in the banking financial system

TAM analyses the extent to which technology is accepted and used in human-computer interaction (Granic & Maranguni, 2019) and is widely used in various fields of activity (Lai, 2017), including banking (Hossain et al., 2020; Ali et al., 2021; AlKailani, 2016). TAM is based on two factors: perceived utility (PU- which refers to performance growth based on the use of new technologies) and perceived ease of use (PEU- which refers to accepting new technologies with minimal effort) (Na et al., 2022).

A study was conducted among 261 banking specialists in Saudi Arabia and indicated positive effects of PU on AI adoption in banking activities (AL Qahtani & Alsmairat, 2023). PU in e-banking is an important aspect explaining the intention to use these services (Malaquias & Hwang, 2019), which offer unique services available at any time, from anywhere (Yoon & Steege, 2013; Shankar & Jebarajakirthy, 2019). Some studies are indicating the influence of PU and PEU on e-banking (Deb & Lomo-David, 2014; Ezzi, 2014; Olasina, 2015; Ali, 2021; Wentzel et al., 2013; Ahmad, 2018). The Internet has improved convenience for customers and PEU is very important due to the complex transactions they can easily make (Riquelme & Rios, 2010) even from their mobile phone (Zhang et al., 2018). The intention to adopt and use e-banking was analyzed to understand current consumer behavior (Yaseen & El Qirem, 2018) as a measure of the level of intent to perform a particular behavior. Thus, we developed the following research hypotheses:

H3- PU plays a positive role on Intention to use AI in FBS,
H4- PEU plays a positive role on Intention to use AI in FBS.

Based on the literature review and TAM, we developed the conceptual model (Figure 1), in which the role of digital banking products and HR in their use, together with PU and PEU, have an important influence on the intention to adopt AI in the banking system (AL Qahtani & Alsmairat, 2023; Bharti et al., 2023; Alshari & Lokhande, 2023; Thomas et al., 2023; Lee & Chen, 2022; Carranza et al., 2021).

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Figure no. 1: Model structural
Source: authors processing

2. Research methodology

The purpose of this study was to use the TAM model to show the impact of internal variables (the role of HR specialists in the banking system) and external variables (AI and digital product innovation), TAM-specific PU and PE, on the intention to continue using AI in the banking financial system.

Tools used for analysis – SPSS and PLS-SEM (Partial Least Squares Structural Equation Modeling) which is a statistical technique that estimates cause-and-effect relationships using latent and observable variables (Hair et al., 2017) and estimates the association between latent variables (Jena, 2023).

The study sample - the study was conducted among 150 persons, young consumers of e-banking services from Romania for the reasons also mentioned by Isa et al (2022), adding that older people need more time and confidence to use digital financial services and AI, indicating a higher degree of resistance to technological adoption (Andalib & Hashim, 2018).

Data collection – According to the requirements of compiling a sample to use PLS-SEM, a total of 200 respondents would be needed to reduce the likelihood of biases in the results obtained (Boomsma & Hoogland, 2001). The method of convenience and snowball was used as a research method to find the right people for the analysis. Each team member offered to complete the physical and online questionnaire at his/her workplace, to colleagues from the same department or from other departments, friends, acquaintances, students, master students, doctoral students, provided that they are in groups up to 30 years old and have used e-banking and AI services. The participants were informed about the purpose of the research and that the data obtained will be used only for scientific purposes.

Sample profile – 57.3% of respondents are men and 43.7% women. Out of the 150 respondents, 67% have bachelor's degrees, 74.7% are from urban areas. Of the total,

52% are in the 16-24 age group and the remaining 48% are in the 25-30 age group (Table 1).

Table no. 1. Demographic characteristics of respondents

Characteristic	N	%	Characteristic	N	%	Characteristic	N	%
Sex								
Male	86	57,3	**Education**			**Age**		
Female	64	42,7	highschool	36	24	16- 24 years	78	52
			bachelor	67	44,7	25-30 years	72	48
Residence			degree		23,3			
Urban	112	74,7	master	35	8			
Rural	38	25,3	PhD	12				

Source: authors processing

3. Results and discussions

The questionnaire (Table 2) was developed using the five-point Likert scale (1- strongly disagree and 5- strongly agree). The structural model examined respondents' perceptions of the intention to adopt AI-enabled banking. It focuses on factors such as digital banking products, the role of HR in their use, PU, PEU and the intention to use AI in banking services.

Table no. 2. Confirmatory factorial analysis and descriptive statistics

Construct	Item	Measure	Average	VIF	Loading (St.Est.)	Chro alpha	AVE	CR
1. Used banking products						0,724	0,628	0,729
	PBDI1	I pay installments, interest online	3.82	1.140	0.774			
	PBDI2	Pay utility costs online	4.39	1.037	0.752			
	PBDI3	I transfer amounts/fees to other persons/institutions	4.48	1.066	0.890			
	PBDI4	Make saves in an online account	3.4	1.179	0.974			
	PBDI5	Open/close bank accounts online	4.31	1.055	0.701			
2. The role of HR in e-banking						0,760	0,624	0,706
	RRUPDB1	HR gives me availability in explaining the implementation of online banking services	4.47	1.062	0.948			
	RRUPDB2	I enjoy the experience of qualified HR in	4.18	1.003	0.704			

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		using digital products					
RRUPDB3		I am offered diversified e-banking products	4.39	1.006	0.825		
RRUPDB4		I am offered various digital and financial management solutions	4.11	1.058	0.776		

3. Perceiving the importance of the usefulness of digital products

						0,721	0,663	0,737
PU1		The information provided is very clear and easy to apply	4.27	1.018	0.825		
PU2		I enjoy the speed of digital banking	4.61	1.038	0.766		
PU3		Mă bucur de costurile reduse ale produselor digitale	4.16	1.040	0.982		
PU4		E-banking services are carried out at any time	4.11	1.043	0.858		

4. Perception of the importance of ease of use of digital banking products

						0,726	0,697	0,796
PEU1		Using e-banking services does not require a great effort of knowledge	4.19	1.005	0.705		
PEU2		Making payments online is easy	4.62	1.020	0.809		
PEU3		Making bank transfers is easy	4.4	1.010	0.822		
PEU4		Online banking is done easily (it can also be done on the move or during other activities)	3.97	1.006	0.757		

5. Using AI in financial banking services

						0,726	0,697	0,776
IASF1		I would like to use AI in e-banking in the future	4.37	1.019	0.742		
IASF 2		I will probably still use AI services in e-banking	4.35	1.016	0.786		
IASF 3		I expect to continue using AI	4.17	1.029	0.745		

in e-banking

Source: authors processing

Thus, TAM will help forecast a possible future technological intention to make decisions made by AI-based recruitment and selection users. The model was estimated using structural equation modeling based on the least squares method in SmartPLS 4.0 (Figure 2).
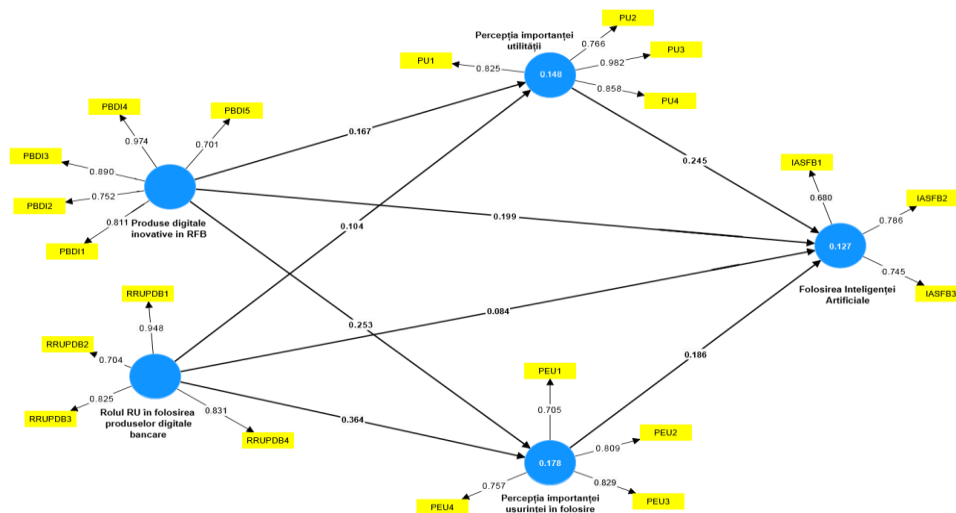

Figure no. 2: Results of the structural model
Source: authors processing

The results indicated the internal consistency of the model (Table 1), since all loads of both Cronbach-alpha and variable variables exceed 0.7 (Hair et al., 2010; Henseler & Sarstedt, 2013); and CR (composite reliability) values are also above 0.7 (Nemteanu et al., 2022). According to the Fornell–Larcker procedure (1981), for each latent variable, the AVE value is greater than the correlation coefficient between competent variables and all distinct variables (Table 3).

Table no. 3. Discriminatory validity - Fornell-Larcker criterion

	Using _Artificiale Intelligence	Perception of the importance PU	Perception of the importance of _PEU	Digital products _inovative in FBS	The role of HR in using digital banking _products
Using _Artificiale Intelligence	0.664				
Perception of the importance PU	0.880	0.596			
Perception of the importance of _PEU	0.633	0.636	0.528		

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Digital products _inovative in FBS	0.651	0.619	0.792	0.594	
The role of HR in using digital banking _products	0.676	0.819	0.694	0.602	0.543

Source: authors processing

The analysis performed was developed to evaluate the relationship between latent variables. Based on statistical values of t, of all developed hypotheses all were accepted (Table 4). Innovative digital products in the banking financial sector have had a significant positive influence on:

- PU (β = 0.167; T-value = 0.943; p < 0.001), therefore, greater customer use of innovative digital products will lead to greater perceived utility; thus, H1a is accepted.
- PEU (β = 0.187; T-value = 0,800; p < 0,001), therefore greater customer use of innovative digital products will lead to perceived greater user-friendliness; thus, H2a is supported.
- intention to use AI in banking services (β = 0.199; T-value = 0.838; p < 0.001), therefore, greater customer use of innovative digital products will lead to a greater intention to use AI in banking services; thus, H1 is accepted.

The role of HR in the financial and banking sector in using innovative digital products has had a significant positive influence on:

- PU (β = 0.031; T-value = 0,185; p < 0.001), therefore, better information from HR banks on innovative digital products will lead to greater perceived utility; thus, H1b is supported.
- PEU (β = 0.364; T-value = 0,101; p < 0.001), therefore, better information from HR banks on innovative digital products will lead to greater perceived ease of use; thus, H2b is supported.
- intention to use AI in banking services (β = 0.084; T-value = 0.459; p < 0.001), therefore, better information from HR banks on innovative digital products will lead to a greater intention to use AI in banking services; thus, H2 is accepted.

PU influence (β = 0.096; T-value = 0.560; p < 0,001) and PEU (β = 0,186; T-value = 0,641; p < 0.001) on the intention to use AI in banking services was positive and significant, meaning that greater utility and usability will lead to greater use of AI in banking services; so both H3 and H4 were accepted.

From the results, it is clear that all research hypotheses are accepted, indicating that all independent variables examined have an important influence.

Table no. 4. Coefficients of the model of the structural equation

Ways	Coeff (P) or (β)	Ave (M)	St.dev. (STDEV)	T Statistic (|P/STDEV|)	P values (* p < 0,1; ** p < 0,01; *** p < 0,001)	Hypothesis
Products digitale_inovative-> PU - (H1A)	0.167	0.187	0.177	0.943	0.000	H1A-accepted
Products	0.187	0.034	0.234	0.800	0.000	H1B-

Ways	Coeff (P) or (β)	Ave (M)	St.dev. (STDEV)	T Statistic (|P/STDEV|)	P values (* *p* < 0,1; ** *p* < 0,01; *** *p* < 0,001)	Hypothesis
digitale_inovative -> PEU - (H2A)						accepted
Products digitale_inovative-> Using AI - (H1)	0.199	0.074	0.238	0.838	0.000	H1-accepted
The role of RU-> PU - (H1B)	0.031	0.062	0.168	0.185	0.000	H2A-accepted
The role of RU -> PEU - (H2B)	0.364	0.128	0.361	0.101	0.000	H2B-accepted
The role of HR -> Use of AI - (H2)	0.084	0.120	0.183	0.459	0.000	H2-accepted
PU-> Using AI - (H3)	0.096	0.028	0.171	0.560	0.000	H3-accepted
PEU -> Using AI - (H4)	0.186	0.062	0.290	0.641	0.000	H4-accepted

Source: authors processing

Studies in the field have shown that innovative digital banking products and the role of HR in the use of these products by customers, especially those in the two analyzed groups (young customers between 16-24 years and those between 25-30 years), have a positive impact on PU, PEU and especially on the intention to use AI in banking services.

A study conducted in Poland indicated that institutions in the banking financial sector that use AI rely on aggressive strategies and are oriented towards development by using this new trend (Borkowski, 2020). In recent years, the banking sector has indicated an increased level of use of AI used in many automated processes and an increase in the quality of banking services offered. Thus, another study indicated that AI can replace HR in banking institutions but not completely, allowing the automation of processes that lead to improved quality of services and banking performance (Zinizha et al., 2019). The current economy leads us to the idea of using new technologies much more intensively in the future and especially in the banking sector, using robo-consulting (Piotrowski &; Orzeszko, 2023) and various other services such as process automation, cost reduction, development of innovative products and services, unique customer experiences and improved decision-making (Tiwari & Saxena, 2021). The results of another study indicated that the intensive use of AI in the banking sector led to improvements in three important areas: strategies, processes, and customers (Fares et al., 2023). A study conducted in the Middle East, in the banking sector, indicated in 2018 that AI even though it is quite used in many areas, in the banking sector it is still used at a medium level of acceptance and adoption of new technologies (Alzaidi, 2018).

Conclusions

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The study was based on the use of TAM and determined on the one hand the influences that innovative digital products could have and the role of HR in challenging customers to use them on PU and PEU, and on the other hand on the intention to use AI in banking services. The results indicated that innovative digital products in the banking sector and the role of HR in using these products are very important and have a positive and strong influence on the intention to adopt AI in the banking financial sector; according to TAM, the influences of the UP and PEU on the intention to adopt AI in banking services were also analysed.

As theoretical implications, it can be added that the process based on the use of AI in the banking sector can be improved based on two important variables such as innovative digital banking products and the role of HR in promoting their use.

As practical implications, the article offers important benefits for clients from the analyzed categories of young people (reduced time, reduced costs, instant use, real-time information, obtaining new knowledge in the banking and digital fields), but also for HR employed in the banking sector, and also for banking institutions (attracting and maintaining young customers, 1-to-1 relationships and their loyalty, developing online and customer skills and for involved HR).

At individual level, it was possible to perceive the degree of intention to adopt AI in the use of banking services of the young clients analyzed. As can be seen, the lowest average scores for innovative digital banking products were obtained for savings made in an online account (3.4) and for payments made online at rates and interest rates (3.82). These results could become starting points for banking institutions in promoting young people to access various categories of loans (such as housing), especially since at this age they already have experience and a stable job. As for creating savings from online accounts, banking institutions should involve these categories of young people in participating in training courses in financial education or constant and continuous investment on the 30-50-20 principle (in which 20% of family income should be deposited in an investment or savings account). Regarding the role of HR in promoting and challenging the young generation to use digital banking products is, according to calculations, quite important, all average scores being above 4.11. As for PU and PEU, young customers enjoy the utility and ease of use of digital banking products, as the average scores are between 3.97 and 4.62. The intention to use AI in banking also enjoys a good and very good average score, scoring between 4.11 and 4.37.

The study had a few limitations; firstly, it can be mentioned that the study did not perfectly represent the reality of the existing financial banking market in the analyzed area from Romania. Another limit was the small number of respondents (150 persons), but the authors assured the different areas of activity of the analyzed clients, two age groups of the younger generation, diverse level of education, gender and residence. A third limit was age-related, but as it was added, the younger generation of consumers was chosen, which do not oppose the resistance to the intention of using AI in banking financial services.

Future research directions will have to seriously consider the importance of AI in the financial and banking sector, but always considering the degree of development of digital products, but also the role of HR in promoting them, but also in challenging not

only the young generation to use them, but also the other generations, in order to improve the benefits of both individual and financial and banking institutions.

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