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Citizen-Centric Governance: Enhancing Citizen Engagement through Artificial Intelligence Tools

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Abstract: The public sector presents important steps for digital transformation. Digital transformation uses a series of tools and methods to improve the relationship with citizens and improve benefits. This paper explores the role of artificial intelligence (AI) in governance processes and provides public institutions with insight regarding the impact of integrating chatbot communication tools when interacting with citizens. The present research provides an analysis of the socio-economic factors that determine the use of artificial intelligence tools, i.e., the propensity to interact more with the public administration as a result of improved communication through virtual assistants, and highlights the implications of AI in improving services towards civil society by determining the degree of satisfaction on aspects such as reduced waiting times in queues, access to information regardless of the traditional working hours of civil servants, quicker execution of operations, et al. The results, derived from an analysis of 507 sets of responses obtained from an online questionnaire, indicate that a number of variables, such as residential environment, employment status, household income and education level, significantly impact the effectiveness of artificial intelligence in mediating citizen communication with government.

Keywords: sustainability; social responsibility; governance; innovation; citizen participation; virtual assistant

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1. Introduction

In line with the evolution of the Internet and its increasing use, the integration of IT technologies has been pursued to improve both government services and communication with citizens with a view to achieve administrative sustainability. Romania, as a country with a unique historical and political context, can provide insights into different governance models and by exploring how citizen-centric governance, facilitated by AI tools, aligns with the evolution of democracy in Romania, can provide valuable lessons and perspectives. In addition, given the specific socio-economic context, studying its approach to citizen-centric governance with AI tools can highlight the impact of socio-economic factors on the adoption and success of such initiatives. The organizational changes needed to implement the concept of e-government in Romania were difficult to adopt in the early 1990s, as they had begun to take shape in the United States, Canada and western Europe, given the imprint of a totalitarian regime that had just recently ended in late 1989 [1,2]. The first global initiatives in this direction aimed to implement simple online services, such as providing information to promote institutional transparency, making it possible to pay certain fees using internet services, access public information via various websites and so on. At the country level, there are no virtual assistants in public institutions, and the

needs of citizens emphasize the desire for online interaction. Romania is a developing country where public institutions do not show a high degree of digital transformation. The European initiatives emphasize activities that will contribute to increasing the level of digitization. The country is in last place (27) in the digital economy and society index. As a result, we have the digital infrastructure and human resources to make the necessary changes in this field.

Subsequently, e-government has evolved along with the facilities offered by technological acceleration, expressed through a comprehensive approach to the development of integrated government portals, the use of electronic signatures and the implementation of online voting systems, all with the aim of increasing transparency and accountability in public administration [3,4].

The concept of e-government is now evolving with the latest technological advances, aiming to streamline government services through the use of artificial intelligence, blockchain and the innovations they entail [5–7].

The academic literature analyzing public management emphasizes the crucial role that artificial intelligence can play in generating and sustaining good governance by harnessing technological advances and providing timely and efficient services to alleviate the lack of trust in public services [6]. Over the last few years, multiple studies have investigated the influence of the digital and technological process on the development of e-government, concluding that the focus should be on ensuring good transport infrastructure, improved services and adaptive leadership [8–11]. Study [7] shows that citizens want e-services and e-governance, emphasizing time efficiency. Study [9] shows that the implications of artificial intelligence and the development of an e-government framework would contribute to increasing the efficiency of public administration. Study [10] reinforces the need for e-government and the use of digital transformation to improve communication with citizens. Studies [12–14] emphasize the need to use artificial intelligence for a current framework in governance.

The objectives of the research derive from the analysis of the ways in which artificial intelligence can improve citizen engagement in government processes, the methodology applied being based upon the testing of the hypotheses established in the study, i.e., the validation of correlations between a series of variables revealed by the literature review. The study has implications for policy makers, technology developers, public institutions and social dialogue entities. This research advances the field of research by presenting the opportunity to implement AI in public institutions as support for increasing interaction with the citizen, being unique at the national level.

The questions this study aims to answer are as follows:

1. What are the challenges facing public administration in improving the relationship between citizens and elected officials?
2. How extensively has the concept of the virtual assistant in the public environment been studied to gain insights into its potential benefits for citizens?
3. Does the scientific literature cover citizen consciousness of the related benefits of AI technology?

The paper is structured in three parts. The first part of the research presents an evaluation of the specialized literature presenting the main aspects related to citizen-centric governance, artificial intelligence in interactive governance, the citizen's perspective on the use of artificial intelligence in governance processes, socio-economic drivers of confidence in using artificial intelligence and public awareness regarding the benefits of AI. The second part of the research presents the aspects related to the methodology and the research sample. The last part presents the results of the research and the discussions. The paper ends with conclusions and limitations of the research.

2. Literature Review

The active participation of citizens in the democratic processes is a necessary part of the development of contemporary governance strengthening the legitimacy of democracy.

Through interactive forms of governance, public administration stands a chance to compensate for the shortcomings of previous doctrines by bringing the citizens into the center of the democratic process instead of treating them as passive beneficiaries [8].

2.1. Citizen-Centric Governance

The academic literature has identified through numerous studies that technology is the central tool behind the transformation of local government, where citizens and communities stand at the center of attention, services are tailored to local needs and administrative organization is adapted to active information and involvement of the population, transforming passive beneficiaries of standardized services into active partners [9–11].

Given the tendency towards excessive bureaucracy as a traditional governmental practice, the integration of citizens and their active participation in decision-making processes is a challenge that can only be addressed through public policies, as well as the transformation of the traditional bases of governance [8]. The researchers stressed that a real involvement of citizens in governance is difficult but a failure in the coagulation of society and governance will certainly result in a significant decrease in the legitimacy of the administration, and thus in the confidence in its capacity for competence [15–17]. The active participation of the citizens in improving the conditions of society is essential to increase the degree of safety, security and well-being. As the research shows [12,18], the management of the government involves perspectives of the citizen.

2.2. Artificial Intelligence and Interactive Governance

Artificial intelligence (AI) has fundamentally changed the way governments interact with citizens, make decisions, and address societal challenges in interactive governance. This concept, which focuses on collaboration, participation, and responsiveness, has found a powerful ally in AI, reshaping the dynamics of policy making and public service delivery and aiming to engage diverse stakeholders in decision-making processes, promoting transparency and inclusiveness. AI acts as a catalyst in this endeavor, providing advanced analytical capabilities and processing vast amounts of data to extract actionable insights, while improving the quality of decision-making by providing decision-makers with comprehensive and real-time information about public sentiments, preferences and needs [12]. A pivotal area where AI has significantly influenced interactive governance is in enhancing citizen engagement and participation. Through AI-based platforms and tools, governments can interact with citizens in a more personal way, allowing them to voice their concerns, provide feedback and actively contribute to policy formulation. Chatbots, social media analytics and online forums equipped with AI algorithms facilitate dialogue, making government more accessible and responsive to the diverse needs of communities [18,19].

The ability of AI to optimize administrative processes is a significant achievement for interactive governance that reduces inefficiencies and allows public officials to focus more on strategic decision-making and citizen-centric initiatives.

However, integrating AI into interactive governance also raises important concerns, such as a number of ethical considerations related to data privacy, algorithmic bias and liability for misuse of technology [13,14,20]. Interactive governance involves active engagement, communication and cooperation among stakeholders, or, in this case, government entities and citizens. Given the research topic of this study, we have chosen to refer to the aspects related to artificial intelligence to maintain a balanced structure both in terms of theoretical and research components.

2.3. The Citizen's Perspective on the Use of Artificial Intelligence in Governance Processes

One of the most significant citizen perspectives on AI in administration is the hope that the technology will improve the efficiency and accessibility of public services, given that many citizens see in AI an enormous potential to streamline administrative processes, reduce bureaucracy and provide faster and more efficient services. Through automa-

tion and advanced data analysis, they have the hope to see a more agile and responsive administration, with faster responses and more precise solutions to current problems [21].

There are, however, a number of data protection and privacy concerns, as well as fears about how personal data are collected, stored and used by AI systems. Thus, transparency and ensuring that personal data are protected and used responsibly become key issues for acceptance and trust in these technologies [22].

Regarding concerns about the potential for discrimination or algorithmic bias in decisions made by AI systems, research shows that citizens are concerned that algorithms may perpetuate or amplify existing inequalities in society if not properly regulated and monitored. Thus, transparency in the operation of these algorithms and ensuring fairness in decisions are crucial issues for the acceptance of AI in administration from the citizen's perspective [23,24].

Another important issue is the level of involvement and trust that citizens have in the decision-making process regarding the implementation of AI, given that they want to be involved and consulted on the adoption and use of this technology in administration, thus ensuring that their interests and concerns are considered [25].

2.4. Socio-Economic Drivers of Confidence in Using Artificial Intelligence

Access and confidence in AI technology is closely linked to socio-economic disparities. Studies show that marginalized or under-resourced groups may perceive AI as inaccessible or threatening, and reducing these disparities and creating equitable access to the benefits of AI can help build stronger trust [26,27].

Analyzing differences in residential environments, researchers suggest that people living in urban areas are more trusting in technology and more likely to use chatbots to improve their quality of life. Considering issues such as digital literacy and education level, a number of studies identify higher levels of trust in AI-specific technology among people with a higher education [28–34].

People with a high level of education and extensive professional experience in technology fields may have a deeper and more detailed understanding of the potential and limitations of AI, demonstrating a tendency for greater confidence in the technology's ability to bring benefits and innovation. At the same time, in terms of professional experience, scientific literature has identified a correlation between occupational status and level of trust in governance. There is, thus, a tendency towards skepticism and passivity in relation to the pursuit of any form of active participation in the governance process, making the means of communication or integration of citizens in democratic practices dysfunctional [31–33].

Other socio-economic aspects, such as age group or average monthly household income, have been reported in some research studies to interfere both with the degree of interest in active participation in democratic processes and with the tendency to use AI-specific means of communication [35,36].

2.5. Public Awareness Regarding the Benefits of AI

Public awareness regarding the benefits of artificial intelligence (AI) is crucial in shaping perceptions and promoting acceptance of this transformative technology, with raising awareness of its benefits becoming essential as it continues to evolve and impact various aspects of our lives.

Challenges raised in public administration, such as improving road infrastructure, easing traffic congestion and increasing quality of life by reducing the time spent behind the wheel, are just some of the issues that seek to be addressed by the use of artificial intelligence in the field of transport, where studies show a high degree of confidence in the use of autonomous cars based on AI technology, given the obvious awareness of the benefits involved [37,38].

In healthcare, artificial intelligence-based diagnostics and predictive analytics are revolutionizing patient care. Artificial intelligence-based tools help with early disease

detection, personalized treatments and drug discovery, significantly advancing medical capabilities. Awareness of the benefits of using AI tools to access medical information has grown significantly in the post-pandemic period, while generating high interest and significant trust in mobile apps for informational or online healthcare access [39–42].

Education also gains from the benefits of artificial intelligence, providing personalized learning experiences tailored to individual needs. Another tool developed out of necessity during the COVID-19 pandemic has developed artificial intelligence platforms that adapt to students' learning styles, providing interactive and engaging educational content, thereby improving learning outcomes. Even after the period when learning was exclusively online, these platforms remained a frequently used tool, redefining traditional approaches to exams, academic conferences or school courses [42–49].

3. Materials and Methods

In order to achieve the proposed objectives, this article will explore emerging technologies that provide benefits to citizens to improve active participation and increase trust in public administration. Based on the available tools, this paper focuses on presenting relevant perspectives and identifying innovative strategies.

3.1. The Questionnaire

The methodology proposed in this research was shaped on the overview and trends in the use of virtual assistants aiming to build the research design. At this stage, the objectives were defined, the questions and hypotheses were formulated, and the optimal research instruments were identified, constructing the conceptual framework of the questionnaire intended to capture a series of multidimensional aspects. The next step involved collecting data from several batches of participants.

The data collection tool employed in this study was a Google Form survey, while the statistical analysis was conducted using SPSS (software-version 4.0) for data analysis, and the one-way ANOVA test, Kruskal–Wallis test, Spearman test, one-sample binomial test and one-sample Kolmogorov–Smirnov normal test were used for hypothesis testing.

Factor analysis was used to identify hidden patterns in the relationships between the datasets, and for the validity and reliability of the research tool, a Kaiser–Meyer–Olkin test and Bartlett's test of sphericity were performed, as shown in Table 1.

Table 1. Kaiser–Meyer–Olkin and Bartlett's test.

KMO and Bartlett's Test		
Kaiser-Meyer-Olkin Measure of Sampling Adequacy		0.815
Bartlett's Test of Sphericity	Approx. Chi-Square	2825.299
	df	66
	Sig.	0.000

The Kaiser–Meyer–Olkin index (0.815) indicates a good suitability of the data for factor analysis and suggests that the data collected are suitable for identifying and assessing underlying or latent factors. The Bartlett test value is 2825.299, and the associated significance (Sig) is 0.000, which means that the result is highly significant.

Interpretation of this result suggests that the data are suitable for factor analysis and that there is sufficient variability in the data to justify attempting to identify underlying or latent factors through factor analysis.

Using the principal component analysis method, 12 principal components were generated in Table 2, and According to Table 1, only the first three factors meet the selection criterion that the eigenvalues must be greater than or equal to 1.

The variance explained by each factor is distributed as follows: first factor, 30.783%; second factor, 15.031%; and third factor, 8.700%, the three factors explaining 54.514% of the variance analyzed.

Table 2. Total variance explained.

Component	Total Variance Explained								
	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	3.694	30.783	30.783	3.694	30.783	30.783	3.657	30.475	30.475
2	1.804	15.031	45.814	1.804	15.031	45.814	1.810	15.082	45.557
3	1.044	8.700	54.514	1.044	8.700	54.514	1.075	8.957	54.514
4	0.951	7.928	62.442						
5	0.931	7.756	70.198						
6	0.835	6.956	77.153						
7	0.749	6.244	83.398						
8	0.694	5.783	89.181						
9	0.597	4.972	94.152						
10	0.568	4.737	98.889						
11	0.090	0.752	99.641						
12	0.043	0.359	100.000						

In the last column in the table above, the values for the three factors are displayed but after applying the rotation procedure. In the same total variance (54.514%), a redistribution of variance can be observed and explained by each factor as follows: the first factor, 30.475%; the second factor, 15.082%; and the third factor, 8.957%.

As can be seen, using the rotation method, the first factor loses saturation in favor of the second factor and the third factor, respectively.

The component matrix shown in Table 3 provides the list of variables and their contribution to the loading of each of the selected factors in terms of correlation. The data in this table refer to the initial factor solution before application of the rotation procedure.

Table 3. Component matrix.

Component Matrix			
	Component		
	1	2	3
RESIDENTIAL	0.138	−0.661	−0.164
KNOWLEDGE	−0.219	−0.404	−0.110
COMFORT	0.666	−0.027	0.040
TRUST	0.671	0.011	−0.008
EDUCATION	−0.069	0.550	−0.216
EMPLOYMENT	−0.149	0.683	0.111
CONFIDENCE	0.957	0.060	−0.039
PARTICIPATION	0.200	0.038	0.622
INCOME	−0.036	0.643	0.055
ACCESSIBILITY	0.105	−0.091	0.736
EASINESS	0.928	0.065	−0.087
RELEVANCE	0.936	0.064	−0.058

The data shown in Table 4 contribute to establishing the factor structure of the variables analyzed. The first factor is constructed from the following variables: relevance (0.939), easiness (0.934), confidence (0.958), trust (0.668) and comfort (0.655). We will label this factor user perception. The second factor is constructed from the following variables: income (0.646) and employment (0.695). We will refer to this factor as economic welfare. The third factor is constructed from the participation (0.638) and accessibility (0.746) variables. We will call this factor civic engagement.

Table 4. Rotated component matrix.

Rotated Component Matrix			
	Component		
	1	2	3
RESIDENTIAL	0.109	−0.674	−0.124
KNOWLEDGE	−0.256	−0.384	0.101
COMFORT	0.655	−0.067	0.111
TRUST	0.668	−0.032	0.062
EDUCATION	−0.009	0.543	−0.242
EMPLOYMENT	−0.113	0.695	0.070
CONFIDENCE	0.958	−0.002	0.060
PARTICIPATION	0.137	0.052	0.638
INCOME	0.001	0.646	0.028
ACCESSIBILITY	0.021	−0.065	0.746
EASINESS	0.934	0.003	0.010
RELEVANCE	0.939	0.002	0.040

3.2. Sample and Recruitment of Participants

The study included 507 sets of respondents, as shown in Figure 1, among which the following age groups were identified: under 18—3.7% of the respondents, namely, 19 respondents; between 18 and 24 years old—27%, specifically, 137 respondents; between 25 and 34 years old, 80 respondents (15.7%); between 35 and 44 years old, 20.9% representing 106 respondents; between 45 and 55 years old, 93 respondents completed the survey (18.3%); 53 respondents belonged to the 55–64 age group and represented 10.4% of the respondents; and 3.9%, specifically, 20 respondents belonged to the 65+ age group. Citizens under the age of 18 were considered in this study because they constitute an age group with high access and understanding of AI technology, could intermediate the relationship with the public administration in helping older family members and, furthermore, represent the next generation of eligible voters.

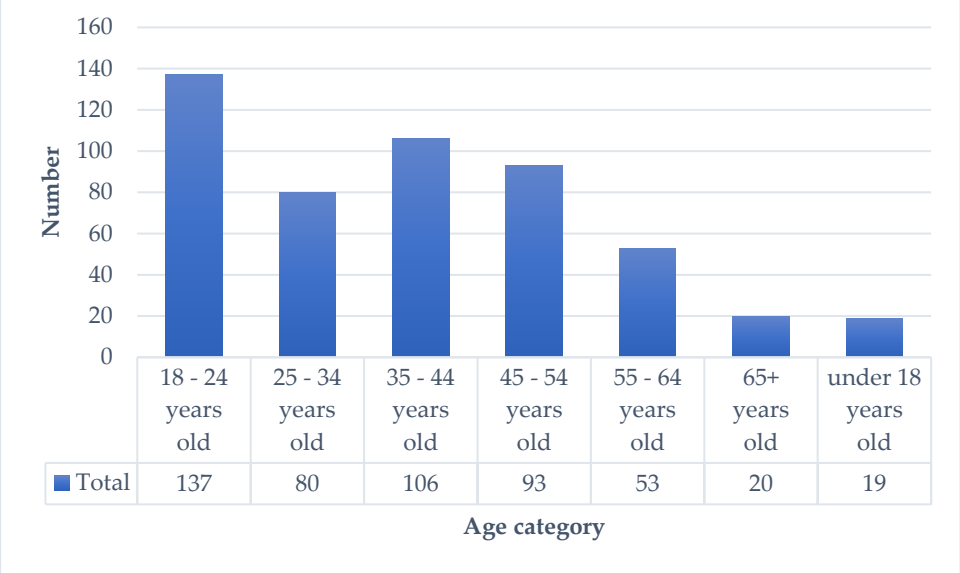

Figure 1. Distribution of respondents according to age.

The data analysis will provide insight into the development of AI culture in public administration towards improving relations with citizens and increasing their involvement in civic processes. Implications for educational interventions, the need for public policy

development and potential ways to promote the technology specific to virtual assistants in the context of good governance will be discussed.

4. Framework and Hypothesis

This paper explores the role of artificial intelligence in governance processes and provides public institutions with insight regarding the impact of integrating chatbot communication tools when interacting with citizens. The present research provides an analysis of the socio-economic factors that determine the use of artificial intelligence tools, i.e., the propensity to interact more with the public administration as a result of improved communication through virtual assistants. The conceptual framework presented in Figure 2 illustrates the reviewed literature and focuses on variables such as residential environment, age, employment status, household income and education level and how they impact the effectiveness of artificial intelligence in mediating citizen communication with government. The dependent variable is enhancing citizen engagement, which is the outcome of this model. The conceptual model explains how the variables discussed may interfere with citizen engagement by correlating to the tendency for using specific artificial intelligence tools.

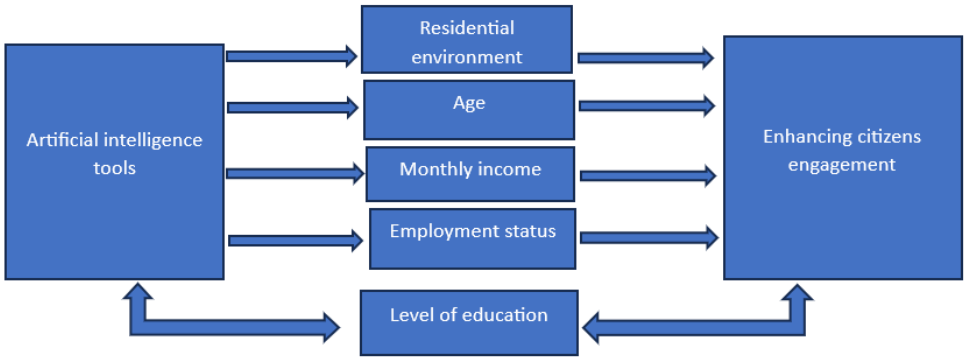

Figure 2. Conceptual model. Source: authors' conceptualization.

Consequently, the research hypotheses of the proposed model are as follows:

Hypothesis 1 (H1): *There is a significant correlation between the residential environment and the level of familiarity in using artificial intelligence tools when interacting with the public administration.*

Hypothesis 2 (H2): *Age is a determining factor when opting to use a virtual assistant in communicating with the public administration.*

Hypothesis 3 (H3): *The monthly household income positively influences the level of trust in using a virtual assistant in relation to public administration.*

Hypothesis 4 (H4): *Unemployment has a negative effect on trust in government, thus affecting the level of trust in using artificial intelligence tools when interacting with the public administration.*

Hypothesis 5 (H5): *Educational level influences the level of trust in the use of a virtual assistant in relation to public administration.*

5. Results

5.1. Hypothesis Testing

Similar to the results of previous studies, our research reveals a number of correlations between socio-economic aspects and the propensity to use artificial intelligence technology, specifically virtual assistants, as a means to communicate with the public administration. Statistics regarding the level of interest in artificial intelligence tools, the level of confidence in using them and familiarity with this technology were obtained by analyzing 507 sets

of responses in Statistical Package for the Social Sciences, which were correlated with the following parameters: level of education, residential environment, average monthly household income and occupational status.

Regarding the first hypothesis, related to the residential environment, the responses were processed through a descriptive analysis for the frequency of response and were recorded according to the results in Table 5.

Table 5. Residential environment of questionnaire respondents.

		Residential Environment			
		Frequency	**Percent**	**Valid Percent**	**Cumulative Percent**
Valid	rural	156	30.8	30.8	30.8
	urban	351	69.2	69.2	99.6
	Total	507	100.0	100.0	

As can be seen in the table above, two-thirds of the respondents are from the urban environment and only one-third of them live in rural areas. In order to analyze the existence of a correlation between the residential environment and the degree of familiarity with the specific artificial intelligence technology, we performed a Spearman correlation test, as shown in Table 6.

Table 6. Correlation between the residential environment and the familiarity with AI tools.

		Correlations		
			Environment	**Use of AI Tools**
Spearman's rho	Environment	Correlation Coefficient	1.000	−0.178
		Sig. (2-tailed)	0.0	0.000
		N	507	507
	Use of AI tools	Correlation Coefficient	−0.178	1.000
		Sig. (2-tailed)	0.000	0.0
		N	507	507

In order to test the influence of age on the predisposition to use AI tools in relation to public administration, we conducted a series of non-parametric tests, as shown in Tables 7–9 and in the figures below (Figures 3 and 4).

Table 7. Nonparametric tests concluded for testing the relationship between age and predisposition to use AI tools in relation to public administration.

Hypothesis Test Summary				
	Null Hypothesis	**Test**	**Sig.**	**Decision**
1	The categories defined by Comfort level in using a chatbot in the relationship with the public administration = comfortable and uncomfortable occur with probabilities 0.500 and 0.500.	One-Sample Binomial Test	0.000	Reject the null hypothesis
2	The distribution of Age group is normal with mean 3 and standard deviation 1.673	One-Sample Kolmogorov-Smirnov Test	0.000	Reject the null hypothesis

Table 8. One-sample binomial test summary conducted for testing the relationship between age and predisposition to use AI tools in relation to public administration.

One-Sample Kolmogorov-Smirnov Normal Test Summary		
Total N		507
Most Extreme Differences	Absolute	0.150
	Positive	0.150
	Negative	−0.120
Test Statistic		0.150
Asymptotic Sig.(2-sided test)		0.000

Table 9. One-sample Kolmogorov–Smirnov normal test summary conducted for testing the relationship between age and predisposition to use AI tools in relation to public administration.

One-Sample Binomial Test Summary	
Total N	507
Test Statistic	458.000
Standard Error	11.258
Standardized Test Statistic	18.120
Asymptotic Sig. (2-sided test)	0.000

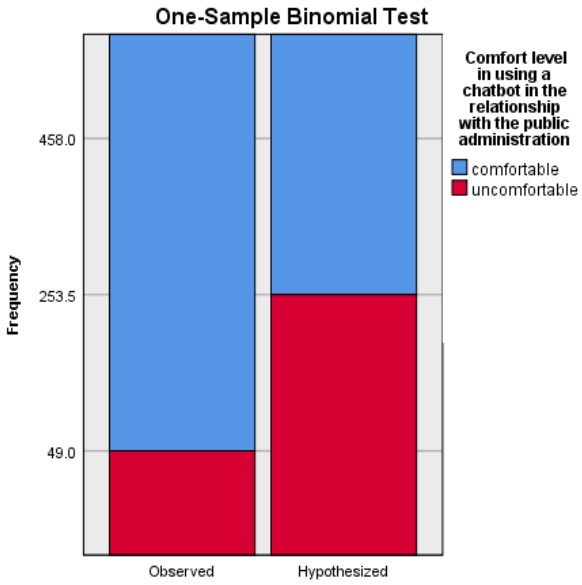

Figure 3. Distribution of the comfort level in using AI tools in the relationship with the public administration according to age. The gray color for the background of the figure highlights the chart values.

To test the relationship between the average monthly income per household and the level of trust in the use of AI tools in interactions with the public administration, in accordance with Hypothesis 3, we performed a one-way ANOVA test, the results of which are described in Tables 10 and 11.

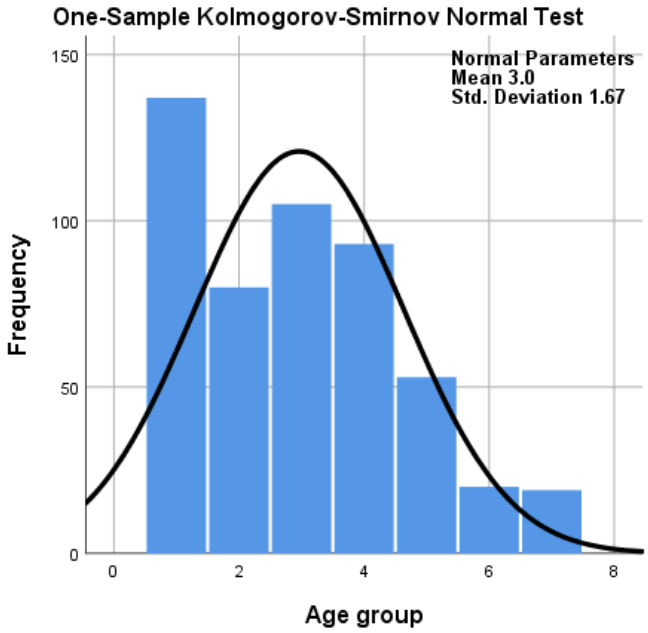

Figure 4. Distribution of the comfort level in using AI tools in the relationship with the public administration according to age.

Table 10. One-way ANOVA test summary.

Descriptives								
Average Monthly Household Income								
	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
					Lower Bound	Upper Bound		
Absolute trust	118	3.12	1.644	0.151	2.82	3.42	1	6
Average trust	158	2.94	1.492	0.119	2.70	3.17	1	6
Increased trust	174	3.14	1.516	0.115	2.92	3.37	1	6
Little trust	28	2.75	1.481	0.280	2.18	3.32	1	6
Zero trust	29	3.24	1.300	0.241	2.75	3.74	1	6
Total	507	3.06	1.525	0.068	2.92	3.19	1	6

Table 11. One-way ANOVA test results.

ANOVA Average Monthly Household Income					
	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	7.667	4	1.917	0.823	0.511
Within Groups	1169.674	502	2.330		
Total	1177.341	506			

To determine whether employment status influences the degree of trust in the use of AI tools in dealing with public administration, we conducted a one-way ANOVA test, the results of which are presented in Tables 12 and 13.

Table 12. One-way ANOVA Test Summary.

Descriptives Employment Status								
	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
					Lower Bound	Upper Bound		
Absolute trust	118	4.08	2.024	0.186	3.72	4.45	1	8
Average trust	158	4.71	2.082	0.166	4.38	5.04	1	8
Increased trust	174	4.08	2.053	0.156	3.77	4.39	1	8
Little trust	28	4.39	2.043	0.386	3.60	5.18	1	8
Zero trust	29	3.24	1.091	0.203	2.83	3.66	2	7
Total	507	4.25	2.040	0.091	4.07	4.42	1	8

Table 13. One-way ANOVA Test Results.

ANOVA Employment Status					
	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	71.559	4	17.890	4.414	0.002
Within Groups	2034.623	502	4.053		
Total	2106.181	506			

With the aim of analyzing the existence of a correlation between the level of education and the level of trust in the use of AI tools in relation to public administration, we performed a nonparametric Kruskal–Wallis test, the results of which are presented in Table 14 and Figure 5.

Table 14. Kruskal–Wallis test summary.

Hypothesis Test Summary				
	Null Hypothesis	Test	Sig.	Decision
1	The distribution of level of trust in using AI tools is the same across categories of education level	Independent Samples Kruskal−Wallis Test	0.044	Reject the null hypothesis

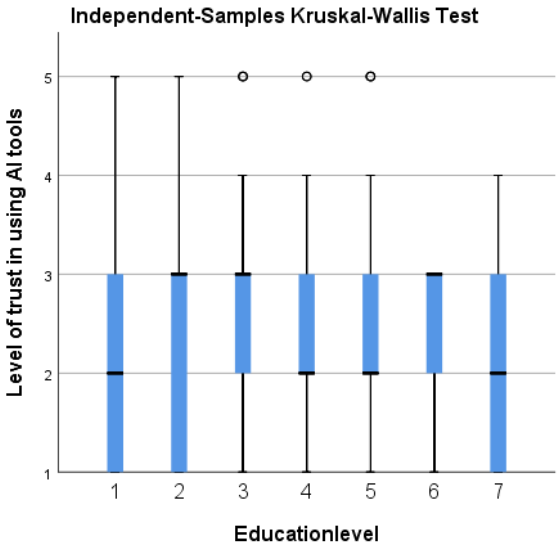

Figure 5. Distribution of the level of trust in using AI tools in the relationship with the public administration across education levels.

5.2. Hypothesis Verification Results

Table 15 summarizes the hypothesis testing performed in this research.

Table 15. Hypothesis verification results.

	Hypothesis	Keyword	Result	Conducted Test
H1	There is a significant correlation between the residential environment and the level of familiarity in using artificial intelligence tools when interacting with the public administration.	Environment Familiarity with AI tools	Validated hypothesis	Spearman Test
H2	Age is a determining factor when opting to use a virtual assistant in communicating with the public administration.	Age Comfort in using AI tools	Validated hypothesis	One-sample binomial test One-sample Kolmogorov–Smirnov normal test
H3	The monthly household income positively influences the level of trust in using a virtual assistant in relation to public administration.	Monthly income Level of trust in AI tools	Invalidated hypothesis	One-way ANOVA test
H4	Unemployment has a negative effect on trust in government, thus affecting the level of trust in using artificial intelligence tools when interacting with the public administration.	Employment status Level of trust in AI tools	Validated hypothesis	One-way ANOVA test
H5	Educational level influences the level of trust in the use of a virtual assistant in relation to public administration.	Level of trust in AI tools Education level	Validated hypothesis	Kruskal–Wallis Test

6. Discussion

In order to verify the first hypothesis, a Spearman correlation test was performed, demonstrating a significant correlation between residential environment and familiarity with AI tools. Considering the negative correlation resulting from the recorded responses, we can observe that the urban environment has a significant influence on the degree of familiarity with AI-specific technology. The results obtained complement studies [49–51] that motivate this aspect by easy access to the Internet and the higher degree of digitalization specific to the urban environment.

To test whether age has an impact on the choice of using an AI tool in communicating with the public administration, we conducted two nonparametric tests, as shown in Tables 3 and 4 and Figures 3 and 4. Observing the *p*-value of the two tests of 0.000, we can see that the results are highly significant. This result complements the literature [52,53], highlighting the importance of age in the use of AI-specific tools and the predisposition to use these tools for easy communication with the public administration.

Contrary to the previous studies identified [54,55], the results of our research invalidate hypothesis 3, demonstrating that the average monthly income per household does not have an impact on the level of trust given to AI tools in communicating with the public administration. The results of the ANOVA test, according to Table 7, indicate a *p*-value of 0.511, implying no significant correlation between the two variables tested.

The ANOVA test carried out in order to verify hypothesis 4, however, indicates a correlation between employment status and the level of trust in AI tools in communication with public administration, with a *p*-value of 0.002. This result complements the existing literature [33,54], attributing a lower level of trust in the case of non-employed respondents, often motivated by a lack of trust in governing authorities rather than technological progress.

The Kruskal–Wallis test was conducted to verify a correlation between the level of education and the level of trust in the use of AI tools in relation to public administration and validated the last hypothesis of the present research. According to Table 10, the *p*-value is 0.044, below the significance level of 0.050, thus demonstrating a different distribution of

the level of trust related to the type of education of the respondents, an analysis that we can also find in some other studies in the literature [54,55].

As shown in studies [9,10,12,18], the importance of using artificial intelligence is important for e-government. Research [18] shows that the use of digital transformation contributes to improving the relationship between the citizen and the public administration. As shown in research [9], the age of the citizen is important in overcoming the barriers in the use of technologies, especially artificial intelligence. Previous research has shown that the living environment contributes to influencing the use of AI in the citizen's communication with the public administration. Very few studies [20,21,32] have evaluated the impact of income on digital transformation. The current study claims that the average monthly income of the household does not influence the degree of confidence in the use of AI tools in the interaction with the public administration, but the level of education influences it, strengthening the presented argument.

7. Conclusions

7.1. General Conclusions

In a world in constant motion, time seems to be the most precious resource. Technological developments, applications, gadgets and tools that have emerged thanks to artificial intelligence manage to bring many benefits so that one can see an increase in the quality of life in terms of reducing operations or time lost due to the fulfillment of needs.

The ability of artificial intelligence to revolutionize various sectors of society poses challenges for a predominantly outdated public administration, so that recent years have demonstrated an openness of authorities to integrate specific AI technology into administrative processes.

This study highlights the determinants that contribute to the improvement of the relationship between citizens and public administration because of the use of specific artificial intelligence tools in the communication process. Thus, by analyzing and validating some relevant socio-economic aspects, a few conclusions can be drawn, as follows:

First, Romania is one of Europe's leading countries in terms of internet speed and territorial coverage. However, discrepancies between urban and rural areas exist, not in terms of ensuring an optimal connection but mainly for economic reasons. For artificial intelligence to be an effective tool for communicating with public administration, resources need to be identified so that access to technology and tools for widespread use in rural areas is not just a desideratum.

Secondly, taking into account that age has a considerable impact on the predisposition to use artificial intelligence technology, for the implementation of effective communication channels based on virtual assistants between the public administration and the citizens, a series of training programs and facilities for the acquisition of tools that allow this type of communication, as well as information campaigns on the benefits of this type of interaction are at least some of the solutions necessary to be implemented.

Last but not least, analyzing the observation that the average monthly household income does not influence the degree of trust in the use of AI tools in interacting with the public administration, but the educational level does impact it, reinforces the argument presented above, namely, the need to intensively promote the benefits of communication through such means.

In the context of sustainable development and efficient public administration, establishing a permanent dialogue between representative and citizen is one of the bridges that needs to be built. Artificial intelligence has the potential to enhance sustainability and contribute to a prosperous dialogue between citizens and public administration through better data analysis, significant quantitative knowledge input and not least by increasing the energy efficiency of economic and social activities, consequently reducing waste. The digitization approach must fit and respect the principles of sustainability. Sustainability implies social responsibility and its needs. If we increase the level of digitalization, the well-being and safety of citizens may be affected.

The integration of artificial intelligence tools in public administration can significantly improve the relationship between citizens and the government. This study highlights several key determinants for enhancing this relationship through the use of specific AI technologies in communication processes. To fully leverage the benefits, addressing internet infrastructure gaps, considering age-related factors, implementing educational programs and promoting the advantages of AI are crucial steps. The establishment of a continuous dialogue between citizens and public administration is seen as essential for achieving sustainable development goals.

7.2. Limitations and Future Research

The format of the research questionnaire and the tests used to validate the hypotheses have a number of limitations, as they were intended to validate the correlation between variables on a point-by-point basis, and tests of variance in different samples were not applied in the present research.

It is necessary in future research to cover a larger number of respondents so that we can observe whether socio-economic predispositions are consistent across a larger group. At the same time, a large study on the rural residential segment could answer a number of questions needed to improve the present study, questions that would highlight the reasons for reluctance or disinterest in AI tools.

A comparative analysis at the societal level considering occupational status and the degree of civic engagement could also improve the present research, so that the public policies needed to integrate citizens into the governmental process can be comprehensive across all segments.

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