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# A Quantitative Analysis on the Impact of Artificial Intelligence Solutions in Accounting and Audit

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## Abstract

*The purpose of this article is to highlight the role of technological, organizational and environmental contexts in the case of the implementation of Artificial Intelligence in the financial sector. As a methodology, the author used statistical tests applied to primary data collected by means of a questionnaire in the form of an online survey with firms that have accounting, financial audit and tax consulting activities. For the study, based on the analysis of specialized literature, seven corresponding hypotheses were developed for three research questions based for the purpose to find out if the implementation of solutions based on Artificial Intelligence is influenced by the technological, organizational and environmental context (TOE Framework, for short). The TOE Framework elements used in this paper are: technological readiness, IT infrastructure, relative advantage, organizational readiness, top management support, industry characteristics, and government regulations. The result of the study shows that artificial intelligence in the field of financial services is significantly influenced by: IT infrastructure, top management support, industrial characteristics, government regulations. The primary data used were collected from large accounting companies and Romanian SMEs.*

**Key words:** Technological-Organizational-Environmental Framework; accounting; audit; artificial intelligence;

**JEL Classification:** M40, M41, M42, M15

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## 1. Introduction

Artificial intelligence (AI) represents the ability of a system to understand external data, to learn from it, and to apply what it has learnt to solve different tasks (Zemánková, 2019). AI also represents the usage of big data together with Machine Learning (ML) to forecast the future based on the past data (Zhang et al., 2020). AI has the capability of executing human-like jobs by the ability to learn from their mistakes and to adapt to new input data. Using AI solutions, massive amounts of data can be analyzed by finding recognizable patterns in the data (Lee & Tajudeen, 2020).

AI has become popular in recent times when more and more companies started to implement these solutions. (Nam et al., 2020) AI solutions are considered smart enough to replace humans and to increase speed of working and data accuracy. In order to attain success companies need to overcome some barriers. AI is considered to be very expensive and risky to adopt because it is a new technology and managers lack the necessary skills and knowledge to implement it (Davenport and Ronanki, 2018). Besides this AI can have also negative consequences for the society as totally replacing jobs and increase in unemployment (Belanche et al., 2019). AI implementation requires prepared people having the necessary knowledge to implement these solutions in order for these solutions to be able further to learn and make its own right decisions (Tussyadiah, 2020).

Fourth Industrial Revolution has AI as a key technology because AI is changing the way we do things (Na et al., 2022).

*In banking* is offering an easier and faster way of taking a credit or doing other transactions using a smartphone. AI is offering to banks the opportunity of doing more precise analysis and to raise operational and management levels of data analysis and underwriting which can lead to increased sales and profit. Banks have always been leaders when it comes to new technology implementation which can improve the business and to increase sales, profit, productivity and give them a competitive advantage (Mohammad et al., 2022; Mansour et al., 2015; Kulkarni et al., 2020; Mohammad et al., 2020).

*In audit*, AI is reducing considerably the number of repetitive tasks, is reducing fraud by intelligent fraud detection and is taking all the information into account for analysis not only a sample as it was done before AI (Siew et al., 2019; Bambang et al., 2021).

*In accounting*, is retrieving data from printed documents using technologies such as visual character recognition (OCR) or intelligent document processing (IDP) and entering them directly into accounting software reduces repetitive activities. It also generates several financial reports which helps the accountants to become financial specialist and to support their clients in different business decisions as expanding the business by merging and acquisition for example (Sutton et al., 2016).

This article has four parts: the literature review – which presents also the hypothesis of this study based on the results from scientific literature; methodology, results and discussions on the tests on data collected, and conclusions.

In this research the following elements were studied: available solutions on the market, complexity of the solutions, interdepartmental collaboration, company existing resources (labor, financial, technological), strategy, management support, employees' development, resources allocation, job stability, communication, organizational size, cyber security, industry pressure, customer readiness, legislation stability, knowledge and information, resistance to change, AI advantages. The novelty of the study consists in the multitude of elements of TOE framework which offers us a clearer image when it comes to AI implementation solutions in financial sector.

## 2. Literature review

The term "Artificial Intelligence" (AI) refers to the technologies that make machines to be "intelligent". AI solutions use automation to replicate human intelligence with the goal of improving the analyzing and decision-making abilities of machines. It enables complicated and time-consuming tasks to be completed in a more effective and efficient manner. AI serves as a catalyst in various industries for internal structural transformation and provides managers with tools that facilitate the decision-making process (Hassan, 2022).

### 2.1. Advantages of AI solutions

AI solutions will increase the efficiency and effectiveness of the company because of its ability to perform the activities faster and also with fewer errors. On long run will help companies to register a cost saving. Employees will have the opportunity to perform less repetitive tasks. AI solutions will increase efficiency, effectiveness, and data

accuracy (Khazode et al., 2020). In the decision-making process AI solutions can bring real value because is automatically generate reports which can be used by financial specialists to make better decisions and also to become consultants for their clients helping them to take more informed business decisions (Bahalerao et al., 2022). Even if the advantages of AI solutions are known there is no known research on the influence of AI advantages on the level of AI solutions implementation.

### 2.2. Limiting factors of AI solutions

In the short term the costs of Ai implementation are high, but in the long term it will be a cost reduction. There is a risk of completely reducing the number of conventional jobs and that the employees will not be able to adapt to the new technology, so the level of unemployment will increase at national level (Stancheva, 2018). AI solutions need implementation and constant maintenance and there is a risk for financial employees of not having at least minimal skills in this regard. In the beginning there is a high cost of development and not all the companies have access to the necessary financial resources (Khazode,

2020). Even if the limiting factors od AI solutions implementation are known there is no known research which study their impact on the level of AI implementation.

### 2.3. Theoretical foundations on the implementation of AI solutions in the financial sector

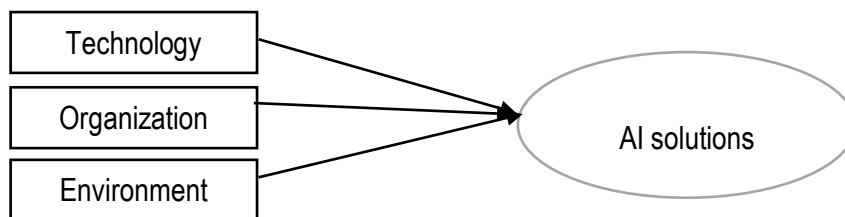
Developed for the first time by Tornatzky et. al. (1990), the Technology-Organization- Environment (TOE) Framework has the purpose of illustrating the external and internal factors involved in the process of technological innovation (*Figure no.1*).

The technological context is represented by the available technology in a company and also from the service providers.

The organizational context is represented by company's characteristics which can influence the level of technology implementation such as: managerial structures, firm size, communication, decision making.

The environmental context is represented by the industry structure which includes: competitors, customers, suppliers, regulatory environment.

**Figure no. 1. TOE Framework for AI solutions**



Source: Authors' representation based on TOE Framework

Table no. 1 contains the most relevant papers on the AI implementation in financial sector. These papers do not use TOE framework but on the implementation process the author was able to find elements which corresponds to

TOE framework. In this way we are able to understand which are the most important factors of this framework which are taken into consideration when a company decides to implement AI solutions.

**Table no. 1. Summary of factors for AI solutions implementation in the financial sector**

Authors	Main context	Main factors
Hassan (2022)	Literature review	1) Employee skills and Cyber security risks 2) Management support 3) Frequent changes in the regulations
Zhang et. al. (2020)	Case studies	1) The Big Four companies are using AI for repetitive activities; There are enough AI solutions; Compatibility, complexity 2) Accounting jobs will disappear 3) There is a need for programming and analysis skills

Authors	Main context	Main factors
Chukwudi et.al. (2020)	Questionnaire	1) In the market and in organizations, there are enough AI solutions. 2) Employees will evolve from data entry roles to audit roles 3) The competition is strong
Ucoglu (2020)	Content analysis	1) The Big Four companies offer enough AI solutions for audit 2) Managers understood the benefits. Every year, they employ less people for entry-level roles 3) There is a thought competition in between Big Four companies
Mohammad (2020)	Qualitative analysis of documents	1) AI can help with cybersecurity: fraud detection, botnet detection. 2) Hackers can use AI to develop their own software
Ukpong et.al. (2019)	Questionnaire	1) Technology readiness, 2) AI perceived benefits, company size 3) Competitive pressure
Stancheva-Todorova (2018)	Literature review	1) Benefits and challenges 2) AI solutions are taking the decision-making process. Changes in the accounting roles 3) Necessity of government implication to stabilize the AI level of implementation
Huang (2018)	Literature review	1) AI solutions characteristics 2) Work-life balance 3) Jobs replacements

Source: Author's representation based on literature review

There are also several researches using TOE framework on AI solutions implementation in: construction (Na et al., 2022), human resource management (Pillai et al., 2020; Pan et al., 2021), telecom (Chen, 2019; Chen, 2020), healthcare (Yang et al., 2022), more industries (Alsheiabni et al., 2019; Alsheiabni et al., 2020; Van, 2022), banking (Mohamed, 2020; Mohammad, 2022; Mansour, 2015; Mugdha, 2020), audit (Siew, 2019; Handoko, 2021; Rosli, 2016; Widuri, 2016), financial services (Zhu, 2015). The study made by Zhu on financial services is applied to 409 respondents and is taking into consideration the following elements of TOE framework: knowledge, trust, cost effectiveness, relative

advantage, department readiness, top management support.

But besides these elements TOE framework has more elements which needs to be taken into consideration when a company decides to implement AI solutions this is why this article was written. The scope of this article is to make a more complex analysis of AI solutions implementation in financial sector.

A comprehensive list of elements of the TOE framework in AI implementation success factors is to be found in a literature review by Hamm and Klesel (2021) and contains the elements presented in **Table no. 2**.

Technological context	Organizational context	Environmental context
<ul style="list-style-type: none"> <li>- Compatibility/ IT infrastructure</li> <li>- Relative advantage</li> <li>- Availability and quality of data</li> <li>- Tool availability</li> <li>- Identified business needs</li> <li>- Security/reliability</li> <li>- Complexity</li> <li>- Perceived barriers</li> <li>- Generalizability/ scalability</li> <li>- Technology management</li> <li>- Satisfaction with existing systems</li> <li>- Technology readiness</li> </ul>	<ul style="list-style-type: none"> <li>- Top management support</li> <li>- Technical competencies</li> <li>- Resources</li> <li>- Organizational size</li> <li>- Organizational structures</li> <li>- Strategy</li> <li>- Organizational readiness</li> <li>- Culture</li> <li>- Organizational innovativeness</li> <li>- Interdisciplinary collaboration</li> <li>- Perceived financial costs</li> <li>- Organizational secrecy policies</li> <li>- Knowledge and information</li> </ul>	<ul style="list-style-type: none"> <li>- Competitive/ industry pressure</li> <li>- Governmental regulations</li> <li>- Customer readiness</li> <li>- Trust</li> <li>- Industry requirements/ characteristics</li> <li>- External partner/ trading partners</li> <li>- Perceived governmental pressure</li> <li>- Perceived pressure from society</li> <li>- Access to external expertise</li> <li>- Public funding</li> <li>- Customer and community support</li> </ul>

Source: Hamm et Klesel (2021)

## 2.4. Factors affecting the AI solutions adaptation in financial sector

Factor which influences the level of AI implementation are: technological context, organizational context, environmental context.

### 2.4.1. Technological context

The concept of technological context refers to the existing technology available. It is divided into: the internal technological context, which refers to the technological resources in the company, and the external technological context, which refers to the technologies offered by technology companies. Routine activities such as accounts payable and receivable, risk assessment, and preparation of expense reports can be easily performed using machine learning (Ucoglu, 2020). There are enough solutions on the market for accounting and audit. The technological companies are offering a large list of AI solutions such as: Nuance, Cortana, Alexa, AlphaSense, Kenso, Skymind, IBM Watson, Clarify, Accenture myWizard, Microsoft Cognitive Services. Beside this Big Four companies are also offering AI solutions for accounting and audit (Zhang et al., 2020).

In our study we choose for technological context the following elements: technological readiness, IT infrastructure and relative advantage (Widuri, 2016). In the studies conducted by other researchers about the TOE Framework in financial services, but also in other fields of activity, these elements of the technological context had a positive impact on the level of AI implementation. Also, these are the most common elements of the TOE framework in the studies carried out so far (Rosli et al., 2013; Handoko et al., 2021; Chatterjee et al., 2021; Chen et al., 2021; Ikumoro et al., 2019; Huang et al., 2018; Akter et al., 2022).

The research question that emerges from the literature review is:

**RQ1: To what extent the level of AI implementation in financial sector is dependable on the technological context?**

*The hypotheses of the study, which emerge from the literature review:*

**H1: The level of AI implementation in the financial sector is positively dependent on the technological readiness.**

**H2: The level of AI implementation in the financial sector is positively dependent on the IT infrastructure.**

**H3: The level of AI implementation in the financial sector is positively dependent on the relative advantage.**

### 2.4.2. Organizational context

Organizational context refers to the firm characteristics which have a significant influence on AI solutions implementation such as: human resources, technological readiness, size of the company, staff knowledge, etc. There is a part of research which believe AI will bring enormous advantages to the accounting profession but another part considers that the accountants might not be able to adapt to the new technology. Direct effects of AI solution on accounting roles are: labor substitution, increased productivity, lower prices, the technology providers will need a higher number of employees. For employees on the accounting field there will be the following changes: they need to develop new skills, they will perform new tasks and have new roles, there will be a task displacement and they will need education and training (Stancheva, 2018).

For the organizational context, we chose the following elements that will be tested to validate hypotheses H4 and H5: organizational training and top management support (Baker, 2011).

In the studies conducted by other researchers about the TOE Framework in financial services, but also in other fields of activity, these elements of the organizational context had a positive impact on the level of AI implementation. Also, these are the most common elements of the TOE framework in the studies carried out so far (Rosli et al., 2013; Handoko et al., 2021; Chatterjee et al., 2021; Chen et al., 2021; Ikumoro et al., 2019; Huang et al., 2018; Akter et al., 2022).

The research question that emerges from the literature review is:

**RQ2: To what extent is the level of AI implementation in the financial sector reliable in the organizational context?**

*The hypotheses of the study, which emerge from the literature review:*

**H4: The level of AI implementation in the financial sector is positively dependent on the organizational readiness.**

**H5:** The level of AI implementation in the financial sector is positively dependent on the top management support.

### 2.4.3. Environmental context

The environmental context refers to industrial characteristics and governmental regulations. The jobs in financial field will be replaced by AI solutions, at least the ones which implied repetitive activities. There will be an increased demand for a technological workforce (Zhang et al., 2020; Huang, 2018).

Competition is already implementing AI solutions and they have an increased working capacity and this represents for companies which does not implement AI solutions already a risk of losing their clients (Ukpong, 2019). Governmental regulations which are on a continuous change may affect the peace of AI implementation. According to studies conducted so far, the government can slow down the pace of implementing AI solutions if legislation is constantly changing. They may also have no effect or may encourage the implementation of AI solutions through incentives offered to companies that implement them (Siew et al., 2020; Ahmi et al., 2014; Rosli et al., 2012; Na et al., 2022).

For Environmental context we choose: industrial characteristics and governmental regulations (Baker, 2011). In the studies conducted by other researchers about the TOE Framework in financial services but also in other fields of activity, these elements of the environmental context had a positive impact on the level of AI implementation. Also, these are the most common elements of the TOE framework in the studies carried out so far (Rosli et al., 2013; Handoko et al., 2021; Chatterjee et al., 2021; Chen et al., 2021; Ikumoro et al., 2019; Huang et al., 2018; Akter et al., 2022).

The research question that emerges from the literature review is:

**RQ3: To what extent is the level of AI implementation in the financial sector dependable in the environmental context?**

The hypotheses of the study, which emerge from the literature review:

**H6:** The level of AI implementation is positively dependable on the industrial characteristics.

**H7:** The level of AI implementation is positively dependable on the governmental regulations.

## 3. Research methodology

### Positivism approach

For this research we have used the positivism approach. For data collection there are various methods such as: questionnaire, observations, interviews, project techniques. In positivism we need to use methods for data collection which are assessable, significant, and observable. Data collection needs to be quantifiable and accurate and to be based on statistical analysis (Kaboub, 2008).

### Quantitative methods

For this article, we used quantitative methods because they are more accurate and realistic. Using this method, we were able to collect a large amount of data, which is a highly subjective method.

### Target population and sampling

Using a survey, we want to do a quantitative study to measure the impact of technological, organizational, and environmental contexts of the level of AI implementation in the financial sector. At a 95% confidence level and 5% margin of error for a population of 11533 companies in Romania a representative sample is 372 respondents from financial sector (Hajian, 2011). We target mainly the big and SMEs based on the number of employees and turnover, and based on that the sample is adjusted to 132 companies (**Appendix 1**). We received 110 responses to the survey, the response rate is 83%, which is satisfactory to make the results relevant.

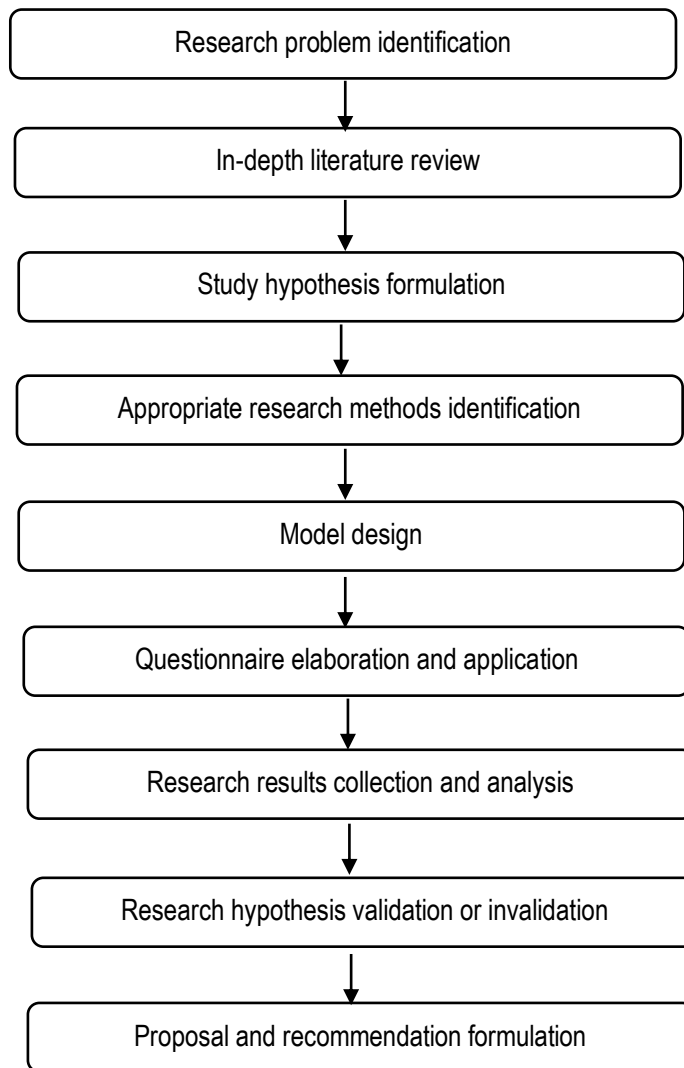
### Instrument development and validation

In order to collect primary data, it has been used as research instrument a survey. In this study two types of data: primary and secondary data. Secondary data are represented by scientific articles from the following databases: Elsevier, Emerald, Google Academics.

*Primary data* represents the data we collect for the first time and is an essential element for studies.

In **Figure no. 2** we can see the steps taken to carry out this research.

**Figure no. 2. Research methodology design**



Source: Author' representation

**The population of interest**

We applied this survey on Google Forms. The respondents we wanted to have are representatives of big and small and medium enterprises (SMEs) because in these types of companies the representatives have access to financial resources to implement AI solutions (OECDLibrary).

We have sent by e-mail the survey and after two weeks we come back with a reminder. We have 110

respondents, representing big companies and small and medium enterprises (SMEs).

The survey has six parts: the first one is related to demographics information of the respondents, the second one is for the technological context, the third is for organizational context, the fourth is for environmental context.

The hypothesis for this article is explained in the literature review based on the collected information from scientific articles.

## 4. Results and discussions

After gathering the necessary data, we needed to perform an accurate analysis. In order to be sure that the data is analyzed in an accurate manner we decided to use SPSS which is widely used in data analysis and interpretation. In terms of age category, 49% are respondents over 40 years old. In terms of

education level, the majority, over 70%, have completed master's programs. The majority of respondents work for companies with 10-50 employees, at 84%. The respondents are 58% women. The predominant work experience among the respondents, with a proportion of 51%, is over 16 years. 95% of the companies are private Romanians. These data are presented in detail in **Table no. 3**.

**Table no. 3. Dataset demographics**

Variable	Category	Responses	Responses in %
Age	Between 20-25 years	3	3%
	Between 26-30 years	23	21%
	Between 32-35 years	10	9%
	Between 36-40 years	20	18%
	Over 40 years	54	49%
Education level	Faculty	16	15%
	Master	80	73%
	PhD. studies	14	13%
Company's number of employees	Between 11-50	92	84%
	Between 51-250	16	15%
	Between 250-500	2	2%
Gender	Feminine	64	58%
	Masculine	46	42%
Experience in financial sector	Less than 5 years	18	16%
	Between 5-10 years	20	18%
	Between 11-15	16	15%
	Over 16 years	56	51%
Company type	Big Four	4	4%
	Romanian private company	104	95%
	Romanian public company	2	2%

Source: Author' representation

In **Table no. 4** we have grouped the questionnaire items by the TOE Framework items, which also represent the quiz questions. The elements of each context chosen based on the study of the specialized literature are

represented by questions formulated using the Linkert scale in which the questionnaire participants could choose values from 1 to 5, 1 meaning total disagreement, and 5 – total agreement.

**Table no. 4. Success factors for AI implementation in financial sector**

A. Technological context
<b>A1. Technological readiness</b>
There are enough AI solutions on the market for financial sector?
Technological service vendors as capable of personalizing the AI solutions?
Technological service vendors are able to offer maintenance and constant support for the AI solutions?
<b>A2. IT infrastructure</b>
In your company there is enough IT infrastructure to support AI solutions?
In your company there are enough resources to develop AI solutions?



<b>A. Technological context</b>
Your company is highly digitalized?
Your company is using cloud computing?
Your company is automatized by using solutions such as: SAGA, Ciel, SAP?
Your company is using AI?
<b>A3. Relative advantage</b>
AI solutions reduce data processing time?
AI solutions increase efficiency?
AI solutions increase data accuracy?
In the long term, AI solutions lead to a reduction in implementation costs?
AI solutions take repetitive tasks away from employees, leaving them with more time for other activities?
<b>B. Organizational context</b>
<b>B1. Top management support</b>
Mangers in your company are assuring employee training, and knowledge transfer?
In your company top management invest in people technological skills?
In your company top management allocate enough budget for AI implementation?
In your company top management allocate the necessary support for AI implementation?
<b>B2. Organizational readiness</b>
In your company employees are ready for AI solutions implementation?
In your company is an effective communication regarding AI solutions implementation?
Your company has a clear goal and objectives regarding AI solutions implementation?
In your company there is a threat of job loss due to AI solutions?
Limited access to the financial resources prevents companies from implementing AI solutions?
Lack of minimal implementation and maintenance skills of employees are a limiting factor for AI solutions?
Resistance to change at the organizational level hinders the implementation of AI?
<b>C. Environmental context</b>
<b>C1. Industrial characteristics</b>
Competitors are already implementing AI-based solutions?
Customers are asking the company to use AI-based solutions?
<b>C2. Governmental regulations</b>
Legislative instability slows the implementation of AI solutions?

Source: Author' representation

The hypothesis for this article is explained in the literature review based on the collected information from scientific articles.

We consider the level of AI implementation in financial sector (AIFS) as a dependent variable on a linear regression model, technological, organizational, and environmental contexts being general determinant factors for AI implementation.

Linear regression models were also used to measure the impact of digitalization and ERP on accounting sector of activity (Stoica et.al., 2021; Barna et. al. 2021). Based on

the previous studies carried out to analyze the way in which various technological solutions are implemented, we created a statistical model in the form of a multiple linear regression.

The model tested for this article consists of the elements used in the questionnaire as in **Table no. 4**, which in this model are represented by independent variables:

$$AIFS = \beta_0 + \beta_1*TR + \beta_2*ITC + \beta_3*RA + \beta_4*OR + \beta_5*TMS+ \beta_6*IC+ \beta_7GR + \epsilon \tag{1}$$

The meaning of the terms in the statistical model is explained in **Table no. 5**.

**Table no. 5. Acronyms for the studied variables**

Variable	Code	Variable type
AI implementation in financial sector	AIFS	Dependent
Technological readiness	TR	Independent
IT infrastructure	ITI	Independent
Relative advantage	RA	Independent
Organizational readiness	OR	Independent
Top management support	TMS	
Industrial characteristics	IC	Independent
Governmental regulations	GR	
$\beta_i$		Parameter
$\epsilon$		Errors

Source: Author' representation

*Technological preparation* refers to the technology available on the market as well as to the technologies already used in financial companies.

*IT infrastructure* refers to the technologies available in companies that want to implement AI solutions.

*Relative advantage* refers to the level of added value that a new technology provides to the companies that adopt it compared to the other technology solutions they have implemented.

*Organizational readiness* refers to an organization's ability to adapt to the adoption of new technologies.

*Top management support* represents the level of involvement of top management in projects to adopt AI solutions through budget allocation and staff training.

*Industrial characteristics* are represented by the factors that influence a company to implement AI solutions, such as: competitors, customers, employees.

*Government regulations* are represented by the legislation in force, which can influence the level of implementation of AI solutions in a positive or negative way.

In order to assure the validity and reliability of the data, the following tests have been conducted: normality of data, Pearson correlation, descriptive statistics, reliability test Cronbach' alpha, ANOVA and regression.

### **Normality of data**

Values between -2 and 2 for skewness and kurtosis are considered acceptable (George & Mallery, 2019).

The indicators Skewness and Kurtosis in **Table no. 6** are in an acceptable range, between -2 and +2.

**Table no. 6. Skewness and Kurtosis – Normality of data**

Variable	Kurtosis	Skewness
Technological readiness	0.15	-0.60
IT infrastructure	-0.51	0.00
Relative advantage	1.18	-1.32
To management support	-0.84	-0.28
Organizational readiness	-0.81	-0.05
Industrial characteristics	-1.27	-0.25
Governmental regulations	-0.76	-0.67

Source: Author' representation

### **Pearson correlation**

Pearson correlation method is used for numerical variables having values between -1 and 1, and zero is no correlation, -1 is negative correlation and 1 is positive correlation. In our case where the correlation values are over 0.5, we have a strong and positive relationship between the variables: technological readiness, IT infrastructure, top management support, organizational readiness, industrial characteristics and governmental regulations. In case of the correlation values are smaller than 0.5 we have a moderate and positive correlation as it is in the case of relative advantage.

**Table no. 7. Pearson correlation between the dependent variable and the independent variables**

	AIFS	TR	ITI	RA	OR	TMS	IC	GR
AIFS	1.00							
TR	0.53	1.00						
ITI	0.62	0.60	1.00					
RA	0.35	0.35	0.30	1.00				
OR	0.77	0.66	0.71	0.41	1.00			
TMS	0.67	0.63	0.69	0.47	0.82	1.00		
IC	0.72	0.49	0.46	0.33	0.73	0.72	1.00	
GR	0.54	0.28	0.30	0.31	0.42	0.44	0.69	1.00

Correlations between all model variables were also calculated, as seen in **Table no. 7**. At  $p < 0.01$  we can see a positive correlation between them.

**Descriptive statistics**

In **Table no. 8** we can see the descriptive statistics of the main categories of influencing factors of AI implementation factors. As we can see the highest value is for relative advantage followed by IT infrastructure and governmental regulations. We can see looking at the mean that the data follow a symmetrical distribution. Min and Max show us

Source: Author' representation where the data falls. We can see min as being 1 or 2 which means that the company does not use AI solutions and Max being 5 which means that the company is using AI solutions. Being a new technology, this difference is normal. Companies have access to AI technologies because technological companies offer these solutions but not all the accounting companies have the ability of using them.

Standard deviation has the role of measuring the amount of variation or in other cases the dispersion of a set of values. Accepted values are in between 0 and 1. We have a high value for standard deviation, meaning that the data are spread out over a wider range.

**Table no. 8. Descriptive statistics on sections**

Variable	Min	Max	Mean	Std. Deviation
Technological readiness	1	5	3.68	0.97
IT infrastructure	2	5	3.97	0.68
Relative advantage	2	5	4.53	0.66
Top management support	1	5	3.63	1.00
Organizational readiness	1	5	3.66	0.87
Industrial characteristics	1	5	3.53	0.95
Governmental regulations	2	5	3.83	0.83

Source: Author' representation

**Factor analysis**

There it has been used the Cronbach's alpha test to measure the level of internal consistency of our model. Because we used survey, we decided to use Likert Scale because it helped us to see better ways in which success can be guaranteed. An acceptable degree of reliability in the construct has a cut-off point of 0.70 on the alpha's value (Hair et al., 1998). This questionnaire contains five main categories with

between three and nine items which analyze the success factors for AI implementation. We decided to use Cronbach's alpha test to see if our collection of items is measuring the same characteristics consistently. This test quantifies on a standardized 0-1 scale the level of agreement. Higher agreement between items is indicated by higher values and it means that the response values for every participant on the questions are consistent. The results of factor analysis are shown in **Table no. 9**.

**Table no. 9. Factor analysis results**

Variable	Number of items	Cronbach's alpha
Evaluating the influence of technological readiness on AI level of implementation	3	0.95
Evaluating the influence of IT infrastructure on AI level of implementation	6	0.78
Evaluating the influence of relative advantage on AI level of implementation	5	0.96
Evaluating the influence of top management support on AI level of implementation	4	0.94
Evaluating the influence of organizational readiness on AI level of implementation	7	0.89
Evaluating the influence of industrial characteristics on AI level of implementation & evaluating the influence of governmental regulations on AI level of implementation	3	0.90

Source: Author' representation

A value in between 0.7 and 0.9 is considered good and we have the case of the variables: IT infrastructure organizational readiness.

A value in over 0.9 is considered to be excellent and we have the case of the variables: technological readiness, relative advantage, top management support, industrial characteristics and governmental regulations.

These results support the fact that the response values for every participant on the questions are consistent.

#### **ANOVA test**

Using the ANOVA test from **Table no.10** we can conclude that the model is valid because p-value is less than 0.05 for all the hypotheses.

**Table no. 10. ANOVA Test**

Source of Variation	SS	df	MS	F	P-value	F crit
Between Groups	512.03	27.00	18.96	18.18	<b>0.00</b>	1.49
Within Groups	3184.09	3052.00	1.04			
Total	3696.12	3079.00				

Source: Author' representation

R square shows us how well the regression model explains the observed data. In our case, according to

**Table no. 11**, is 67%, meaning that the R square is significant for our model.

**Table no. 11. Regression statistics**

<b>Regression Statistics</b>	
Multiple R	0.82
R Square	0.67
Adjusted R Square	0.65
Standard Error	0.00
Observations	110

Source: Author, representation

In **Table no. 12** we can see the p value for each hypothesis and the coefficients. For p values less than 0.05 we can

accept the hypothesis and for the p values higher than 0.05 we can reject the hypothesis.

**Table no.12. Regression statistics coefficients and p value**

	<b>Coefficients</b>	<b>Standard Error</b>	<b>P-value</b>
Intercept	-0.93	0.59	0.11
Technological readiness	0.00	0.10	0.97
IT infrastructure	<b>0.35</b>	0.16	<b>0.03</b>
Relative advantage	0.02	0.12	0.85
Top management support	<b>0.52</b>	0.14	<b>0.00</b>
Organizational readiness	-0.14	0.16	0.39
Industrial characteristics	<b>0.27</b>	0.12	<b>0.03</b>
Governmental regulations	<b>0.18</b>	0.09	<b>0.02</b>

Source: Author representation

Having the p-value lower than 0.05 we can accept the following hypotheses which are validated:

**H2:** The level of AI implementation in the financial sector is positively dependent on the IT infrastructure.

**H5:** The level of AI implementation in the financial sector is positively dependent on the top management support.

**H6:** The level of AI implementation is positively dependable on the industrial characteristics.

**H7:** The level of AI implementation is positively dependable on the governmental regulations.

Being validated these hypotheses, our model is the following:

$$AIFS = 0.35*ITI + 0.52*TMS + 0.28*IC + 0.18*GR + \epsilon \quad (2)$$

Where:

AIFS – Artificial Intelligence in financial sector

ITI – IT infrastructure

TMS – Top management support

IC – Industrial characteristics

GR – Governmental regulations

In Romanian big companies and SMEs, AI implementation level depends, from the tested variables, on: IT infrastructure, top management support, industrial characteristics, governmental regulations.

*IT infrastructure* refers to the existing infrastructure in a company and the technological solutions used. As we can see AI solutions implementation is positively dependable on ITC which means that when the level of ITC of the company increases by 1 unit, AI implementation level increases by 0.35.

*Top management support* refers to the ability of top management of using the company resources (financial,

labor force, existing technology) to assure a proper AI implementation process. As we can see the level of AI implementation in the financial sector is positively dependent on the top management support. When TMS increase with 1-unit AIFS increases with 0.52.

*Industrial characteristics* refers to technological service providers ability of offering the needed solutions, competition ability of implementing AI solutions, client's willingness to work with AI solutions, available resources on the market. Also, the level of AI implementation is positively dependable on the industrial characteristics. When IC increases with 1-unit AIFS increase with 0.28.

*Governmental regulations* were considered an impediment due to continuous legislative changes but during and after pandemic crisis it started to be a stimulating factor which encourage companies to implement AI. The level of AI implementation is positively dependable on the governmental regulations which means that when there will be changes in this variable with one unit on the AI implementation level will be an increase with 0.18.

The variables that emerged from this study as having a positive influence are present in the same way in the specialized literature. (Rosli et al., 2013; Handoko et al., 2021; Chatterjee et al., 2021; Chen et al., 2021; Ikumoro et al., 2019; Huang et al., 2018; Akter et al., 2022).

## Conclusions

Our model is valid and contains at least one element from each context of TOE framework which helps us better understand the level of AI implementation in our country in case of big and SMEs. We can see that the AI implementation in Romanian financial sector is positively influenced by the IT infrastructure, top management support, industrial characteristics and governmental regulations.

The role of AI in financial services has been studied by several researchers over the last years. Its role is to: perform repetitive activities, increase efficiency, reduce data errors, and reduce costs in the long run (Khanzode et al., 2020). The benefits of AI are easy to see, but there are also some limiting factors, which are important when a company representative decides to implement such solutions. Some of these limiting factors are: limited access to financial resources, limited implementation abilities, and organizational resistance to change (Stancheva, 2018).

This study can be useful for large companies and SMEs who want to start implementing AI-based solutions.

Following the analysis of recent data from 110 Romanian companies that responded to a questionnaire, we obtained an econometric model with the most important factors that influence the implementation of AI solutions.

A limitation of the study is the size of the echelon analyzed. Also, the selected elements of the TOE Framework for this study are a limitation. If we can use more elements of the TOE Framework, we will probably be able to have more elements for the model. But a questionnaire cannot be very long to ensure that respondents will complete it. Further research will be carried out for this.

## REFERENCES

- Anderson, J., (2000). A generic distributed simulation system for the design and evaluation. In: Proceedings of the Tenth Conference on AI, Simulation and Planning, AIS-2000, *Society for Computer Simulation International*, p. 36-44.
- Ahmi, A., Saidin, S. Z., & Abdullah, A. (2014). IT adoption by internal auditors in public sector: A conceptual study. *Procedia-Social and Behavioral Sciences*, 164, 591-599.
- Akter, S., Michael, K., Uddin, M. R., McCarthy, G., & Rahman, M. (2022). Transforming business using digital innovations: The application of AI, blockchain, cloud and data analytics. *Annals of Operations Research*, 1-33.
- Barna, L.E.L. and Ionescu, B.Ş., (2021). ERP Systems: A Solution for Sustainable Business Development. *7th BASIQ International Conference on New Trends in Sustainable Business and Consumption*. Foggia, Italy, 3-5 June 2021. Bucharest: ASE, pp. 618-624 DOI: 10.24818/BASIQ/2021/07/079
- Belanche, D., Casaló, L. V., & Flavián, C. (2019). Artificial Intelligence in FinTech: understanding robo-advisors adoption among customers. *Industrial Management & Data Systems*.119(7): 1411-1430
- Bhalerao, K., Kumar, A., & Pujari, P. (2022). A Study of Barriers and Benefits of Artificial Intelligence Adoption in Small and Medium Enterprise. *Academy of Marketing Studies Journal*, 26, 1-6.
- Chatterjee, S., Rana, N. P., Dwivedi, Y. K., & Baabdullah, A. M. (2021). Understanding AI adoption in manufacturing and production firms using an integrated TAM-TOE model. *Technological Forecasting and Social Change*, DOI: 10.1016/j.techfore.2021.120880
- Chen, H., Li, L., & Chen, Y. (2021). Explore success factors that impact artificial intelligence adoption on telecom industry in China. *Journal of Management Analytics*, 8(1), 36-68.
- Davenport, T. H.; Ronanki, R. (2018). Artificial Intelligence for the Real World. *Harvard business review*, available on: <https://hbr.org/2018/01/artificial-intelligence-for-the-real-world>
- George, D.; Mallery, P., (2019). IBM SPSS Statistics 26 Step by Step: A Simple Guide and Reference. *Routledge*
- Eachempati, P., et al. (2021). Validating the impact of accounting disclosures on stock market: A deep neural network approach. *Technological Forecasting and Social Change*, 170: 120903.
- Hang, L., (2018). Deep learning for natural language processing: advantages and challenges, *Computer Science*, Vol. 5, No. 1, p. 24-26
- Hair Jr., J. F. et al. (1998). *Multivariate Data Analysis with Readings*. Englewood Cliffs, NJ: Prentice-Hall
- Hasan, A. R., (2021). Artificial Intelligence (AI) in accounting & auditing: A Literature review. *Open Journal of Business and Management*, 10.1: 440-465.

15. Hamm, P. and Klesel, M., (2021). Success Factors for the Adoption of Artificial Intelligence in Organizations: A Literature Review. *AMCIS 2021 Proceedings*. 10. available on: [https://aisel.aisnet.org/amcis2021/art\\_intel\\_sem\\_tech\\_intelligent\\_systems/art\\_intel\\_sem\\_tech\\_intelligent\\_systems/10](https://aisel.aisnet.org/amcis2021/art_intel_sem_tech_intelligent_systems/art_intel_sem_tech_intelligent_systems/10)
16. Huang, M.-H.; Rust, R. T., (2018). Artificial intelligence in service. *Journal of service research*, 21.2: 155-172.
17. Hoang, T. D. L.; Nguyen, H. K., (2022). Towards an economic recovery after the COVID-19 pandemic: empirical study on electronic commerce adoption by small and medium-sized enterprises in Vietnam. *Management & Marketing. Challenges for the Knowledge Society*, 17.2: 98-119.
18. Handoko L., B., Edward Riantono, I., & Wigna Sunarto, F. (2021, April). Determinants Affecting Intention of Use of Big Data Analytics on Remote Audits: TOE Framework Approach. In „2021 7th International Conference on Education and Training Technologies”, pp. 53-59.
19. Huang, Z., (2018). Discussion on the development of artificial intelligence in taxation. *American Journal of Industrial and Business Management*, 8(08), 1817.
20. Ikumoro, A. O., & Jawad, M. S. (2019). Intention to use intelligent conversational agents in e-commerce among Malaysian SMEs: an integrated conceptual framework based on tri-theories including unified theory of acceptance, use of technology (UTAUT), and TOE. *International Journal of Academic Research in Business and Social Sciences*, 9(11), 205-235.
21. Khanzode, Ku. C. A.; Sarode, R. D., (2020). Advantages and disadvantages of artificial intelligence and machine learning: A literature review. *International Journal of Library & Information Science (IJLIS)*, 9.1: 3.
22. Kaboub, F., (2008). Positivist paradigm. *Encyclopaedia of counselling*, 2.2: 343.
23. Li, H., (2018). Deep learning for natural language processing: advantages and challenges, *Natural Science Review*, , Vol. 5, No. 1
24. Na, S., Heo, S., Han, S., Shin, Y., & Roh, Y., (2022). Acceptance model of artificial intelligence (AI)-based technologies in construction firms: Applying the Technology Acceptance Model (TAM) in combination with the Technology–Organisation–Environment (TOE) framework. *Buildings*, 12(2), 90.
25. Odoh, L. C., et al., (2018). Effect of Artificial Intelligence on the Performance of Accounting Operations among Accounting Firms in South East Nigeria. *Asian Journal of Economics, Business and Accounting*, 7.2: 1-11.
26. OECDiLibrary, Artificial intelligence: Changing landscape for SMEs, <https://www.oecd-ilibrary.org/sites/01a4ae9d-en/index.html?itemId=/content/component/01a4ae9d-en>
27. Pang, G.; Shen, C.; Cao, L.; Hengel, A., (2021). Deep learning for anomaly detection: A review. *ACM computing surveys (CSUR)*, 54.2: 1-38.
28. Rosli, K.; Yeow, P. H.; Siew, E. G., (2012). Factors Influencing Audit Technology Acceptance by Audit Firms: A New I-TOE Adoption Framework. *Journal of Accounting and Auditing: Research & Practice*. DOI: 10.5171/2012.876814
29. Shapiro, A.F., (2002). The merging of neural networks, fuzzy logic, and genetic algorithms, *Mathematics and Economics*, 31, p. 115-131
30. Stoica, O. C., & Ionescu-Feleagă, L. (2021). The accounting practitioner as a driver of digitalization pace. În: *Proceedings of the International Conference on Business Excellence*, Vol. 15, no. 1, pp. 768-782. Sciendo.
31. Siew, E. G.; Rosli, K.; & Yeow, P. H., (2020). Organizational and environmental influences in the adoption of computer-assisted audit tools and techniques (CAATTs) by audit firms in Malaysia. *International Journal of Accounting Information Systems*, 36, 100445.
32. Tussyadiah, I. (2020). A review of research into automation in tourism: Launching the Annals of Tourism Research Curated Collection on Artificial Intelligence and Robotics in Tourism. *Annals of Tourism Research*, 81, 102883.
33. Ukpong, E. G., (2022). Integration of Artificial Intelligence Applications for Financial Process Innovation by Commercial Banks in Nigeria. *AKSU Journal of Administration and Corporate Governance (AKSUJACOG)*, Volume 2, Number 1, April, 125-137
34. Ucoglu, D., (2020). Current machine learning applications in accounting and auditing. *Press Academia Procedia*, 12.1: 1-7.

35. Widuri, R.; O'Connell, B.; & Yapa, P. W., (2016). Adopting generalized audit software: an Indonesian perspective. *Managerial auditing journal.*, 31(8/9):821-847
36. Zhang, Y., et al., (2020). The impact of artificial intelligence and blockchain on the accounting profession. *Ieee Access*, DOI:10.1109/ACCESS.2020.3000505

<b>Appendix 1. Companies' turnover and number of employees by county in the analyzed sample (year 2021)</b>			
<b>County</b>	<b>Turnover (RON)</b>	<b>No. of employees</b>	<b>No. of companies</b>
ARGES	1,213,049.00	13	1
ARAD	4,907,089.00	36	3
BUCURESTI	1,097,538,078.00	3,515	84
BIHOR	3,820,916.00	36	3
BRAILA	1,402,971.00	16	1
BRASOV	5,656,095.00	51	2
BUZAU	865,010.00	12	1
CLUJ	22,636,197.00	122	8
CONSTANTA	2,227,901.00	14	1
COVASNA	1,885,613.00	12	1
DOLJ	2,929,065.00	26	2
GORJ	1,805,926.00	31	2
HUNEDOARA	743,734.00	10	1
ILFOV	35,401,481.00	171	4
IALOMITA	1,017,486.00	11	1
IASI	11,321,058.00	91	5
MARAMURES	8,095,581.00	18	1
PRAHOVA	2,216,214.00	28	1
SIBIU	4,421,108.00	25	2
SUCEAVA	6,131,483.00	56	3
TULCEA	1,273,711.00	10	1
TIMIS	9,743,844.00	62	4
<b>Total</b>	<b>1,227,253,610.00</b>	<b>4,366.00</b>	<b>132.00</b>

Source: Author' representation based on listefirme.ro