- **(Ne)continuitatea activităţii vs. câştig sau pierdere şi influenţa asupra opiniei de audit**

- **(Non)Going Concern vs. Gain or Loss and Influence on Audit Opinion**

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(Non)Going Concern *vs.* Gain or Loss and Influence on Audit Opinion

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Abstract

In today's unstable environment, one of the overarching principles for financial reporting of major importance to users of financial statements is going concern. The management of companies is responsible for disclosing information about whether the entity is a going concern or not. In addition, financial auditors must also obtain sufficient and reliable evidence to support their audit opinion on the appropriateness of management's use of the going concern principle in the preparation of financial statements. This study considers the following directions: it first investigates the extent to which financial auditors confirm management's use of the going concern principle in the preparation of the annual financial statements; it then tests the asymmetric relationship between going concern and earnings reporting and between going concern and loss reporting; finally, it seeks to identify the extent to which going concern issues at company level identified by the auditor, loss reporting and negative equity influence the type of audit opinion issued. The sample is represented by companies listed on the regulated market of the BSE in the period 2016-2021 and highlights that the accuracy of the use of the going concern principle in the preparation of financial statements by management is often refuted by financial auditors, that there are business areas in which there are entities for which going concern problems have been reported in one period, but rather gains are reported in the immediately following period, and for other business areas, there are entities for which no going concern problems have been reported and they report losses in subsequent periods. Also, the processing carried out showed that the type of audit opinion depends mainly on the sign of equity and the existence of going concern issues.

Key words: *(non)going concern; gain; loss; equity; audit opinion;*

JEL Classification*: K22, M41, M42, M48*

1. Introduction

Going Concern (GCO) is one of the basic generally accepted accounting principles which assumes that a company continues as a going concern without going into liquidation or significant downsizing. When management determines that it intends to cease operations, the annual financial statements will no longer be prepared on a going concern basis. In addition, events occurring after the balance sheet date that may have an impact on going concern are also taken into account for going concern reporting. The entity's management is responsible for disclosing information about whether the company is a going concern or not of the company's activity, and the financial auditors are required to obtain sufficient audit evidence to support their audit opinion on the appropriateness of management's use of the going concern basis of accounting in the preparation of the financial statements. The global financial crisis of 2008-2009 is considered to have resulted from misjudgements and misleading opinions by auditors on the going concern and sustainability of companies (Jan, 2021). In other words, both management's and the financial auditor's statement on a company's going concern should be carefully considered by those concerned.

The purpose of the study is focused on answering three questions:

1. *Do financial auditors always confirm management's use of the going concern basis for the preparation of the annual financial statements of companies listed on the BSE regulated market in the period 2016-2021?*

2. *Does the reporting of significant uncertainty issues related to going concern in the financial auditors' reports in one period have the effect of reporting gains or losses in the immediately following periods for companies listed on the BSE regulated market in the period 2016-2021? and*

3. *To what extent does the modified audit opinion issued by the financial auditors depend on the existence of going concern issues, negative equity and losses for BSE-listed companies in the period 2016-2021?*

The study is further structured in sections. Section 2 is intended to review the literature focused, on the one hand, on the analysis of the influence of non-going concern of the activity of companies reported in one period on the result of the next period, and on the other hand, on the analysis of the factors that define the type of audit opinion issued by financial auditors in their reports. Section 3 develops the research methodology, broken down into: the study population and the sample analysed, the variables analysed, the data source and the models proposed for testing. Section 4 deals with the results obtained from the processing and their interpretation. The final part of the study is devoted to conclusions.

2. Literature review

2.1. Accuracy of the application of the going concern in accounting and influence on the quality of financial reporting

Companies' financial statements must be accompanied by a statement on the prospect of continuing in business for the foreseeable future. Most managers who have such an obligation are very optimistic that going concern is assured, even in situations where companies have negative equity (Istrate, 2016). But it is not only the entity's management that is responsible for declaring whether or not the entity's going concern is assured, but also the financial auditors, who must assess the extent to which the audited firm is likely to continue as a going concern. When financial auditors report going concern issues in published audit reports, investors react negatively (Menon and Williams, 2010; Chen et al., 2012). The market interprets the reporting of going concern issues as risk communication, leading to a change in the market valuation of distressed firms (Blay et al., 2011). If entities do not prepare annual financial statements on a going concern basis, accounting policies and estimates will be affected. These include: estimating the useful life of fixed assets for depreciation, estimating impairment adjustments and provisions, reclassification of some receivables and payables from long-term to short-term, etc.

The quality of financial reporting has been judged by some researchers (Timbate and Park, 2018; Gonçalves et al., 2021; Ryu et al., 2021; Song, 2022) in terms of earnings management techniques, corporate social responsibility and time periods. Applied to a sample of 568 publicly listed companies in the European Union between 2010 and 2018, Gonçalves and his collaborators' study found that managers in more socially responsible companies behave more ethically, as few cases of earnings manipulation were identified and therefore have better quality financial reporting. Conversely, in times of crisis or losses, the results obtained in the above-mentioned study

showed that the relationship between corporate social responsibility and accounting distortions is positive. This suggests that, in adverse economic conditions, management opportunistically uses sustainable corporate status to manage earnings (Gonçalves et al., 2021).

The literature has shown that International Financial Reporting Standards (IFRS) have had a positive impact on the quality of financial reporting with the transition to IFRS (Istrate et al., 2015; Hwang et al., 2018). However, an analysis of the effects over time on the quality of information reported by companies concluded that there are, however, differences by area due to the social, economic and cultural characteristics of countries (Hwang et al., 2018).

For efficient exchanges in financial markets, trusting relationships are essential. Investor confidence in financial markets is often conditioned by confidence in financial auditors. (Rodgers et al., 2019). Rodgers et al point out that a going concern opinion can have immediate consequences for both the audit profession and users of financial statements. Using the GMM (Generalized Method of Moments) approach, empirical findings by some authors (Truong et al., 2022) indicate that the level of transparency of disclosures by companies has a significant positive effect on firm value.

2.2. Significant uncertainty about going concern – determinant of audit opinion type

After the financial crisis of 2008-2009, there has been a growing call around the world to improve the quality of audit reporting. A new audit report format has been developed through a series of discussions between the European Union and the IAASB – *International Auditing and Assurance Standards Board* (IAASB, 2018). An important change for the new audit reports was the requirement for financial auditors to present KAMs, i.e. risks encountered during the audit process, significant judgements or significant events during the audit period, in language that investors can understand. Financial auditors must act professionally and independently when providing audit services and provide appropriate opinions when there are doubts about going concern (Chi and Chu, 2021). Audit researchers were interested in whether issuing an audit report containing an uncertainty paragraph about a distressed company's going concern protects auditors from litigation (Kaplan and Williams, 2012). They concluded that auditors discourage lawsuits by issuing audit reports that flag going concern problems for their financially distressed clients. In addition, if they are sued, when financial auditors have issued audit reports with paragraphs on going concern uncertainty they still incur lower costs than if they had not reported this issue.

Although some studies have found significant associations between questionable financial reporting quality and the auditor's issuance of modified audit opinions (Grosu et al., 2020), auditing standards do not require the auditor to include in the audit report a paragraph on significant uncertainty regarding going concern when they identify poor reporting quality, but rather, they must include such a paragraph when audited companies are in financial distress (Louwers, 1998; Carson et al., 2012). It is also found that distressed firms that rely more heavily on large clients are more likely to receive audit opinions containing a going concern uncertainty paragraph (Dhaliwal et al., 2020).

In order to test the going concern assumption of the companies listed on the BSE in the period 2008-2010 by the financial auditors, models were proposed that identified the determinants of the risk of non-compliance with the going concern assumption in the preparation of the annual financial statements (Robu et al., 2012), taking into account that the financial auditor has to verify this assumption, since the statement of the responsible persons within the companies on going concern is not always confirmed by the financial auditor (Istrate, 2016). Other authors have focused in their studies on how the information included in the audit report can help anticipate financial distress and have concluded that by identifying the type of audit opinion, the existence of the going concern uncertainty paragraph, and certain key audit issues mentioned, any user can predict a bankruptcy situation as accurately as if they had analyzed the entire report (Muñoz-Izquierdo et al., 2019).

Companies are increasingly using social media to communicate with stakeholders. A recent study (Beka and Pavlatos, 2022), of companies listed on the Athens Stock Exchange analyses the impact of companies' social media posts on accounting and auditing, and concludes that the posts analysed do not influence either going concern or the audit opinion issued. In contrast to the statements of company management and financial auditors on the going concern status of companies, an important tool to inform stakeholders about the sustainability of entities is integrated reporting, but it also came with certain challenges that both companies and auditors had and have to overcome (Goicoechea et al., 2019).

2.3. Development of research hypotheses

There is an asymmetry between going concern and earnings reporting and between non-going concern and loss reporting – over time (Hossain et al., 2020; Kim, 2021). In their study, Hossain et al., conducted on a number of companies between 2000-2014, concluded that there were situations in which the management of the entities did not report going concern problems associated with the companies, and in the following period the entities ended up going bankrupt. At the other end of the spectrum, there were more cautious entities, where their management reported some going concern issues, but without any failures in the subsequent period. In other words, more prudent entities, from an accounting point of view, are more conservative. Studies have shown that accounting conservatism can reduce agency costs by improving corporate governance and audit contracting efficiency (Ramalingegowda and Yu, 2012). However, accounting conservatism favours slower recognition of income compared to expenses, which is seen as biased accounting that causes the market value of assets to exceed the book value (Chen et al., 2013). In other words, conservatism in accounting can be defined as "a tendency of the accounting professional to require a greater degree of verification to recognize good news as gains than to recognize bad news as losses" (Pae et al., 2005). Financial auditors of more conservative clients are found to issue fewer opinions on the existence of going concern issues for audited companies, charge lower fees and resign less often, indicating that for such clients the audit risk assumed by the auditor is lower (DeFond et al., 2015). The same authors and others demonstrate in their studies that auditors of conservative clients are less accountable and caution regulators that some accounting treatments (e.g., fair value measurement) abandon conservatism as an attribute of financial reporting quality (DeFond and Subramanyam, 1998; DeFond et al., 2015). Another strength of conservatism is that other researchers (García Lara et al., 2016), find that it improves investment efficiency, and the empirical results of their study show that more conservative firms invest more. It has been shown that monitoring institutions are more likely to demand conservatism in the reporting practices of the firms in which they have invested and consider it an instrument of good governance (Ramalingegowda and Yu, 2012).

Table no. 1 presents the variables extracted from the literature, their source and the models used by the researchers to test the hypotheses.

Table no. 1. Variables of interest, their source and models applied

Variable	Authors	Model
Going Concern - Company (GCO_C)	(Hossain et al., 2020)	Regression models
	(Kim, 2021)	Regression models based on time series
	(Beka and Pavlatos, 2022)	Regression models
	(Chi and Chu, 2021)	Long Short-Term Memory (LSTM) and Gated Recurrent Unit (GRU)
Going Concern- Auditor (GCO_A)	(Robu et al., 2012)	Regression and Correlation Models and Principal Component Analysis
	(Kaplan and Williams, 2012)	Regression models
	(Blay et al., 2011)	Regression Models and Score Functions
	(Chi and Chu, 2021)	Long Short-Term Memory (LSTM) and Gated Recurrent Unit (GRU)
	(Rodgers et al., 2019)	Throughput Model
Equity (Eq)	(Hossain et al., 2020)	Regression models
Result (Profit or Loss)	(Hossain et al., 2020)	Regression models
Change in Result (increase/ decrease)	(Hossain et al., 2020)	Regression models
	(Chen et al., 2013)	Regression models
	(DeFond et al., 2015)	Regression models
	(García Lara et al., 2016)	Regression models
Type of audit opinion	(Hossain et al., 2020)	Regression models
	(Grosu et al., 2020)	QATRMT Model (Quick Audit Test for Significance Threshold Readjustment)

Source: Own processing

Based on the literature reviewed, the following research hypotheses are formulated:

H1: The significant uncertainty about the going concern status of BSE listed companies reported by the auditor often contradicts management's statement on the adoption of the going concern principle in the preparation of their financial statements.

H2: It is possible to identify a profile of the listed company on the BSE, depending on the field of activity, for which there is an asymmetry between going concern and earnings reporting, respectively between going concern and loss reporting.

H3: The going concern problems at the level of the companies identified by the auditor, the negative equity and the accounting losses recorded have a significant influence on the type of audit opinion issued by the financial auditors for companies listed on the BSE.

3. Research methodology: population, sample, variables, data source, and data analysis methods

In order to test the research hypotheses, a statistical approach is proposed (Jaba, 2002; Robu, 2021) which considers: identification of the population, selection of the sample, choice of variables, establishment of data analysis methods and proposal of econometric models to be analysed, data collection and processing, as well as obtaining the research results and their interpretation in the discussion part. The starting point is Kim's model (Kim, 2021), which shows that there is an asymmetry over time between going concern and earnings reporting and between non-going concern and loss reporting. The model was applied for the period 2000-2013 to a large number of companies, and the results revealed that

firms that received opinions with associated going concern issues responded immediately with a greater degree of conservatism, but after moving beyond this stage were more likely to report losses rather than gains in a timely manner.

3.1. The study population and sample analyzed

In order to conduct the study, the starting population was represented by all companies listed on the Bucharest Stock Exchange (BSE) subject to statutory financial audit, in accordance with the Law no. 162/2017 on statutory audit of annual financial statements and annual consolidated financial statements and amending certain regulatory acts, published in the Official Gazette of Romania no. 548/12 July 2017, and the sample selected comprises only companies on the regulated market. From the total number of listed firms during the period under review (2016-2021), firms in the financial-banking, insurance and financial intermediation sectors have been excluded as they apply different criteria in their financial reporting and their audit reports are based on the requirements of other reporting frameworks and are not comparable with the audit reports of other firms, as well as delisted or listed firms during this period. This resulted in a balanced *sample* comprising 65 listed firms, for which data was collected from the annual financial statements and audit reports issued for the period 2016-2021, with 390 observations. The year 2016 was chosen as the debut year as from this financial year each financial auditor had to include a separate Key Audit Matters (KAM) section in the audit report (Grosu et al., 2020), and going concern issues are such a key issue.

According to the activity, the sample analysed includes companies operating in the manufacturing industry (54%), service companies (14%), energy-oil companies (12%), chemical-pharmaceutical companies (12%), construction companies (6%) and trade companies (2%).

Figure no. 1 shows the distribution of the sampled companies by business area.

Figure no. 1. Distribution of the sample by field of activity
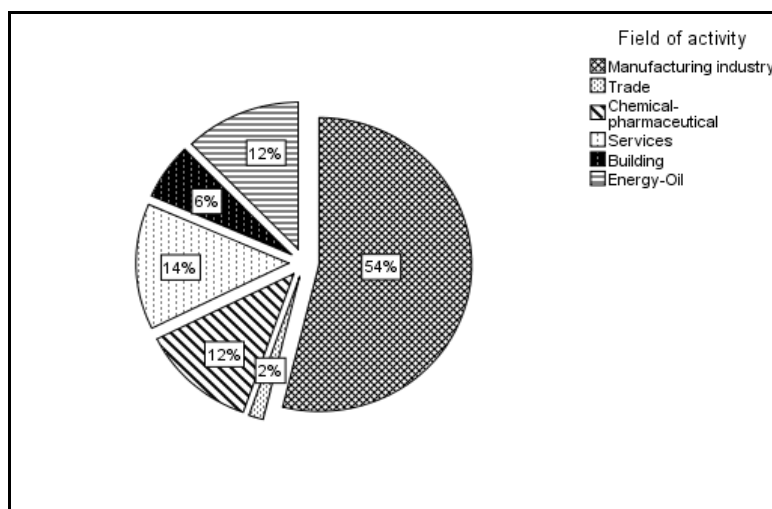
Source: Own processing

3.2. Variables analysed, data source and models proposed for testing

In order to test and validate the proposed research hypotheses, starting from the literature, the variables of interest are first identified. On the one hand, the existence or not of going concern problems of the sampled entities in one period and the influence on the result (profit or loss) in the next period are considered, depending on the field of activity. In other words, the aim is to identify the profile of the company listed on the BSE, according to the scope of activity, for which there is an asymmetry between going concern and earnings reporting, respectively between

non-going concern and loss reporting. On the other hand, the extent to which the type of audit opinion depends on the existence of going concern issues of the sampled entities, the sign of equity and the type of earnings is investigated.

Data were collected manually from the individual financial statements prepared in accordance with IFRS and from the audit reports of the companies included in the sample analysed for the period 2016-2021, and data analysis was performed with SPSS 23.0 software.

To carry out the processing, the variables identified and their description are presented in **Table no. 2**.

Table no. 2. List of identified variables and their description

Variable symbol	Variable description	Value
F_Act	Field of activity	Manufacturing industry
		Trade
		Chemical-pharmaceutical
		Services
		Building
		Energy-Oil
TO	Type of Opinion	Unqualified
		Qualified
GCO_A	Significant uncertainty about going concern (Auditor)	YES
		NO
GCO_C	Going Concern Statement (Company)	Yes
		No

Variable symbol	Variable description	Value
Eq	Equity	Positive
		Negative
TR	Type of Result (2017, 2018, 2019, 2020, 2021)	Profit
		Loss
CR	Change in Result	Profit
		Profit increase
		Profit decrease
		Loss reporting
		Loss
		Loss increase
		Loss decrease
		Loss coverage and profit reporting

Source: Own processing

The variables presented in **Table no. 2** are qualitative variables, the attributes associated with the variables: equity, result type and result change were obtained by transforming the quantitative variables into nominal variables, taking into account the signs and meaning of the change in values over time.

To test the accuracy of the financial auditor's use of the going concern principle for the preparation of the annual financial statements, and the asymmetry between significant going concern uncertainty reported by the auditor in one period and reporting the loss in the next period and non-reporting of going concern issues in one period by the auditor and reporting the profit in the next period, Multiple Correspondence Factor Analysis (MCFA) is used as a multivariate data analysis method (Pintilescu, 2007), and a multiple linear regression model is used to test the influence of going concern issues, equity sign and outcome type on the audit opinion (Jaba, 2008).

4. Results and discussions

The first research hypothesis (H1): *The significant uncertainty about the going concern status of BSE listed companies reported by the auditor often contradicts management's statement on the adoption of the going concern principle in the preparation of their financial statements* is tested by applying the MCFA which shows the associations between the existence of going concern problems in a period reported by auditors in audit reports and management's statement on the adoption of the going concern principle in the preparation of financial statements for the sampled entities. *Figure no. 2* shows these associations.

Figure no. 2. Combination of GCO_A, GCO_C and Eq, depending on the field of activity
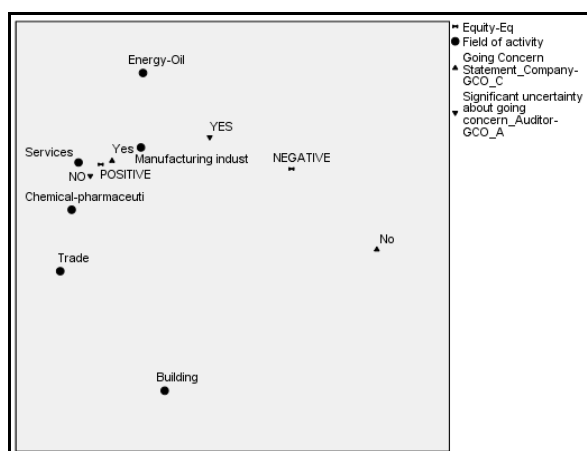
Source: Own processing using MCFA

From *Figure no. 2* it can be seen that for very few of the sampled entities, the responsible persons in the entities declare that the entities have problems in terms of going concern (the answer **NO** cannot be linked to a specific area of activity), despite the fact that the period analysed was also affected by the Covid-19 pandemic. In contrast, the auditors of the analysed entities include in their audit reports a section on significant uncertainty related to going concern, especially for the manufacturing industry. The reason why this phenomenon is reported by the auditor is mainly related to negative equity, but also to other causes (the **YES** answer lies between the equity sign: positive/negative). Given the results of the processing, it can be stated that in the sample analysed, the management's statement on the adoption of the going concern principle in the preparation of the financial statements of listed companies on the BSE is often refuted by the auditor by including in the audit report the paragraph on significant uncertainty related to going concern.

The second research hypothesis (H2): *It is possible to identify a profile of the listed company on the BSE, depending on the field of activity, for which there is an asymmetry between going concern and earnings reporting, respectively between going concern and loss reporting* is tested by applying the MCFA that reports the associations between the existence of going concern problems in one period and loss or earnings reporting in the immediately following period. *Figures 3, 4 and 5* depict these associations.

Figure no. 3. GCO_A association for 2016 and 2017 and TR in 2017 and 2018, depending on the area of activity
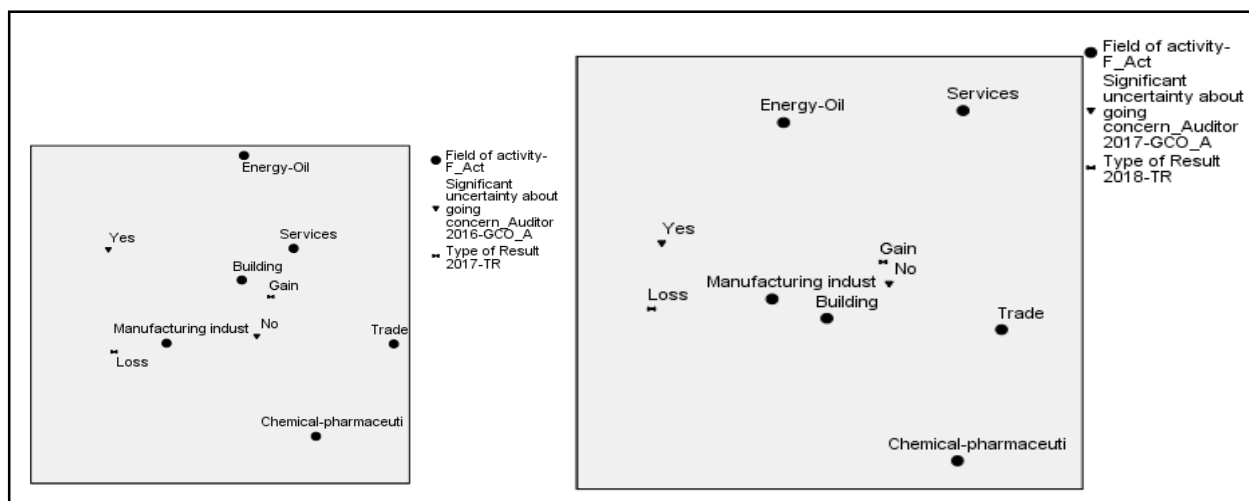
Source: Own processing using MCFA

From the first diagram of *Figure no. 3*, it can be seen that, for the first period analysed, the manufacturing industry is the one for which the mentioned asymmetry stands out, by not reporting going concern problems in 2016 and, however, by recording, rather, losses in 2017. The explanation lies in the fact that other factors emerged that could not be anticipated by either the entity's management or the financial auditor. For the second period analysed, as can be seen from the second chart in *Figure no. 3*, for the manufacturing industry, there is symmetry between not reporting going concern issues and recording gains and reporting going concern issues and recording losses, in the sense that when going concern issues are reported, losses are recorded in the immediately following period (rather accounting conservatism is manifested), and when going concern issues are not reported, gains are recorded in the following period, as expected. For the other areas of activity, no such association can be made, as they are far removed from the existence or otherwise of going concern problems.

Figure no. 4. GCO_A association for 2018 and 2019 and TR in 2019 and 2020, depending on the area of activity
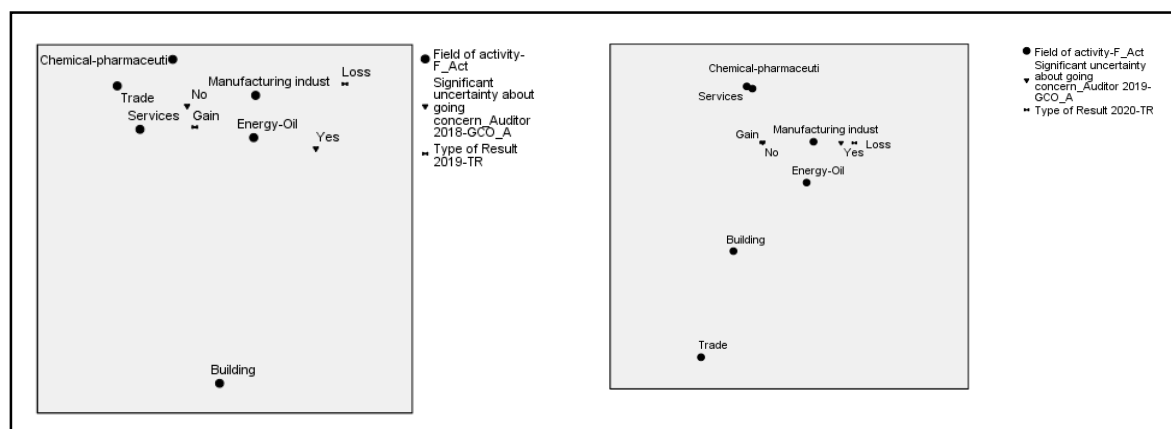
Source: Own processing using MCFA

For the third period analysed, the first chart in *Figure no. 4* highlights that the energy-oil sector is the one for which the mentioned asymmetry stands out, by reporting going concern problems in 2018 and yet registering rather gains in 2019. This finding leads to the conclusion that for companies operating in this sector, accounting conservatism is not manifesting itself (Kim, 2021). In 2019-2020, there is no such asymmetry, but there is accounting conservatism, as shown in the second diagram in *Figure no. 4*. In this period it should be borne in mind that a new factor that emerged was the Covid-19 pandemic, which certainly had an influence on certain sectors of activity (Apostol, 2020).

Figure no. 5. GCO_A association for 2020 and TR in 2021, depending on the area of activity
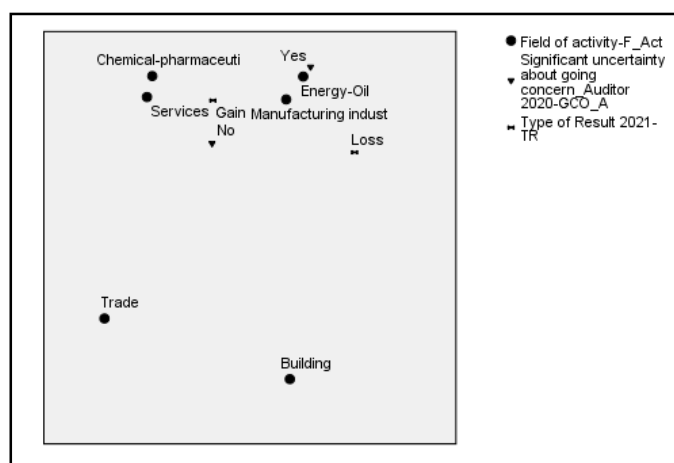
Source: Own processing using MCFA

For the fifth period analysed, the asymmetry is also evident in the energy sector, in the sense that in the audit reports for the financial year 2020, the financial auditors report going concern problems, while in 2021, the result reported by companies operating in this sector is more likely to be a profit. Thus, the asymmetry between the

variables mentioned is again apparent, but not accounting conservatism (*Figure no. 5*).

In an analysis of the result over time, the following attributes were identified for the result: profit, loss, increase profit, increase loss, decrease profit, decrease loss, reporting loss (when a profit was recorded in one period and a loss in the next), covering loss and reporting profit. The diagram in *Figure no. 6* shows the associations between the existence or not of going concern problems and the change in the result, by business area.

Figure no. 6. GCO_A association and CR, depending on the area of activity
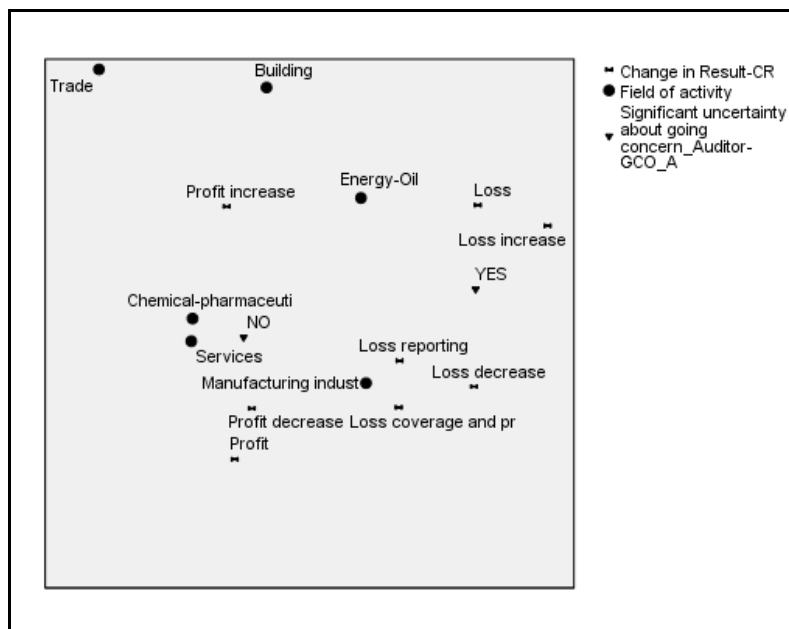
Source: Own processing using MCFA

From *Figure no. 6*, it can be seen that in the area of the manufacturing industry, during the period under review, no going concern problems are reported by the financial auditors, and at the level of the result, however, it is noted either a decrease in profit or the reporting of losses. At the other end of the spectrum, the energy-oil sector is at the opposite end of the spectrum, where the going concern problems reported by the financial auditors are confronted with losses, from which it can be seen that the manifestation of accounting conservatism is evident, but also with an increase in profit. The summary of the asymmetry between non-going concern – loss reporting / going concern – profit reporting, but also on the manifestation or not of accounting conservatism is presented in **Table no. 3**.

Table no. 3. Synthesis of the asymmetry between non-going concern and loss reporting and going concern and profit reporting and the manifestation of accounting conservatism

Field of activity	Period	Manifesting asymmetries	Manifestation of accounting conservatism
Manufacturing industry		**YES**	
Building		NO	
Trade	2016-2017	NO	NO
Chemical-pharmaceutical		NO	
Energy-Oil		NO	
Services		NO	

Field of activity	Period	Manifesting asymmetries	Manifestation of accounting conservatism
Manufacturing industry *Building* *Trade* *Chemical-pharmaceutical* *Energy-Oil* *Services*	2017-2018	NO NO NO NO NO NO	**YES**
Manufacturing industry *Building* *Trade* *Chemical-pharmaceutical* ***Energy-Oil*** *Services*	2018-2019	NO NO NO NO **YES** NO	NO
Manufacturing industry *Building* *Trade* *Chemical-pharmaceutical* *Energy-Oil* *Services*	2019-2020	NO NO NO NO NO NO	**YES**
Manufacturing industry *Building* *Trade* *Chemical-pharmaceutical* ***Energy-Oil*** *Services*	2020-2021	NO NO NO NO **YES** NO	NO

Source: Own processing

From the situation presented in the Table no. 3, the asymmetry analysed is manifest in the case of two areas of activity (manufacturing industry and the energy-oil sector), and accounting conservatism can be brought into question particularly at the level of manufacturing industry.

The third research hypothesis (H3): *The going concern problems at the level of the companies identified by the auditor, the negative equity and the accounting losses recorded have a significant influence on the type of audit opinion issued by the financial auditors for companies listed on the BSE* is tested using the regression model shown in **Equation 1**.

$$TO_i=\beta_0+\beta_1 GCO\_A_i+\beta_2 Eq_i+\beta_3 TR_i+\varepsilon_i \qquad (1)$$

where:

− TO_i represents the *Type of opinion* issued for firm *i,* with *i=1,...,65*, which can receive one of the two ratings described in Table 1 (Unmodified-0, Modified-1);

− GCO_A_i, EqC_i, TR_i represents *Significant Uncertainty about Auditor's Reported Going Concern (No-0, Yes-1), Equity (Positive-0, Negative-1) and Result Type (Profit-0, Loss-1)* for firm *i*, with *i=1,...,65*;

− $\beta_{i=0,...,3}$ are the parameters of the regression models;

− ε_i represents the error component, $\varepsilon \sim N(0, 1)$.

For the interpretation of the processing, an extract of the results obtained is presented in Table no. 4.

Table no. 4. Parameter estimates for the regression model (TO)				
Variables included in the model	**β**	**Stand β**	**t**	**Sig**
GCO_A	0.166	0.183	3.593	0.000
Eq	**0.497**	**0.399**	**7.484**	**0.000**
TR	*0.064*	*0.068*	*1.361*	*0.174*
Constanta	0.088		4.112	0.000

R^2 is 0,313; N=65

The regression model (TO): $TO_i=\beta_0+\beta_1 GCOA_i+\beta_2 Eq_i+\beta_3 TR_i+\varepsilon_i$

Source: Own processing

From the model described, it can be concluded that the type of audit opinion depends only 31% on the existence or not of going concern issues, the sign of equity and the type of result (profit/loss). The 70% difference is explained by the variables not included in the model, among which the following can be mentioned: limitation of the audit scope by late appointment of the auditor and non-participation of the auditor in the inventory, ineffective internal control, not providing the auditor with the information to collect sufficient and sound evidence, etc. In addition, it can be seen that among the selected independent variables, the greatest influence is on the equity (positive/negative), which reflects the financial position of the entity, and not on the type of result (profit/loss). This finding is justified by the fact that the accounting result is quite volatile and can be affected by earnings management, which means that the key factors to be considered by financial auditors in defining the audit opinion are going concern issues and equity (positive/negative). The results obtained confirm the results obtained in other studies carried out at international level (Hossain et al., 2020; Chi and Chu, 2021; Kim, 2021; Beka and Pavlatos, 2022), and the added knowledge brought by this study consists in the fact that the period analysed is more extensive and the models were applied to companies operating in an emerging economy.

Conclusions

Under the going concern assumption, a company is seen as being able to continue in business for the foreseeable future and annual financial statements are prepared in accordance with this principle. If a company's responsible persons believe that it will cease trading in the foreseeable future, the annual financial statements will no longer be prepared on a going concern basis. In addition to these responsible persons, financial auditors should also obtain sufficient and reasonable evidence to support their audit opinion as to the appropriateness of management's use of the going concern basis for the preparation of the financial statements. In general, many company managers who have such an obligation are very optimistic that going concern is ensured, even in situations where companies have negative equity. This study sought to answer three questions: 1. *Do the financial auditors always confirm the use of the going concern principle by management for the*

preparation of the annual financial statements of companies listed on the BSE regulated market in the period 2016-2021?; 2. *Does the reporting of significant uncertainty issues related to going concern in the financial auditors' reports in one period have the effect of reporting gains or losses in the immediately following periods for companies listed on the BSE regulated market in the period 2016-2021?* and 3. *To what extent does the modified audit opinion issued by the financial auditors depend on the existence of going concern issues, negative equity and losses for BSE-listed companies in the period 2016-2021?*

In order to answer the first question, the first hypothesis (H1: The significant uncertainty about the going concern status of BSE listed companies reported by the auditor often contradicts management's statement on the adoption of the going concern principle in the preparation of their financial statements) was tested and the results showed that financial auditors include a section on significant going concern uncertainty in their audit reports more frequently than the audited companies' responsible persons declare this phenomenon in the sample analysed. Negative equity is the main factor underlying the reporting of this phenomenon by financial auditors. Given the results, we believe that the financial auditors' reports are more supportive to those concerned, as the management's statement on the adoption of the going concern principle in the preparation of financial statements of listed companies is often refuted by the auditor.

To answer the second question, the second hypothesis formulated (H2: It is possible to identify a profile of the listed company on the BSE, depending on the field of activity, for which there is an asymmetry between going concern and earnings reporting, respectively between going concern and loss reporting), and the synthesis of the results highlights that the asymmetry analysed (between going concern and earnings reporting, respectively between non-going concern and loss reporting) is more frequently manifested in the case of two fields of activity out of the six analysed, i.e. the manufacturing industry and the energy-oil sector. Thus, for the manufacturing industry, this asymmetry is evidenced by the non-reporting of going concern problems in certain periods and yet recording losses in subsequent periods, while for the energy-oil sector, this asymmetry is evidenced by the reporting of going concern problems in certain periods and yet recording gains in subsequent periods.

The answer to the third question is given after testing hypothesis three (H3: *The going concern problems at the level of the companies identified by the auditor, the negative equity and the accounting losses recorded have a significant influence on the type of audit opinion issued by the financial auditors for companies listed on the BSE*), with the results of the processing showing that, among the selected independent variables, equity capital (positive/negative), a relevant indicator for owners, has the greatest influence and not the existence of going concern issues. Overall, the three variables considered (Significant uncertainty about the auditor's reported going concern, Equity and Type of result) influence the change in audit opinion by more than 30%.

Previous research has shown that reporting going concern problems for companies is expected to be positively associated with firms' subsequent accounting conservatism. The processing shows that every two financial years there is a manifestation of accounting conservatism for some of the business areas related to the companies analysed, in the sense that reporting going concern issues leads to accounting conservatism.

This study contributes to the development of knowledge in that it can support interested users by highlighting the asymmetry that may exist between under-reporting going concern problems for some companies in one period and reporting profit in the next period, and under-reporting going concern problems in one period and under-reporting loss in the next period. In other words, the result reported by companies in their financial statements is more a result of management and for this reason should be interpreted quite cautiously. But, given the current crisis due to the aftermath of the Covid-19 pandemic and the global geopolitical tensions in the context of the war near Romania's borders, the companies' activity remains influenced by certain risks that may have consequences for the going concern of their business.

We believe that our study will have an impact, in particular, on the users of the disclosures in the annual financial statements, as they will be more attentive to management's going concern statement and will corroborate it with the statement of the financial auditor. In addition, the results of the research may also be useful to financial auditors when they have clients in specific industries, and to other researchers interested in this topic. The study certainly has limitations, one of which is the failure to take into account non-financial variables that could have influenced the audit opinion. Thus, the study could be developed in future research.

REFERENCES

1. Apostol, C. (2020), Coronavirus – a new International Economic Crisis?, in *European Finance, Business and Regulation, EUFIRE 2020*, Editura Universității "Alexandru Ioan Cuza", Iaşi

2. Beka, E., Pavlatos, O. (2022), The Impacts of Social Media on Accounting and Auditing: Evidence from Greek Listed Firms. *Sustainability* 14, 10279. doi: 10.3390/su141610279.

3. Blay, A. D., Geiger, M. A., North, D. S. (2011), The Auditor's Going-Concern Opinion as a Communication of Risk. *AUDITING: A Journal of Practice & Theory* 30, 77–102. doi: 10.2308/ajpt-50002.

4. Carson, E., Fargher, N. L., Geiger, M. A., Lennox, C. S., Raghunandan, K., Willekens, M. (2012), Audit Reporting for Going-Concern Uncertainty: A Research Synthesis. *AUDITING: A Journal of Practice & Theory* 32, 353–384. doi: 10.2308/ajpt-50324.

5. Chen, C., Martin, X., Wang, X. (2012), Insider Trading, Litigation Concerns, and Auditor Going-Concern Opinions. *The Accounting Review* 88, 365–393. doi: 10.2308/accr-50347.

6. Chen, L. H., Folsom, D. M., Paek, W., Sami, H. (2013), Accounting Conservatism, Earnings Persistence, and Pricing Multiples on Earnings. *Accounting Horizons* 28, 233–260. doi: 10.2308/acch-50664.

7. Chi, D.-J., Chu, C.-C. (2021), Artificial Intelligence in Corporate Sustainability: Using LSTM and GRU for Going Concern Prediction. *Sustainability* 13, 11631. doi: 10.3390/su132111631.

8. DeFond, M. L., Lim, C. Y., Zang, Y. (2015), Client Conservatism and Auditor-Client Contracting. *The Accounting Review* 91, 69–98. doi: 10.2308/accr-51150.

9. DeFond, M. L., Subramanyam, K. R. (1998), Auditor changes and discretionary accruals. *Journal of*

Accounting and Economics 25, 35–67. doi: 10.1016/S0165-4101(98)00018-4.

10. Dhaliwal, D., Michas, P. N., Naiker, V., Sharma, D. (2020), Greater Reliance on Major Customers and Auditor Going-Concern Opinions. *Contemporary Accounting Research* 37, 160–188. doi: 10.1111/1911-3846.12551.

11. García Lara, J. M., García Osma, B., Penalva, F. (2016), Accounting conservatism and firm investment efficiency. *Journal of Accounting and Economics* 61, 221–238. doi: 10.1016/j.jacceco.2015.07.003.

12. Goicoechea, E., Gómez-Bezares, F., Ugarte, J. V. (2019), Integrated Reporting Assurance: Perceptions of Auditors and Users in Spain. *Sustainability* 11, 713. doi: 10.3390/su11030713.

13. Gonçalves, T., Gaio, C., Ferro, A. (2021), Corporate Social Responsibility and Earnings Management: Moderating Impact of Economic Cycles and Financial Performance. *Sustainability* 13, 9969. doi: 10.3390/su13179969.

14. Grosu, M., Robu, I.-B., Istrate, C. (2020), The Quality of Financial Audit Missions by Reporting the Key Audit Matters. *Audit Financiar* 18, 182–195. doi: 10.20869/AUDITF/2020/157/005.

15. Grosu, V., Mateş, D., Zlati, M.-L., Mihaila, S., Socoliuc, M., Ciubotariu, M.-S. (2020), Econometric Model for Readjusting Significance Threshold Levels through Quick Audit Tests Used on Sustainable Companies. *Sustainability* 12, 8136. doi: 10.3390/su12198136.

16. Hossain, M., Raghunandan, K., Rama, D. V. (2020), Abnormal disclosure tone and going concern modified audit reports. *Journal of Accounting and Public Policy* 39, 106764. doi: 10.1016/j.jaccpubpol.2020.106764.

17. Hwang, I. T., Hur, K. S., Kang, S. M. (2018), Does the IFRS Effect Continue? An International Comparison. *Sustainability* 10, 4818. doi: 10.3390/su10124818.

18. IAASB (2018), Handbook of International Quality Control, Auditing, Review, Other Assurance, and Related Services Pronouncements. *IFAC*. Available at: https://www.ifac.org/iaasb/publications/2018-handbook-international-quality-control-auditing-review-other-assurance-and-related-services-26 [Accessed November 17, 2022].

19. Istrate, C. (2016), *Contabilitate şi raportări financiare individuale şi consolidate*, Editura Polirom, Iaşi.

20. Istrate, C., Georgescu, I., Carp, M., Robu, I.-B., Păvăloaia, L. (2015), Accruals earnings management in emerging markets under the transition to IFRS: The case of Romanian listed companies. *Transformations in Business and Economics* vol 14, 393–411.

21. Jaba, E. (2002), *Statistică*, Ediția a 3-a, Editura Economică, Bucureşti

22. Jaba, E. (coordonator) (2008), *Econometrie aplicată*, Editura Universității "Alexandru Ioan Cuza", Iaşi.

23. Jan, C.-L. (2021), Using Deep Learning Algorithms for CPAs' Going Concern Prediction. *Information* 12, 73. doi: 10.3390/info12020073.

24. Kaplan, S. E., Williams, D. D. (2012), Do Going Concern Audit Reports Protect Auditors from Litigation? A Simultaneous Equations Approach. *The Accounting Review* 88, 199–232. doi: 10.2308/accr-50279.

25. Kim, T. (2021), Does a Manager Respond to a Going-Concern Audit Opinion with an Asymmetry in Gain and Loss? *Sustainability* 13, 4425. doi: 10.3390/su13084425.

26. Louwers, T. J. (1998), The Relation between Going-Concern Opinions and the Auditor's Loss Function. *Journal of Accounting Research* 36, 143–156. doi: 10.2307/2491325.

27. Menon, K., Williams, D. D. (2010), Investor Reaction to Going Concern Audit Reports. *The Accounting Review* 85, 2075–2105. doi: 10.2308/accr.2010.85.6.2075.

28. Muñoz-Izquierdo, N., Camacho-Miñano, M.-M., Segovia-Vargas, M.-J., Pascual-Ezama, D. (2019), Is the External Audit Report Useful for Bankruptcy Prediction? Evidence Using Artificial Intelligence. *International Journal of Financial Studies* 7, 20. doi: 10.3390/ijfs7020020.

29. Pae, J., Thornton, D. B., Welker, M. (2005), The Link between Earnings Conservatism and the Price-to-Book Ratio*. *Contemporary Accounting Research* 22, 693–717. doi: 10.1506/9FDN-N6ED-LJE9-A1HL.

30. Pintilescu, C. (2007), *Analiză statistică multivariată*, Editura Universității "Alexandru Ioan Cuza", Iaşi.

31. Ramalingegowda, S., Yu, Y. (2012), Institutional ownership and conservatism. *Journal of Accounting*

and *Economics* 53, 98–114. doi: 10.1016/j.jacceco.2011.06.004.

32. Robu, A., Mironiuc, M., Robu, I.-B. (2012), Un model practic pentru testarea ipotezei de "going-concern" în cadrul misiunii de audit financiar pentru firmele românesti cotate: A Practical Model for Testing the "Going-Concern" Assumption in the Financial Audit Engagement for Romanian Quoted Companies. *Audit Financiar* 10, 13–24.

33. Robu, I. B. (2021), *Calitatea informației financiare. Fundamentări contabile, modelări econometrice şi analize statistice*, Editura Performantica, Iaşi.

34. Rodgers, W., Guiral, A., Gonzalo, J. A. (2019), Trusting/Distrusting Auditors' Opinions. *Sustainability* 11, 1666. doi: 10.3390/su11061666.

35. Ryu, H., Chae, S.-J., Song, B. (2021), Corporate Social Responsibility, Audit Committee Expertise, and Financial Reporting: Empirical Evidence from Korea. *Sustainability* 13, 10517. doi: 10.3390/su131910517.

36. Song, B. (2022), The Influence of Audit-Committee Characteristics on the Association between Corporate Social Responsibility and Earnings Quality. *Sustainability* 14, 10496. doi: 10.3390/su141710496.

37. Timbate, L., Park, C. K. (2018), CSR Performance, Financial Reporting, and Investors' Perception on Financial Reporting. *Sustainability* 10, 522. doi: 10.3390/su10020522.

38. Truong, L. D., Le, T. X., Friday, H. S. (2022), The Influence of Information Transparency and Disclosure on the Value of Listed Companies: Evidence from Vietnam. *Journal of Risk and Financial Management* 15, 345. doi: 10.3390/jrfm15080345.

Empirical Evidence on the Relationship between Capital Structure and Organizational Life Cycle

Abstract

The paper investigates the capital structure of companies listed on the Bucharest Stock Exchange (BSE) from an organizational life cycle perspective, seen as a determinant of the decisions to finance operations and growth. For this purpose, the life cycle is measured according to the cash flows patterns. Motivated by the pecking-order theory (POT) and carried out on a sample of 59 companies in the period 2010-2020, the study uses a Least Squares Dummy Variable (LSDV) panel data model and shows that listed Romanian companies resort more to bank financing in the initial stages of their life cycle. As they reach the maturity and shake-out stages, companies reorient towards internal financial resources and equity issuance, which is in line with the POT. Furthermore, the age of companies has a rather weak effect on the financial leverage, and its effect diminishes as firms age. The results also confirm the importance of having a high level of tangible fixed assets as collateral for bank loans, but also the significant role of the industry and geographical positioning on the degree of external financing.

***Key words**: capital structure; life cycle; financial leverage; cash flows; external financing;*

***JEL Classification**: M41, M10, G30*

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Introduction

The theory of the organizational life cycle states that companies, by analogy with living organisms, go through predictable stages of development and that each stage of the life cycle is characterized by certain resources, competitive advantages, informational asymmetries, financial structures, strategies, etc. (Akbar and others, 2019). Dickinson (2011) concludes that companies evolve under the influence of internal factors (strategic choices, financial resources, managerial capabilities, etc.) and external factors (the competitive environment and macroeconomic conditions), and the modification of these factors determines distinct phases that define the life cycle of an entity.

The literature documents that the stages of the company's life cycle do not follow a linear, sequential model. Sometimes entities may enter an advanced stage of the life cycle, skipping two or more stages, in other circumstances firms may return to an earlier stage of their life cycle or the stages may imperceptibly overlap, making the delineation of the organizational life cycle stages a difficult undertaking. This explains, in the opinion of Walid (2019), the lack of consensus among researchers regarding the temporal delimitation, the extent and the number of stages to be considered (for example, there are life cycle models in three phases – Anthony and Ramesh, 1992; four-phase models – Miller and Friesen, 1980 and five-phase models – Dickinson, 2011). Differences of opinion also appear with reference to the criteria used to identify each phase of the life cycle. For some authors, the evolution of a company is done as it ages (Walid, 2019). Other authors consider dividends, sales growth, capital expenditures and the company's age as descriptors that must be analyzed to explain the entity's transition from one stage of the organizational life cycle to another (Ambalavanar, 2019). Dickinson (2011) is of another opinion: she develops, for the delimitation of the life cycle stages, a proxy based on the expected behavior of the cash flows (the cash flow model), her idea being later accepted by other researchers (Tian, Han and Zhang, 2015; Faff and others, 2016).

Over time, studies related to the organizational life cycle have been conducted in the financial, accounting and corporate governance literature, which highlights the interest on this topic. Their results document that organizational life cycle stages significantly influence financing, investment, asset pricing, financial performance, dividend policy, corporate social responsibility, human resource's learning and development, reporting of economic entities (Atif, Liu and Nadarajah, 2022; Bakarich, Hossain and Weintrop, 2019; Hasan and Habib, 2017; Krishnan, Myllymäki, and Nagar, 2021; Tam, Gray and Can, 2016; Tsalidis and others, 2021; Zhao and Xiao, 2018).

A separate category of researchers has been interested in investigating the relationship between the organizational life cycle stages and the capital structure, in order to understand how corporate financing changes over time, that is, how capital restructuring takes place (Hillier and others, 2014). In general, firms try to discover the optimal capital structure that maximizes their market value. This structure, also called the target capital structure (Hillier and others, 2014), represents the optimal debt-equity ratio if it results in the lowest cost of capital (Mironiuc, 2018).

The response of the financial policy to the passage through the phases of the organizational life cycle was analyzed by Frielinghaus, Mostert and Firer (2005) in South Africa, La Rocca, La Rocca şi Cariola (2011) in Italy, Tian, Han and Zhang (2015) in China, Ahsan, Wang and Qureshi (2016) in Pakistan, Pinková and Kamínková (2012) in the Czech Republic, Ambalavanar (2019) in Germany, Castro, Tascón and Amor-Tapia (2015) in France and Spain. We join the existing discussions in the literature on this topic to examine the direct impact of the corporate life cycle stages on the capital structure, which is why we pose the following research question: "*What is the extent of the capital restructuring determined by the corporate life cycle stages of Romanian listed companies*?" To answer it, the paper analyzes whether the level of indebtedness, measured by the financial leverage, and implicitly, the degree of financing through equity, of Romanian companies listed on the main segment of the BSE, changes from a stage to another and whether indebtedness is more important in the initial phases of the life cycle.

The paper is, to the best of our knowledge, ***the first*** to address the connection between the phases of the corporate life cycle and the level of external financing of Romanian listed companies. It joins and complements the existing literature in the field of the organizational life cycle, contributing to it by bringing new and more recent evidence regarding the existence of a relevant relationship between the financing behavior of listed firms and their life cycle, in the case of an emerging country (Romania), which is less

studied. An emerging country, where the capital market is a relatively new and less developed institution, and the opacity of business ties generates information asymmetry, with direct negative effects on the level of corporate lending (Jõeveer, 2013; Nenu, Vintilă and Gherghina, 2018) represents a relevant background for studying this topic. The macroeconomic context, dominated by the lack of available public information and the poor quality of state institutions, significantly influences the volume of corporate bank lending, which is low, and the level of interest rates, which is high (Jõeveer, 2013; Nenu, Vintilă and Gherghina, 2018). On the other hand, the poorly developed and inefficient capital market makes banking intermediation play an essential role in the development of new businesses and in their subsequent growth (La Rocca, La Rocca and Cariola, 2011), which justifies, once again, studying the association between life cycle and indebtedness in this context.

To achieve the proposed research goal, two models are used to test the two developed research hypotheses. The first one is based on the classification of firms by life cycle phase according to their cash flows patterns (Dickinson, 2011) and the second model uses the age of firms and its non-linear relationship with the capital structure (La Rocca, La Rocca and Cariola, 2011). The results reveal the impact of the business life cycle on financing resources, supporting life cycle theories according to which firms in a certain stage have different financing characteristics and behaviors compared to those in another phase. Also, the empirical study shows that the company's ability to provide material guarantees for bank loans, the specifics of the activity carried out and the geographical location in certain macro-regions of economic development explain, to a significant extent, the recourse to external financing in certain stages of the business life cycle.

The rest of the paper is organized as follows: Section 1 reviews the theoretical framework and representative studies in the field, which help developing the main research hypotheses. Section 2 describes the research methodology in the form of the variables used, sample selection and data sources, but also the used methods and developed models. Section 3 consists of the presentation and discussion of the results and the last section concludes the paper.

1. Delimitations and interactions between organizational life cycle theory and financial structure theories

The organizational literature indicates the presence of elements related to the life cycle theory in studies as early as the 50s and summarizes the entire chronology of the development of this theory in four periods (Tam, Gray and Can, 2016).

Studies related to the "primitive period" (1950-1960) look at the progress of firms biologically, with an emphasis on the management challenges and survival thresholds at certain stages (Lippitt and Schmidt, 1967). During the 70s, numerous models were developed to conceptually describe, through a different number of phases, the evolution of organizations in terms of size (from small to large) and age (from young to mature), in correlation with changes in the managerial strategies and the business environment (Scott, 1971; Greiner, 1972; Lyden, 1975). One can note the ten-stage model developed by Adizes (1979) and his key observation that the stages of organizational life "are defined by the interrelationship between flexibility and control" and not by the chronological age, sales, assets or number of employees of the organization (Frielinghaus, Mostert and Firer, 2005).

The extension of the organizational life cycle context to the SME environment is specific to the 80s, a period in which a stage of decline in the organizational life cycle is proposed for the first time, because an organization cannot remain profitable, stable and efficient for its entire life (Cameron, Myung and Whetten, 1987). Miller and Friesen (1984) review research in organizational life stage theory to identify common phases in most of the literature and to propose five generic stages of organizational growth (introduction, growth, maturity, revival, and decline), while arguing that not all organizations will go through the same stages in a linear sequence. In the same decade, Mintzberg (1984) tries to understand the power of the manager and managerial coalitions in different stages of the organizational life cycle, and Kazanjian (1988) finds that human resources are crucial in all these stages.

Tam, Gray and Can (2016) call the period of the 90s and after the "validation period", in which researchers strive to validate, by empirical means, the models of the

organizational life cycle previously proposed in a conceptual form and to debate more deeply the consistency and linearity of the stages of growth. Thus, Hanks (1990) argues that organizations do not necessarily pass through the defined growth stages, but operate actively by managing change from one stage to another without a unidirectional sequence. Drazin and Kazanjian (1990) review Miller and Friesen's (1984) five-stage model with additional tests and conclude that the stages of birth, growth, and maturity are empirically supported, thus providing further evidence for a usable three-stage model. Phelps, Adams and Bessant (2007) accept the concept of organizational problems within the life cycle and opine that overcoming them and continuing to grow depend on the speed with which organizations acquire the necessary knowledge to address them.

To conclude, we emphasize that the organizational life cycle theory, which enjoyed the greatest popularity in the 1970s and 1980s and is seen as an extension of the product life cycle theory, is the result of research in the field of strategic management (Frielinghaus, Mostert and Firer, 2005). Understanding the individual stages of the organizational life provides management with a compass to guide the firm's strategic direction and understand how to commit and balance tangible and intangible resources as the firm moves from one life stage to another. According to Frielinghaus, Mostert and Firer (2005) and Solomon, Fernald and Dennis (2003), these are critical aspects of a firm's success.

Around the time when the theory of organizational life cycle began to develop, researchers with experience in corporate finance developed the controversial theories related to the capital structure.

The debate related to the mechanisms that guide firms' financing choices began in 1958, when Modigliani and Miller published the theory of capital structure irrelevance or value invariance, according to which "the market value of any firm is independent of its capital structure" (Frielinghaus, Mostert and Firer, 2005; Myers, 1984). Their theory was developed under perfect capital market conditions ("frictionless market") or under a "deliberately artificial set of conditions" (Barclay, Smith and Watts, 1995; Frielinghaus, Mostert and Firer, 2005), i.e. a market without taxation, a market where all operators have perfect and symmetrical access to information, a market without transaction costs and with a stable investment policy. By challenging the simplifying assumptions of Modigliani and Miller, other key theories in the study of capital structure were derived.

The trade-off theory, substantiated by Kraus and Litzenberger, in 1973, disputes the hypothesis of the lack of taxes by Modigliani and Miller and introduces the effects of taxation into the analysis. According to this theory, indebted companies benefit from fiscal savings as the interest on the borrowed capital is tax deductible, which theoretically encourages the increase of indebtedness. Stiglitz (1974) brings as an argument for limiting debt to an optimal level the costs of bankruptcy, which are associated with high levels of debt (Frielinghaus, Mostert and Firer, 2005). Consequently, the static trade-off theory, an evolved variant of the initial theory, concludes that companies can establish an optimal level of indebtedness, respectively a capital structure that maximizes their market value by balancing the fiscal savings, derived from indebtedness, with the current value of bankruptcy costs (Ambalavanar, 2019; Myers, 1984).

The *pecking order theory* (POT) is authored by Myers and Majluf (1984) and comes as a reaction to the perfect information hypothesis of Modigliani and Miller. According to this theory, there is an informational asymmetry between managers, who are better informed about the company's risks and prospects, and contractual partners (creditors and investors/shareholders), who lack the same key information. Also, based on the agency relationship, there may be conflicts of interest between managers and shareholders or between shareholders and creditors, which could affect the company's financing decisions. Both situations lead to the manifestation of phenomena such as adverse selection and moral hazard, increase the company's risk, increase the cost of capital, due to the higher rewards expected by creditors, and negatively affect the participants in the contractual relationship (Mirrlees, 1971). In order to minimize the costs of adverse selection (costs of information asymmetry) and moral hazard (agency costs), managers prefer to access the necessary financing resources in a hierarchical order, that is: i) reinvested profits; ii) debt; iii) equity. Retained earnings are cheaper compared to debt and equity financing due to the avoidance of information asymmetry, in the absence of the involvement of external financiers. As for external financing, managers prefer to use debt, especially low-risk debt that usually corresponds to short-term debt, to the detriment of equity, the cost of debt being lower than the cost of equity (Serrasqueiro and Caetano, 2014). According to agency cost theory, firms use more debt in their capital structure when investors try to pressure management to use funds efficiently (Frielinghaus, Mostert and Firer, 2005).

Capital structure and organizational life cycle have largely been examined separately. Only at the beginning of the 90s did researches appear to seek to explain the interdependencies between these theories, the empirical testing of the mentioned links having appeared even later. It was observed, at that time, that understanding the characteristics of the company's life stages could facilitate the understanding of corporate financing mechanisms and the identification of the factors that determine the need to adjust the capital structure over time. The results of these interdisciplinary researches, on topics related to strategic management and corporate finance, have contributed to the formation of a body of knowledge considered by some researchers to represent the capital structure life stage theory (Frielinghaus, Mostert and Firer, 2005).

Frielinghaus, Mostert and Firer (2005) opine that early research on the connections between capital structure and organizational life cycle stages have focused their arguments on the trade-off between financial risk and business risk. For example, Bender and Ward (1993) postulate that business risk is reduced during the life stages of a firm, allowing financial risk to increase. Thus, the authors warn the firms in the early stages of life that they should have less debt to compensate for the higher business risk, and in the mature stages they should resort to debt as much as possible, encouraged by the fiscal savings. When entering the declining life stages, companies would again experience an increase in business risk and should reduce their exposure to debt. Damodaran (2001) concluded that expanding firms would primarily finance themselves with equity, while mature firms would replace equity with debt. Hovakimian, Opler and Titman (2001) believe that firms should progressively use more debt in their financing mix as they mature and also use more debt to finance existing assets and more equity to finance their growth opportunities. The results of the previously mentioned studies seem to confirm the static trade-off theory, namely that debt ratios follow a "low-high-low" model ("inverted U") throughout the life of the firm.

Against the background of insufficient empirical studies that test the link between the capital structure and the organizational life cycle, Frielinghaus, Mostert and Firer (2005) are among the first authors to carry out a pilot study, on South African industrial firms, finding a statistically significant relationship between the stage of life and capital structure. However, their results do not support the trade-off theory, but confirm the pecking order theory, according to which firms in the early and late

stages of life, which usually have less internal financing than they need, use more debt than mature firms (high-low-tall/U-shaped pattern). Similar conclusions are presented by La Rocca, La Rocca and Cariola (2011) after examining the strategic financing options of Italian small and medium-sized companies through the lens of the business life cycle. Thus, in accordance with the pecking order theory, the authors argue that in the first stages of the life cycle, debt is the first financing option for young and middle-aged companies, due to informational asymmetry and insufficient retained earnings to support the business with internal financing. On the contrary, companies can have substantially higher retained earnings in their maturity stages, being able to replace debt with internal capital and thus rebalance their financial structure in the later stages of their life cycle. Pinková and Kamínková (2012) empirically prove that Czech firms in the birth, growth and decline life cycle stages have the highest levels of debt. Furthermore, they find that this financial behavior appears to be consistent over time and across industries.

It can be seen that the empirical deductions confirm, in relation to the analyzed theories, that firms make different financing decisions from one stage to another of their life cycle, which makes the benefits and costs of debt financing vary throughout the life cycle and determine the adjustment of financing strategies. In this context, the first research hypothesis is developed:

H₁: *Life cycle stages, delimited based on the cash flows patterns, are significantly associated with the level of indebtedness through bank loans in the case of Romanian companies listed on the Bucharest Stock Exchange.*

In order to test whether the age of the companies also influences their financing decisions, the second research hypothesis is developed:

H₂: *The financial structure of the capital of companies listed on the Bucharest Stock Exchange is significantly correlated with their age.*

2. Research methodology

2.1 Variables

Table no. 1 shows how the main dependent and independent variables used in the models were calculated. It also refers to other relevant papers in the field that used the same or similar variables, in different contexts.

Variable	Calculation method	Source
Table no. 1. Dependent variable, main variables of interest and control variables		
Dependent variable		
Financial leverage (LEV)	Interest-bearing financial liabilities / (Interest-bearing financial liabilities + Stockholders equity)	(Dickinson, 2011; La Rocca, La Rocca and Cariola, 2011; Hasan and Habib, 2017)
Main variables of interest		
Life cycle stages (LCS) • Introduction (Intr) • Growth (Grw) • Maturity (Mat) • Shake-out (SO) • Decline (Dcl)	Based on cash flows from operations (CFO), investments (CFI) and financing (CFF) as follows: Introduction: CFO <0, CFI <0, CFF >0 Growth: CFO >0, CFI<0, CFF>0 Maturity: CFO >0, CFI <0, CFF <0 Shake-out: CFO>0, CFI>0, CFF>0 sau CFO>0, CFI >0, CFF <0 sau CFO<0, CFI<0, CFF <0 Decline: CFO<0, CFI >0, CFF>0 sau CFO <0, CFI >0, CFF <0	(Dickinson, 2011; Tian, Han and Zhang, 2015; Hasan and Habib, 2017; Wasilewski and Żurakowska, 2020; Durana and others, 2021)
Age (Age)	ln(number of years since incorporation)	(Dickinson, 2011; La Rocca, La Rocca and Cariola, 2011; Tian, Han and Zhang, 2015; Hasan and Habib, 2017; Cucculelli and Peruzzi, 2020; Durana and others, 2021)
Control variables		
Profitability (Prof)	BDITDA/ Capital	(La Rocca, La Rocca and Cariola, 2011)
Tangibility (Tang)	Fixed tangible assets/Total assets	(La Rocca, La Rocca and Cariola, 2011; Tian, Han and Zhang, 2015; Durana and others, 2021)
Size (Size)	ln(total assets)	(Tian, Han and Zhang, 2015; Hasan and Habib, 2017; Huang, Tseng and Lin, 2020)
Industry (Industry)	Manufacturing (Man) Pharmaceutical (Pharma) Gas and electricity (G&E) Financial (Fin) Other industries (Other)	(La Rocca, La Rocca and Cariola, 2011; Hasan and Habib, 2017)
Geographical location (Geography)	The four macroregions of development of Romania (MR1-MR4)	(La Rocca, La Rocca and Cariola, 2011; Walid, 2019; Cucculelli and Peruzzi, 2020)

Source: Authors' projection

Financial leverage (LEV), as an expression of the degree of indebtedness of the company, is an essential indicator of capital structure because its level influences the financial balance of the company (Mironiuc, 2018). High leverage increases the degree of risk associated with the firm, with negative effects on its market value. Finding an optimal level of indebtedness and its appropriate structure is a constant concern for managers when implementing the financial policy. From another perspective, leverage indicates the financial constraints faced by the firms which, by resorting to external financing, are carefully analyzed and monitored by creditors. This limits the decision-making freedom of managers (Hasan and Habib, 2017). In Romania, the external financing of listed companies mainly takes the form of accounts payable and bank loans (Huian, 2015b), the use of debt securities, such as bonds, or derivative instruments, being very limited, due to a poorly developed and ineffective capital market (Istrate, 2014; Huian, 2015a). Therefore, the use of short and long-term loans payable is the main form of

external financing for the growth of companies of all sizes, being a specific instrument for countries where the main financial intermediary is the banking sector (La Rocca, La Rocca and Cariola, 2011).

Firm *age* (Age) is often used, as a separate indicator or in combination with other indicators (eg, size), as a proxy for the life cycle of firms (Tian, Han, and Zhang, 2015; Hasan and Habib, 2017). Its use is often criticized because firms do not move sequentially from one life stage to another, so they do not necessarily go progressively from start-up to decline. Dickinson (2011) believes that the life cycle is non-sequential, as a firm can go into decline from any phase, even from the introduction stage. She proposes the classification of firms into various stages according to the *characteristics of their cash flows*. In this paper, both classification of firms into life cycle stages (the cash flows model and companies' age) are used.

Based on the reviewed literature, five *control variables* are selected, as deemed relevant to the study of the relationship between the capital structure and the corporate life cycle. *Profitability* (Prof) is considered, according to the pecking-order theory, to have an essential role in optimizing the financial structure, because profitable companies have at their disposal levers other than bank loans to finance their short- and long-term needs (Hasan and Habib, 2017; La Rocca, La Rocca and Cariola, 2011; Nenu, Vintilă and Gherghina, 2018). Therefore, a negative relationship between financial leverage and profitability is expected. The *tangibility* (Tang), expressed as the share of tangible fixed assets in total assets, is expected to be relevant for obtaining borrowed capital due to its role in guaranteeing loans (Nenu, Vintilă and Gherghina, 2018). *Firm size* (Size), inversely correlated with the probability of bankruptcy, allows firms to borrow more. Large firms have easier access to external financing and can more easily generate

economies of scale (Cucculelli and Peruzzi, 2020). This fact translates into an expected positive relationship with the dependent variable. The *field of activity* (Industry) shows the differences among sectors with different growth rates that leave their mark on the coporate financial structure (La Rocca, La Rocca and Cariola, 2011). *Geographical location* (Geography), expressed through regional dummy variables, is considered relevant because more economically developed areas, with more efficient local institutions, are potentially more accessible for obtaining bank loans (La Rocca, La Rocca and Cariola, 2011; Huang, Tseng and Lin, 2020).

2.2 Sample and data source

The data was taken from Bureau Van Dijk's Orbis database and refers to companies listed on the main segment of the Bucharest Stock Exchange, covering a timeframe between 2010 and 2020. All financial data comes from individual or consolidated financial statements, drawn up according to the IFRS. The age of the companies was calculated based on the data taken from their websites about their year of incorporation. The geographical classification was carried out according to the declared main headquarters, based on Romania's development macro-regions, at the NUTS1 level (Eurostat, 2022a). Due to availability of cash flow data, an unbalanced sample of 68 firms and 512 annual observations was obtained. Subsequently, observations with zero financial leverage were removed, leaving 59 firms and 365 observations in the final sample.

2.3 Research methods and models

In order to test the research hypotheses, a panel data analysis was performed, by developing two models, according to equations (1) and (2).

$$Y_{it} = \beta_0 + \beta_1 \times LCS_{it} + \beta_2 \times Prof_{it} + \beta_3 \times Tang_{it} + \beta_4 \times Size_{it} + \beta_5 \times Industry_{it} + \beta_6 \times Geography_{it} + \varepsilon \quad (1)$$

$$Y_{it} = \beta_0 + \beta_1 \times Age_{it} + \beta_2 \times Age^2 + \beta_3 \times Prof_{it} + \beta_4 \times Tang_{it} + \beta_5 \times Size_{it} + \beta_6 \times Industry_{it} + \beta_7 \times Geography_{it} + \varepsilon \quad (2)$$

where, t = time period (year); i = company at time t; Y = dependent variable (financial leverage – LEV); LCS = life cycle stages (dummy variables described in **Table no. 1**); Age = Age of the company, calculated from the date of its incorporation; Prof= profitability; Tang = tangibility or share of tangible fixed assets in total assets;

Size = company size; Industry = field of activity; Geography = location in the 4 economic macroregions of Romania; ε = the error term.

In both equations, we started from a *baseline model* that contained, in addition to the variables of interest LCS and Age, the control variables Prof, Tang and Size. Subsequently, dummy variables regarding the field of activity

(Industry) and geographic location (Geography) were added, which resulted in the *extended models* from equations (1) and (2). To account for the non-linear relationship between capital structure and firm age, the term age squared (Age[2]) was introduced, following the model of La Rocca, La Rocca and Cariola, 2011.

In Model 1, *Ordinary Least Square* (OLS) regression was applied to the baseline model, with heteroscedasticity-consistent standard errors. For the extended Model 1, *Least-Squares Dummy Variable* (LSDV) was applied (Greene, 2003; La Rocca, La Rocca, & Cariola, 2011) with cross-sectional effects, that diminish or cancel the bias generated by the omitted variables, and with robust standard errors. The results of this model are identical to those we would obtain when applying the cross-sectional fixed-effects model, proven to be the most appropriate, according to the Hausman test. *Generalized Least Square* (GLS) regression with random effects and robust standard errors was applied to the baseline Model 2. Extended Model 2, based on the LSDV approach with cross-sectional and time effects, was validated by testing the time parameters (La Rocca, La Rocca, and Cariola, 2011).

In order to avoid the dummy variable trap (Gujarati, 2011), which creates multicollinearity issues that affect the accuracy of the calculated regression coefficients, three (two) dummy variables used in Model 1 (Model 2) were chosen as reference variables: for the life cycle – Introduction stage (Intr); for the field of activity and the economic macro-regions, the categories with the highest

frequency, namely, the manufacturing industry sector [Man] and the MR1 macro-region, formed by the NUTS2 regions North-West and Centre. To ensure normality of the distribution, the dependent variable (LEV) and the control variable (Tang) were logarithmized.

3. Results and discussion

Table no. 2 shows the descriptive statistics of the modeled variables. It is observed that the financial leverage had an average level of approximately 0.25, which denotes a low degree of use of external financing by Romanian listed companies. These low levels are not surprising for an emerging country like Romania, where information asymmetry generates problems which constitute a major impediment in companies' recourse to bank financing (Jõeveer, 2013). The negative values of the indicator are due to the negative equity of the firms in question (12 observations). The average age of the sampled firms was approximately 50 years. Around half of them (48.21%) were in the mature phase of their life cycle and 22.73% were in the growth stage. Between 10 and 11% of the companies were in the introduction or shake-out phases. Only 7.39% were in decline.

Table no. 2. Descriptive statistics				
Variable	**Mean**	**Standard deviation**	**Minimum**	**Maximum**
LEV	0.2490	0.6112	-2.8381	8.1813
Age	49.9726	36.0739	1.0000	246.0000
Intr	0.1013	0.3022	0.0000	1.0000
Grw	0.2273	0.4197	0.0000	1.0000
Mat	0.4821	0.5003	0.0000	1.0000
SO	0.1150	0.3195	0.0000	1.0000
Dcl	0.0739	0.2620	0.0000	1.0000
Prof	0.8077	2.0159	-1.5315	26.4466
Tang	0.4591	0.2404	0.0004	0.9500
Size	11.3422	1.7532	7.3187	16.1103
Man	0.4904	0.5005	0.0000	1.0000
Pharma	0.0821	0.2750	0.0000	1.0000
G&E	0.1643	0.3711	0.0000	1.0000
Fin	0.0712	0.2575	0.0000	1.0000
Other	0.1917	0.3942	0.0000	1.0000
MR1	0.3561	0.4795	0.0000	1.0000
MR2	0.2246	0.4179	0.0000	1.0000
MR3	0.3041	0.4606	0.0000	1.0000
MR4	0.1150	0.3195	0.0000	1.0000

Source: Authors' processing, 2022

Profitability was, on average, 0.80, only mature firms exceeding 1 (**Table no. 2**) and tangible fixed assets represented approximately 46% of total assets. The average size of the assets of the sampled companies was approximately 530,000 thousand euros, with fairly high standard deviations, varying between a minimum of 1,508 thousand euros and a maximum of 9,922,577 thousand euros. Almost half of the sample was represented by manufacturing companies (Man – 49.04%), 16.43% were active in the gas and electricity (G&E) sector, 8.21% in the pharmaceutical sector, approximately 7% in the financial sector (exclusively banking) and the rest (19.17%) in other sectors than those mentioned. 35.61% of the companies came from the MR1 macro-region, 30.41% from Bucharest – Ilfov and South-Muntenia (MR3 macro-region) and only 11.5% from the South-West and West

(MR4 macro-region). According to the value of GDP per capita, the most developed macro-region in the analyzed period was MR3, followed at a great distance by MR1 and MR4 (almost equal) and MR2 (Eurostat, 2022b).

Table no. 3 presents the mean of the main variables of interest by life cycle stage, industry and geography. It is observed that the most indebted firms are those in the introduction phase, with the leverage decreasing as they advance in the life cycle. Profitability, tangibility and the size of total assets showed the highest values in the maturity stage. The most indebted are the companies in the manufacturing sector, and the most profitable are those in the financial sector and gas and electricity (which are also the largest). In the macro-regions, the companies in MR3 have the biggest leverage, (they are also the largest), and the companies in MR1 are the most profitable.

Table no. 3. Descriptive statistics by life cycle stage, field of activity and geographic region

Variable	No. of obs.	LEV (Mean)	Prof (Mean)	Tang (Mean)	Size (Mean)
Life cycle stages					
Intr	37	0.3009	0.7661	0.4216	10.5483
Grw	83	0.2856	0.6803	0.4613	11.2753
Mat	176	0.2451	1.1005	0.5125	11.7749
SO	42	0.2256	0.3446	0.3290	10.9001
Dcl	27	0.1272	0.0685	0.3582	10.5040
Field of activity					
Man	179	0.3026	0.5374	0.5238	10.7913
Pharma	30	0.2344	0.7141	0.3388	11.3979
G&E	60	0.1784	1.3352	0.4925	13.8296
Fin	26	0.1720	2.7082	0.1422	10.9832
Other	70	0.2074	0.3812	0.4345	10.7288
Geographical location					
MR1	130	0.2568	1.5446	0.4777	10.6972
MR2	82	0.2063	0.2722	0.5390	11.1743
MR3	111	0.2799	0.5064	0.4262	12.1784
MR4	42	0.2267	0.3689	0.3330	11.4573

Source: Authors' processing, 2022

The correlation analysis in **Table no. 4** reveals relationships between variables of very weak, weak and moderate intensity, both positive and negative, which minimizes the risk of multicollinearity in the developed models.

Table no. 4. Correlation analysis

Variable	1	2	3	4	5	6	7	8	9	10	11
1. LEV	1										
2. Intr	0.12	1									
3. Grw	0.15	-0.17	1								

Variable	1	2	3	4	5	6	7	8	9	10	11
4. Mat	-0.07	-0.30	-0.54	1							
5. SO	-0.14	-0.11	-0.19	-0.35	1						
6. Dcl	-0.07	-0.08	-0.15	-0.27	-0.10	1					
7. Prof	0.00	0.00	-0.03	0.13	-0.08	-0.09	1				
8. Tang	0.21	-0.10	0.04	0.24	-0.21	-0.17	-0.13	1			
9. Size	-0.07	-0.16	-0.02	0.23	-0.08	-0.13	-0.04	0.05	1		
10. Industry	-0.18	0.04	-0.01	-0.05	0.06	-0.00	0.07	-0.36	0.09	1	
11. Geogr.	-0.06	-0.04	0.06	-0.05	0.05	-0.01	-0.22	-0.22	0.28	-0.04	1

Source: Authors' processing, 2022

The results of the regression analysis are presented in **Table no. 5**.

Table no. 5. Regression analysis				
Variable	**Model 1** **Life cycle stages**		**Model 2** **Age**	
	Baseline model	**Extended model**	**Baseline model**	**Extended model**
Grw	-0.2755	-0.0952		
Mat	-0.8772***	-0.4326***		
SO	-1.1566***	-0.6568***		
Dcl	-0.9419**	-0.2860		
Age			0.6852	2.1689*
Age^2			-0.2021	-0.6312*
Prof	0.0252	-0.0010	-0.0142	0.0015
Tang	0.3005***	0.5466***	0.5169**	0.5064***
Size	-0.0584	0.0892	0.0082	0.0940
Pharma		-0.1601		2.2377
G&E		-1.8107***		-3.3692**
Fin		1.7529***		0.5978
Other		-3.0809***		-2.4989***
MR2		-0.2233		-0.4669
MR3		0.5293		1.4342*
MR4		-3.1409***		-2.3122
R^2	0.1071	0.8286	0.0770	0.8293
F test /Wald chi	4.39***	4.53***	12.17**	-
Year dummies	-	No	-	Yes
Company dummies	-	Yes	-	Yes

Source: Authors' processing, 2022

Table no. 5 shows that in Model 1, which uses the cash flows patterns to classify firms into the life cycle stages, both in its baseline and extended form, relatively the same independent variables have statistically significant connections with financial leverage. Thus, mature firms and those in the shake-out stage have lower debt ratios than those in the reference category (introduction stage). This confirms the idea from the literature that more mature firms generally have positive operating cash flows and

high liquidity (Dickinson, 2011; Durana and others, 2021), so a greater ability to generate internal financial resources (profits), resorting to external financing to a lesser extent. By contrast, early-stage firms have a greater need to raise capital from bank loans to grow (La Rocca, La Rocca and Cariola, 2011; Tian, Han and Zhang, 2015; Wasilewski and Żurakowska, 2020). In other words, this result is consistent with the pecking-order theory, according to which firms initially access bank loans and in the later

stages of their life cycle turn more and more to equity issues and self-financing, because they have high and stable profitability (Myers, 1984).

As for the control variables, it can be observed that there are no scale effects, as the size of the company did not influence the degree of use of external financial resources. This finding is consistent with other results from the literature, including those regarding Romanian companies (Nenu, Vintilă and Gherghina, 2018; Walid, 2019). Profitability does not turn out to be associated with leverage, which can be explained by the low level of corporate profitability. This lack of significance is also confirmed by other works that focus on the Romanian listed companies (Nenu, Vintilă and Gherghina, 2018). The only relevant financial variable was tangibility (Tang). This confirms the important role of tangible fixed assets in attracting capital from banks, for which they often serve as collateral (La Rocca, La Rocca and Cariola, 2011; Mironiuc, 2018; Nenu, Vintilă and Gherghina, 2018), meaning that a higher level of these assets is associated with higher leverage. The extended model validates the existence of a relationship between the field of activity and the level of financial leverage (La Rocca, La Rocca and Cariola, 2011), highlighting the differences between the various sectors, based on the specificity of each sector, which influences its short- and long-term financing needs (Mironiuc, 2018). Thus, companies in the gas and electricity (G&E) sector and in other sectors (Other) have a lower level of debt than those in the reference group (manufacturing) and for those in the financial sector (Fin) there is a significant and positive relationship with financial leverage. In addition, compared to the firms in the reference microregion MR1 (consisting of the NUTS2 Northwest and Center regions), the most numerous in the sample, firms located in the MR4 microregion (consisting of the NUTS2 Southwest and West regions) borrow less capital from banks. MR4 consists predominantly of companies from the manufacturing sector (Man), which represents almost 75% of the total number of companies in the region (the rest operating in the pharmaceutical and financial sectors) and companies distributed in a perfectly balanced manner between the initial stages (introduction and growth) and the most advanced stages of the life cycle (maturity, shake-out and decline). Hypothesis H$_1$ is validated.

Model 2 shows the low significance (only in the extended model, with a p-value<0.1) of the variable age (Age) for the capital structure, confirming some similar results from the literature (Tian, Han and Zhang, 2015) and invalidating

others (La Rocca, La Rocca and Cariola, 2011). It is observed that both variables (Age and its square – Age^2) are significant, validating the existence of a non-linear relationship, but they have an opposite sign, which shows that as firms age, the effect of age on leverage becomes weaker. This fact can be interpreted in the sense that the ageing of companies comes with the repayment of bank loans, thus reducing indebtedness, and with the use of other means of financing (Walid, 2019). Regarding the control variables, results similar to those in model 1 are found, namely the positive influence of a high level of tangible fixed assets, which can be used as a collateral for the borrowed capital (Mironiuc, 2018) and the negative association with some fields of activity such as gas and electricity (G&E) and other sectors (Other). Unlike model 1, in the second one, location in the most economically developed microregion (MR3) comes with a higher level of indebtedness than that of the firms from the reference category, a fact also confirmed by the descriptive statistics in **Table no. 3**. Hypothesis H$_2$ is partially validated.

Conclusions

The paper, based on the organizational life cycle approach, investigates the degree of dependence between certain stages of the life cycle and the capital structure of listed companies. The results validate the pecking-order theory, according to which the more mature and therefore more profitable firms substitute the financial debts, to which they resorted to during the introduction and growth stage, with profits and resources generated through equity issuance, restructuring their sources of financing. Therefore, firms at various stages of their life cycle, determined on the basis of the cash flows patterns, have different financing characteristics.

Changes in the capital structure can be a non-linear function of firm age. However, in this paper, the nonlinear relationship is of low intensity and shows that reaching maturity increases the firm's ability to generate internal resources, which allows it to gradually change its capital structure. Manufacturing companies and those located in the MR3 macro-region (which includes Romania's most developed area – Bucharest-Ilfov) are the ones that borrow the most.

The results are intended to be useful to investors, creditors, managers, auditors and financial analysts in their correct assessment of companies, of the financing decisions made in various phases of their life cycle and of the determinants of the choices regarding the capital structure. The paper is also

addressed to regulators who must be aware of the need to develop and implement policies to support the growth of companies based on the most diverse financing alternatives, which ensure access to both the financial market and the markets of goods and services.

The limitations of the paper are related to the small sample size, specific to emerging capital markets. It also focuses on a sample of well-established companies, which resort to bank loans to a rather limited extent because they have a greater variety of financial instruments at their disposal than small and medium-sized companies. Replicating the models on the case of the latter companies, for a comparative analysis, is one of the future research directions that the authors intend to pursue.

BIBLIOGRAPHY

1.   Adizes, I. (1979), Organizational passages-diagnosing and treating lifecycle problems of organizations, *Organizational Dynamics*, vol. 8, no 1, pp. 3-25. https://doi.org/10.1016/0090-2616(79)90001-9.

2.   Ahsan, T., Wang, M. and Qureshi, M. A. (2016), How do they adjust their capital structure along their life cycle? An empirical study about capital structure over life cycle of Pakistani firms, *Journal of Asia Business Studies*, vol. 10, no 3, pp. 276-302, https://doi.org/10.1108/JABS-06-2015-0080.

3.   Akbar, A., Akbar, M., Tang, W. and Qureshi, M.A. (2019), Is Bankruptcy Risk Tied to Corporate Life-Cycle? Evidence from Pakistan, *Sustainability*, vol. 11, no 3:678, pp. 1-22, https://doi.org/10.3390/su11030678.

4.   Ambalavanar, N. (2019), The impact of corporate life cycle on the capital structure of German listed companies, Master thesis, Behavioural, Management and Social Sciences, University of Twente.

5.   Anthony, J. H. and Ramesh, K. (1992), Association between accounting performance measures and stock prices. A test of the life cycle hypothesis, *Journal of Accounting and Economics*, vol. 15, no 2-3, pp. 203-227, https://doi.org/10.1016/0165-4101(92)90018-W.

6.   Atif, M., Liu, B. and Nadarajah, S. (2022), The effect of corporate environmental, social and governance disclosure on cash holdings: Life-cycle perspective, *Business Strategy and the Environment*, vol. 31, no 5, pp. 2193–2212, https://doi.org/10.1002/bse.3016

7.   Bakarich, K., Hossain, M. and Weintrop, J. (2019), Different time, different tone: Company life Cycle, *Journal of Contemporary Accounting & Economics*, vol. 15, no 1, pp. 69-86, https://doi.org 10.1016/j.jcae.2018.12.002.

8.   Barclay, M. J., Smith, Jr., C. W. and Watts, R. L. (1995), The Determinants of Corporate Leverage and Dividend Policies, *Journal of Applied Corporate Policy*, vol. 7, no 4, pp. 4-19, https://doi.org/10.1111/j.1745-6622.1995.tb00259.x.

9.   Bender, R. and Ward, K. (1993), Corporate Financial Strategy. Oxford: Butterworth-Heinemann.

10.   Cameron, S.K., Myung U. K. and Whetten, A.D. (1987), Organizational Effects of Decline and Turbulence, *Administrative Science Quarterly*, vol. 32, no 2, pp. 222-240, https://doi.org/10.2307/2393127.

11.   Castro, P., Tascón, M.T. and Amor-Tapia, B. (2015), Dynamic analysis of the capital structure in technological firms based on their life cycle stages, *Spanish Journal of Finance and Accounting*, vol. 44, no 4, pp. 458-486, https://doi.org/10.1080/02102412.2015.1088202.

12.   Cucculelli, M. and Peruzzi, V. (2020), Innovation over the industry life-cycle. Does ownership matter?', *Research Policy*, vol. 49, no 1, 103878, https://doi.org/10.1016/j.respol.2019.10387

13.   Dickinson, V. (2011), Cash Flow Patterns as a Proxy for Firm Life Cycle, *The Accounting Review*, vol. 86, no 6, pp. 1969–1994, https://doi.org/10.2308/accr-10130.

14.   Damodaran, A. 2001, Corporate finance: Theory and practice, New York: John Wiley and Sons.

15.   Durana, P., Michalkova, L., Privara, A., Marousek, J. and Tumpach, M. (2021), Does the life cycle affect earnings management and bankruptcy?, *Oeconomia Copernicana*, vol. 12, no 2, pp. 425–461, https://doi.org/10.24136/oc.2021.015.

16.   Eurostat (2022a), *NUTS – Nomenclature of territorial units for statistics – Eurostat*. Available at:

https://ec.europa.eu/eurostat/web/nuts/background (Accessed: 22 November 2022).

17. Eurostat (2022b), *Database – Eurostat*. Available at: https://ec.europa.eu/eurostat/data/database (Accessed: 22 November 2022).

18. Faff, R., Kwok, W. C., Podolski, E. J. and Wong, G. (2016), Do corporate policies follow a life-cycle? *Journal of Banking & Finance*, vol. 69, pp. 95-107, https://doi.org/10.1016/j.jbankfin.2016.04.009.

19. Frielinghaus, A., Mostert, B. and Firer, C. (2005), Capital structure and thefirm's life stage, *South African Journal of Business Management*, vol. 36, no 4, pp. 9-18, https://doi.org/10.4102/sajbm.v36i4.640.

20. Greene, W.H. (2003), *Econometric analysis*. 5th ed., N.J: Prentice Hall, Upper Saddle River.

21. Greiner, L. E. (1972), Evolution and revolution as organizations grow, *Harvard Business Review*, vol. 50, no 4, pp. 37–56.

22. Gujarati, P.D. (2011), *Econometrics by Example*. New edition, London, Palgrave Macmillan.

23. Hanks, S.H. (1990), An empirical examination of the organization life cycle in high technology organizations, Dissertation or Thesis, University of Utah.

24. Hasan, M.M. and Habib, A. (2017), Corporate life cycle, organizational financial resources and corporate social responsibility, *Journal of Contemporary Accounting & Economics*, vol. 13, no 1, pp. 20–36, https://doi.org/10.1016/j.jcae.2017.01.002.

25. Hillier, D., Clacher, I., Ross, A.S., Westerfield, R. and Jordan, D.B. (2014), Fundamentals of Corporate Finance, Maidenhead, McGraw-Hill Education.

26. Hovakimian, A., Opler, T. and Titman, S. (2001), The debt-equity choice, *Journal of Financial and Quantitative Analysis*, vol. 36, no 1, pp. 1-24, https://doi.org/10.2307/2676195.

27. Huang, J.-C., Tseng, J.-J. and Lin, H.-C. (2020), The Impact of Financial Constraint on Firm Growth: an Organizational Life Cycle Perspective and Evidence from Taiwan, *The International Journal of Organizational Innovation*, vol. 12, nr. 3, pp. 265-276.

28. Huian, M.C. (2015a), Impact of the IFRS Adoption on Financial Assets and Liabilities. Empirical Evidence from Bucharest Stock Exchange, *Review of Economic and Business Studies*, vol. 8, no 2, pp. 69–90, https://doi.org/10.1515/rebs-2016-0004.

29. Huian, M.C. (2015b), The Usefulness of Accounting Information on Financial Instruments to Investors Assessing Non-Financial Companies. An Empirical Analysis on the Bucharest Stock Exchange, *Journal of Accounting and Management Information Systems*, vol. 14, no 4, pp. 748–769.

30. Istrate, C. (2014), Impact of IFRS on the accounting numbers of Romanian listed companies, *Journal of Accounting and Management Information Systems*, vol. 13, pp. 466–491.

31. Jõeveer, K. (2013), Firm, country and macroeconomic determinants of capital structure: Evidence from transition economies, *Journal of Comparative Economics*, vol. 41, no 1, pp. 294–308. https://doi.org/10.1016/j.jce.2012.05.001.

32. Kazanjian, R. K. (1988), Relation of dominant problems to stages of growth in technology-based new ventures, *Academy of Management Journal*, vol. 31, pp. 257–280, https://doi.org/10.5465/256548.

33. Kazanjian, R. K. and Drazin, R. (1990), A state-contingent model of design and growth for technology based new ventures, *Journal of Business Venturing*, vol. 5, no 3, pp. 137–151, https://doi.org/10.1016/0883-9026(90)90028-R.

34. Kraus, A. and Litzenberger, R. H. (1973), A state-preference model of optimal financial leverage, *The Journal of Finance*, vol. 28, no 4, pp. 911-922, https://doi.org/10.2307/2978343.

35. Krishnan, G.V., Myllymäki, E-R. and Nagar, N. (2021), Does financial reporting quality vary across firm life cycle?, *Journal of Business Finance & Accounting*, vol. 48, no 5-6, pp. 954-987, https://doi.org/10.1111/jbfa.12508.

36. La Rocca, M., La Rocca, T. and Cariola, A. (2011), Capital Structure Decisions During a Firm's Life Cycle, *Small Business Economics*, vol. 37, no 1, pp. 107–130, https://doi.org/10.1007/s11187-009-9229-z.

37. Lippitt, G.L. and Schmidt, W.H. (1967), Crisis in a developing organisation, *Harvard Business Review*, vol. 45, no 6, pp. 103-112.

38. Lyden, F. J. (1975), Using Parson's functional analysis in the study of public organizations. *Administrative Science Quarterly*, vol. 20, nr. 1, pp. 59–70, https://www.jstor.org/stable/2392123.

39. Miller, D. and Friesen, P. (1980), Archetypes of organizational transition, *Administrative Science Quarterly*, vol. 25, no 2, pp. 268-299, https://doi.org/10.2307/2392455.

40. Mintzberg, H. (1984), Power and Organization Life Cycles, *The Academy of Management Review*, vol. 9, no 2, pp. 207-224, https://doi.org/10.2307/258435.

41. Mirrlees, J. (1971), An Exploration in the Theory of Optimum Income Taxation, *Review of Economic Studies*, vol. 38, pp. 175–208.

42. Mironiuc, M. (2018), Fundamentele ştiinţifice ale gestiunii financiar-contabile a întreprinderii, Ediţia a 3-a revizuită şi adăugită, Iaşi, *Editura Universităţii Alexandru Ioan Cuza din Iaşi*.

43. Myers, S.C. (1984), The Capital Structure Puzzle, *The Journal of Finance*, vol. 39, no 3, pp. 574–592, https://doi.org/10.1111/j.1540-6261.1984.tb03646.x.

44. Myers, S. C. and Majluf, N. S. (1984), Corporate financing and investment decisions when firms have information that investors do not have, *Journal of Financial Economics*, vol. 13, no 2, pp. 187-221, https://doi.org/10.1016/0304-405X(84)90023-0.

45. Nenu, E., Vintilă, G. and Gherghina, Ş. (2018), The Impact of Capital Structure on Risk and Firm Performance: Empirical Evidence for the Bucharest Stock Exchange Listed Companies, *International Journal of Financial Studies*, vol. 6, no 2(41), https://doi.org/10.3390/ijfs6020041.

46. Phelps, R., Adams, R. and Bessant, J. (2007), Life cycles of growing organizations: A review with implications for knowledge and learning, *International Journal of Management Reviews*, vol. 9, no 1, pp. 1–30. https://doi.org/10.1111/j.1468-2370.2007.00200.x.

47. Pinková, P. and Kamínková, P. (2012), Corporate life cycle as determinant of capital structure in companies of Czech automotive industry. *Acta Universitatis Agriculturae et Silviculturae Mendelianae Brunensis*, vol. 60, no 2, pp. 255-260, https://doi.org/10.11118/actaun201260020255.

48. Scott, B. R. (1971), Stages of corporate development–Part 1, Case No 9-371-294, Boston, Intercollegiate Case Clearing House.

49. Solomon, G., Fernald, L.W. and Dennis, W. (2003), Selfidentified management deficiencies of entrepreneurs, *Journal of Private Equity*, vol. 7, no 1, pp. 26-35, https://doi.org/10.3905/jpe.2003.320062.

50. Serrasqueiro, Z. and Caetano, A. (2014), Trade-Off Theory versus Pecking Order Theory: capital structure decisions in a peripheral region of Portugal, *Journal of Business Economics and Management*, Vol. 16, no 2, pp. 445-466, https://doi.org/10.3846/16111699.2012.744344.

51. Stiglitz, J.E. (1974), On the irrelevance of corporate financial policy, *The American Economic Review*, vol. 64, no 6, pp. 851-867, https://www.jstor.org/stable/1815238.

52. Tam, S., Gray, E.D. and Can, W. (2016), We Learn from the Organizational Life Cycle Theory? A Conceptualization for the Practic of Workplace Learning, *Journal of Management Research*, vol. 8, no 2, pp.18-30, https://doi.org/10.5296/jmr.v8i2.9093.

53. Tian, L., Han, L. and Zhang, S. (2015), Business Life Cycle and Capital Structure: Evidence from Chinese Manufacturing Firms, *China & World Economy*, vol. 23, no 2, pp. 22–39, https://doi.org/10.1111/cwe.12105.

54. Tsalidis, G.A., de Santo, E., Gallart, J.J.E., Corbera, J.B., Blanco, F.C. and Pesch, U. (2021), Developing social life cycle assessment based on corporate social responsibility: A chemical process industry case regarding human righ, *Technological Forecasting and Social Change*, vol.165, 120564, pp. 1-9, https://doi.org/10.1016/j.techfore.2020.120564.

55. Walid, Y. (2019), Life Cycle Theory of the Capital Structure: Evidence from Tunisian SMEs, *Asian Economic and Financial Review*, vol. 9, no 4, pp. 432–449, https://doi.org/10.18488/journal.aefr.2019.94.432.449.

56. Wasilewski, M. and Żurakowska, J. (2020), The Stages of Firm Life Cycle and Capital Structure Ratios For Companies of Industry, *Zeszyty Naukowe SGGW, Polityki Europejskie, Finanse i Marketing*, vol. 23, no 72, pp. 256–267, https://doi.org/10.22630/PEFIM.2020.23.72.21.

57. Zhao, T. and Xiao, X. (2018), The impact of corporate social responsibility on financial constraints: Does the life cycle stage of a firm matter? *International Review of Economics and Finance*, vol. 63, pp. 76-93, https://doi.org/10.1016/j.iref.2018.08.010.

Financial Implications of Covid-19 Pandemic.

An Empirical DuPont Analysis on Economic Value-Added Reported by European Developed Countries

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Abstract

The recent COVID-19 pandemic has raised various concerns related to firms' financial vulnerabilities and resilience. The best way to achieve financial resilience is to identify drivers of sustainable economic development, mainly resumed to strategies designed aiming for shareholders' value creation. The way firms' resources are allocated indicate the premises for reaching the potential of value creation. This study provides a general picture of firms' capacity to create value add. For this purpose, was performed a factorial analysis, considering a DuPont model. The analysis is performed on a sample of firms originating from well-developed European economies, considering a four-based DuPont factorial model analysis. For a better understanding of the contribution of each financial ratio of the DuPont financial analysis model, a CHAID decision tree was estimated. The results show generalized effects on the calculated economic value-added indicator, no matter the country firms considered in the analysis are originated from, or the industry the operate in. However, in 2020, most of the firms have reported significantly better results in terms of economic value-added, so, an essential part of the discussion is related to the impact of savings made on the cost of the economic capital.

Key words: *economic value-added; DuPont analysis; cost of capital; resilience; COVID-19;*

JEL Classification: *M42, M41, M48*

1. Introduction

The context generated by the COVID-19 pandemic has once again highlighted how important it is for companies to be able to respond, recover and resume operations at a level of service acceptable for consumers, customers, and commercial partners in the context in which significant disruptions such as those caused by social distancing measures imposed to limit de spread of the novel coronavirus disease took place (EY, 2020).

Hence, a concept that gained a lot of interest in the past financial crises, represent even in nowadays a debated topic, namely firm's resilience. In this context marked by uncertainty, for companies, resilience is not just a choice but an essential requirement to remain competitive, ensure a sustainable economic development and create value through resources used in the most efficient way, complementarities, lock-in, and novelty (Amit and Zott, 2001).

After a health crisis that shook the globe and led to an economic crisis, it is believed that a successful organization must be able to withstand shocks, stay strong, adapt to change and even more, take advantage of the opportunities which changes bring (Parast et al., 2019). But are companies capable to create, even so, value add? The pandemic crisis has affected firms' operational efficiency or firms' resilience?

Our aim in this paper is to bring some new perspectives on the efforts made to achieve financial resilience, considering that the pandemic context generated by the „novel coronavirus disease" raised various concerns related to firms' financial vulnerabilities and capabilities to overcome the crisis. As emphasized on Salignac et al. (2019) multidimensional mode of assessment of firms' financial resilience, the management has to decide on strategic directions and direct resources for implementation of various projects of firms' process improvements, that aim for adaptability and flexibility through firms' capabilities to manage economic resources (effective and efficient resources management), to optimize firms' financial structure on minimal cost of capital (projects financing capacity), capabilities on expertise on financial products and services, or social capital. Overall, all those dimensions translate into firms' potential to generate value add, which becomes essential in times of crisis.

In this context, the focus of our paper is to provide a general picture of firms' capacity to create value add, even in an uncertain context, through a factorial analysis,

considering a DuPont model. As underlined by Mahi et al. (2021) based on a bibliometric analysis of more than 1600 papers addressing the topic of pandemics, no matter COVID-19 or other pandemics, the researchers have failed to provide useful insights on the economics and financial turmoil created by the COVID-19 pandemic, and even less on financial resilience. So far, papers addressed insufficiently the problem of economic and financial implications of the actual pandemic, being focused on more generalized sustainability-based approaches, process and system-wise debate, and principle-based workflow, risk management or assurance of resilience capabilities, from implementation point of view and impact in corporate decision making (Settembre-Blundo et al., 2021). Thereby, our article comes with additional insights within the literature and fills in the gap through the analysis that shows a generalized effect on the calculated economic value-added indicator, no matter the country firms considered in the analysis are originated from, or the industry they operate in.

This paper is structured as follows: Section 2 presents the literature review and the hypothesis development; Section 3 presents the research methodology, Section 4 discusses the results obtained, and Section 5 summarizes the main findings, conclusions, and avenues for future research directions.

2. Literature review

Due to the novel coronavirus disease, the world has stopped for a moment. The sharp spread of the COVID-19 pandemic in Europe, and the increasingly stringent measures taken by the governments to prevent harmful effects both on citizens and the economy as well, raised many questions about the actions that should be taken by companies to ensure compliance and to continue their activity. The businesses had to be rethought so that it could continue even in the „new normal" caused by the social distance measures imposed to limit the spread of COVID-19. Hence, the pandemic context has led to vulnerabilities in the supply chain, rising prices and blockages, preventing companies from replenishing their stocks, and not being able to meet the growing demand of customers who have stockpiled for food supplies (Sombultawee et al., 2022). Delays in deliveries of suppliers have also increased the risk of non-collection, which in turn affected the cash flow (Deloitte, 2020), or even firm value (Bose et al., 2021).

But the financial crisis generated by the novel coronavirus has not affected all sectors of activity. They were both

winners and losers. The essential services sector, namely the pharmaceutical, food, health, telecommunications, and utilities sectors, were one of the lucky ones. But the big winners, those for whom the current crisis has represented an increase in market demand, were, for example, companies operating in e-commerce, video communications, cloud platforms or telemedicine, entities that noticed the importance of digitization and transposed the activity in the online environment. For the economic entities in the field of tourism, entertainment, traditional retail or restaurants, the financial crisis has produced a real business decline.

Hence, companies have begun to use new digital strategies and technologies to adapt to the new context (Hasan, 2022; Chen et al., 2022) or implement remote work to ensure business continuity. Also, companies have paid higher attention to the essential input of innovation and risk management, especially in supply chain management and product portfolio management, that was insufficiently addressed by corporate governance and companies' information systems landscape in the current context of transition of business models towards sustainable solutions (Heredia et al., 2022). Nonetheless, it has become essential for managers to decide companies' strategic path considering in the decision-making process also their dynamic capabilities, that currently are oriented towards organizational sustainability and organizational resilience as well (Corrales-Estrada et al. 2021; Miceli et al., 2021).

Instead, there is a lack of literature on the area of financial measurement of companies' efforts to reach dynamic capabilities addressing companies' potential to become more flexible and adaptable to the dynamic and highly uncertain economic environment. This gap on the literature is even more important in the context of financial crisis. In times of crisis, there are managers that tend to conduct big bath accounting to clear their financial statements from the balance sheet items that are expected to bring future losses to the company (Dumitrescu, 2014), or apply aggressive accounting policies related to accruals estimation in uncertain times, or tax avoidance strategies (Ozili, 2021) to present the best possible situation of the company in front of shareholders and stakeholders. The way in which managers present the results reported in crisis conditions is also of particular interest. The study conducted by Hope and Wang (2018) reveals that managers prefer to use extremely positive language, which aims to outline a

generalized discourse, avoiding the dissemination in the financial statements of factual aspects, based on reliable and relevant information, when they conduct big bath accounting techniques.

For a significant number of sectors, however, this crisis has led to a short-term decline in financial performance. There is a risk that the observed short-term decline will have an impact on medium- and long-term business. Given that the value of a business is primarily determined by its ability to generate cash in the future, it is important for managers to understand the impact of a potential recession on the projections of business cash flows and try to prevent such situations through efficient business management.

After the outbreak of the pandemic, companies were forced to change the way they organize their processes and manage their activity, especially by implementing digital and technological solutions that allow them to operate in the new work environment. This change also had to address their dynamic capabilities (Corrales-Estrada et al. 2021; Miceli et al., 2021), including the ones related to accounting information system, as they represent premises for high quality corporate reporting, and effective planning management function, generating a mediating effect on business process capabilities (Al-Matari et al., 2022).

All this required significant investment in money, time, practical knowledge, and other resources. But the resulting transformations certainly lead to streamlined processes that allowed real-time responses to internal needs and requests from employees, customers, and commercial business partners, thus generating, in time, value added for the companies that are involved and want to ensure their economic sustainability and not just to obtain short-term profits.

3. Methodology research

As noted by Alshater et al. (2021), the COVID-19 pandemic has generated significant negative effects on companies' operations, with serious implications on the evolution of financial markets, shortages along supply chains, institutions' abilities to overcome those effects through smart public policies, or impact on business decision making, going concern related to entrepreneurial initiatives, consumer behavior, or even organizational culture. Companies' management had to reassess their strategic orientation, in order to address better the needs

of creation and consolidation of companies' dynamic capabilities, including promoting innovation initiatives, supporting human resources to develop and provide premises for accumulation of intellectual capital, development of a robust information technology landscape using merging technologies, digitalization and automatization of processes, or simply reengineering of business processes that leads to more agile process management and decision making (Corrales-Estrada et al. 2021; Miceli et al., 2021).

Figure no. 1. Financial analysis framework
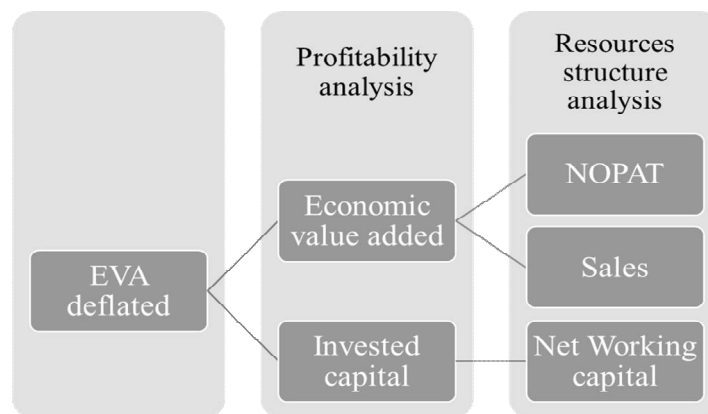
Source: Authors' projection

The objective of this paper is to identify essential drivers of firms' performance in terms of the capacity to create economic value add, which can be considered a basic premise for a sustainable growth model for companies, in terms of potential of financing innovative projects and supporting strategic direction towards acquisition and consolidation of companies' dynamic capabilities. The design considered for the study is mainly consisting of a DuPont financial analysis framework. The financial factorial analysis is defined through a multiplicative model, that considers four levels of analysis, aimed to allow us assess contribution to firms' performance of each of: (i) the margin of economic value creation on the operational results; (ii) the profitability of operations, (iii) working capital efficiency; (iv) working capital weight in the economic capital affected. In *Figure no. 1* we illustrate the general financial analysis framework, emphasizing the main elements of the empirical analysis.

To review the main drivers of achieving optimal level of economic value creation, we consider two research hypotheses derived from the economic value-added indicator definition, respectively:

H1*: The pandemic crisis has significantly affected firms'
operational efficiency, in terms of operations
profitability and economic profit reported.*

H2*: The pandemic crisis has significantly
affected firms' resilience, related to firms'
working capital coverage ratio in sales,
suggesting firms' capacity to finance long-
term operational financing needs.*

We have resumed our analysis to a DuPont factorial financial analysis framework consisting of four ratios, mainly oriented towards financial results analysis and less to financial position analysis. The aim of the study is rather related to firms' performance, the focus on times of crisis being oriented to firms' ability to cover the financing needs of operations. The financing needs of operations are rather related to the rotation of working capital in sales, reflecting an expression of long-term operations financing needs.

3.1. Data collection

The empirical analysis consists of processing data related to a sample of 275 firms with headquarters in four European well-developed economies, respectively Germany (81%), Italy (10%), France (5%) and Spain (4%). The most part of the sample composition covers several

economic areas, such as the technology (22%), sector of commerce (19%), manufacturing (19%), or healthcare (11%). The sample composition is reflected in *Figure no. 2*.

The choice for this sample resumes to the fact that firms originating from well-developed economies, listed internationally, are characterized by more complex

business models. In case of those firms, the economic value is generated through various channels, processes within multiple product business units. In times of pandemic, it is expected that diversified portfolio of products and services ensure higher firms' resilience, allowing them to recover from shocks in revenue or exponential evolution of fixed costs.

Figure no. 2. Sample composition
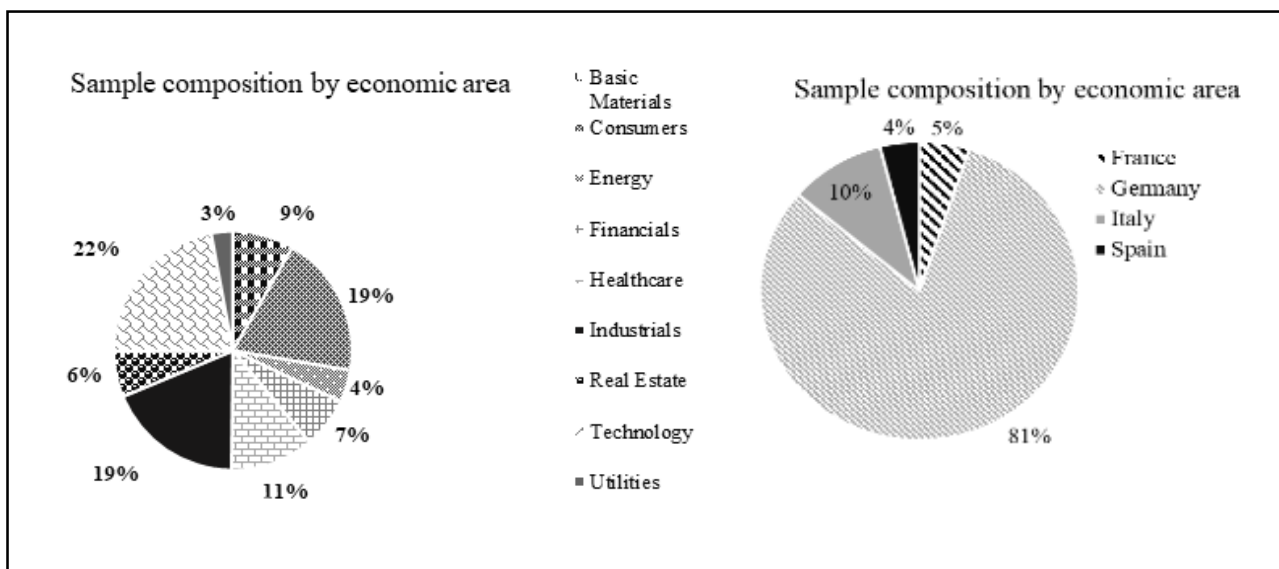
Source: Authors' projection

The final sample contain only the firms with available data for all variables included in the financial analysis model, for the complete period of analysis, respectively 2017-2020. The period is selected mainly to allow us reflecting effects of COVID-19 pandemic crisis on firms' financial performance. Data considered in the analysis is extracted from *Refinitiv* database.

3.2. Variables definition

In **Table no. 1** we define the variables considered in our analysis. The relation used

to calculate the economic value-added does not consider accounting-related adjustments, that control for potential impact of accounting accruals or difference in classification of assets between the functional versus the traditional balance sheet. The purpose of the study is not to analyze potential impact of choice on accounting policy and earnings management, but rather on providing indication of the overall effect of COVID-19 pandemic crisis on firms' capacity to create value for shareholders.

Table no. 1. Definition of variables		
Variable	**Symbol**	**Description**
Economic value added	EVA	- it represents the economic profit of the period, calculated as difference between the net operating income (NOPAT) and the cost of capital (WACC), affected in operations, respectively $EVA_{i,t} = NOPAT_{i,t} - WACC_{i,t} \cdot Capital_{operations}$. The operating profit is determined by relation $NOPAT_{i,t} = EBIT_{i,t} \cdot (1-t)$, where t is the corporate tax on revenue, as reported by Eurostat, whereas $EBIT_{i,t}$ are the earnings before interest and taxes reported by firm i in period t. The $WACC_{i,t}$ represent the weighted cost of capital, determined by relation $WACC_{i,t} = c_{equity} \cdot \frac{Equity}{Total\ capital} + c_{debt} \cdot \frac{Total\ Debt}{Total\ capital}$.
Value add margin	R1	- the indicator describes proportion of the operational profit ($NOPAT_{i,t}$) explained by the economic value-added generated ($EVA_{i,t}$), as per relation $\frac{EVA_{i,t}}{NOPAT_{i,t}}$;
Operational margin	R2	- the indicator describes the operational margin reported defined by the ratio that shows the operational profit reported ($NOPAT_{i,t}$) for a level of revenue ($Sales_{i,t}$), as per ratio $\frac{NOPAT_{i,t}}{Sales_{i,t}}$;
Working capital efficiency	R3	- the indicator describes the efficiency of working capital, defined as the ratio between revenue reported for period t by firm i ($Sales_{i,t}$) and related working capital affected ($Net\ WC_{i,t}$) to generate this level of revenue, as per ratio $\frac{Sales_{i,t}}{Net\ WC_{i,t}}$;
Working capital ratio	R4	- it describes the structure of economic assets affected for operations, with focus on firms' operations resilience from the perspective of contracting required financing resources in times of crisis, defined by per ratio $\frac{Net\ WC_{i,t}}{Assets_{i,t}}$.

Source: Authors' projection

3.3. DuPont factorial analysis framework

The model starts from the ratio of $EVA_{\%}$, which represents the economic value-added deflated by the value of the invested capital that is affected on period business operations. The capital affected on business operations to generate value add is rather oriented on a long-term financial analysis perspective, aimed to ensure sustainable economic growth. Therefore, from a source of financing, the capital is calculated as $Equity_{i,t} + Long\ term\ debt_{i,t}$, which is the basis for the weight cost of capital.

$EVA_{\%}$ is determined by the relation: $EVA_{\%} = \frac{EVA_{i,t}}{Assets_{i,t}}$. The split of this ratio by different levels of analysis is reformulated by relation below:

$$EVA_{\%} = \frac{EVA_{i,t}}{NOPAT_{i,t}} \cdot \frac{NOPAT_{i,t}}{Sales_{i,t}} \cdot \frac{Sales_{i,t}}{Net\ WC_{i,t}} \cdot \frac{Net\ WC_{i,t}}{Assets_{i,t}}$$

The notions are explained in **Table no. 2**.

Once determined the ratios derived from the DuPont model, we proceed to estimation of a decision tree, to understand the importance of each of those ratios, as measures of different drivers of the economic value-added.

As a first step, we review if there is any significant difference between the different financial ratios influenced by either the specific of economic area, or by characteristics more related to country institutional specific. For this purpose, we proceed to an ANOVA model estimation.

Table no. 2. Decision tree model specifications

Growing Method	CRT
Dependent Variable	EVA deflated
Independent Variables	R1, R2, R3, R4
Validation	Split Sample
Maximum Tree Depth	5
Minimum Cases in Parent Node	200
Minimum Cases in Child Node	3

Source: Authors' projection

As a second step of the analysis, we estimate the decision three to have a better understanding on how the different financial ratios determine the level of $EVA_\%$. The decision three is estimated using a CHAID algorithm implemented on the SPSS 25.0 statistical software. For model estimation, we consider the four financial variables derived from the DuPont factorial model. The estimation is made considering cross validation, with a maximum tree depth between 3 and 5 levels, whereas each parent node incorporates minimum 100 observations and each child node included minimum 10 observations.

4. Results and discussion

The analysis of results obtained for each firm included in the sample are determined based on the DuPont factorial framework, that looks for operations profitability, assets efficiency and the role of working capital in the total capital affected to business operations.

4.1. Descriptive statistics
In **Table no. 3** we first provide the summary statistics of all financial ratios incorporated on the DuPont factorial model. The dependent variable is the ratio of economic value-added deflated by the capital affected in business operations. Overall, firms generate negative economic profit looking on the mean of −0.043, or the median of −

0.042 of EVA deflated, calculated for all firms on sample considered in the analysis.

However, the significantly high standard deviation of 0.101, suggest visible heterogeneity in the sample. Therefore, either firms' characteristics, specifics of country institutional framework, or characteristics of economic area could lead to this situation. Among firms' characteristics we can remind here either significant changes determined by the COVID-19 pandemic crisis on the regular operational transactions, or by discretionary accruals manipulation, such as the big bath accounting specific for times of crisis, aggressive accounting policies related to accruals estimation in uncertain times, or tax avoidance strategies (Ozili, 2021). Even more interesting is the overlapping effect of the transformation of the accounting profession, in the light of firms' ambitions of digitalization of processes, improvement of business analytics estimates, or alignment with the more recent changes in business processes redesign and continuous improvements, all mainly led by Industry 4.0, lean and agile management, or total quality management systems (Sutton et al., 2016; Amani and Fadlalla, 2017; Hasan, 2021; Chen et al., 2022). Nonetheless, it has been paid too little attention by standard-setters on designing teleworking legal framework, reason why COVID-19 pandemic has generated significant gaps in the regulation, that have limited the homogeneity on actions taken by firms to ensure effective and efficiency of risk management and internal control systems and processes (Naqvi, 2020).

Table no. 3. Descriptive statistics

Indicator		EVA deflated	R1	R2	R3	R4
Sample size	Valid	1100	1090	1040	779	779
Mean		-0.043	-1.155	0.015	5.047	0.244
Median		-0.042	-1.052	0.015	3.820	0.223
Std. Deviation		0.101	4.906	0.038	10.80	0.232
Minimum		-0.687	-12.18	-0.084	-18.56	-0.096
Maximum		0.930	11.43	0.094	34.46	0.688
Percentiles	25	-0.068	-3.184	0.003	1.321	0.058
	50	-0.042	-1.052	0.015	3.820	0.223
	75	-0.018	0.587	0.029	7.619	0.405

Source: Authors' calculation

In case of the four financial ratios defining the DuPont model consider in this study, we observe slight lower standard deviation, therefore a lower heterogeneity in the sample. In these terms, we underline how close is the mean value in case of the last financial ratio (0.244) to the standard deviation (0.232), which indicate that in pandemic period, large part of the firms had to balance their working capital to the shock on revenue determined by the economic constraints implemented by governments to reduce the spread of the COVID-19 virus in the community.

Result suggest as well that firms have reported a negative economic profit, whereas the operations profitability is positive in average (0.015). As the operational profit has incorporated only the cost of debt, the negative economic value-added suggest that the cost of equity is significantly high and cannot be covered with firms' self-financing resources. As the heterogeneity in our sample (coefficient of variation) is higher in case of first ratio ($\frac{4.906}{1.155} \approx 4.25$), compared with the second ration ($\frac{0.038}{0.015} \approx 2.6$), we get a preliminary indication of the implications of firms' risk exposure in the pandemic period and shareholders' risk aversion, which is heterogeneous, especially in times of high economic uncertainty. Therefore, the higher variation

in the economic value-added is mainly driven by the weighted cost of capital, which is directly influenced by the risk shareholders assume and the premium they ask as reward for the additional risk assumption.

4.2. Correlation analysis

In **Table no. 4** we provide the Pearson correlation matrix. The Pearson correlation shows no strong statistically significant association between the financial ratios and the economic value-added indicator. However, moderate statistically significant correlation exists between the first ratio and the second one (-0.257), or between the economic value-added and the first ratio (0.256).

The negative association between the first ratio ($\frac{EVA_{i,t}}{NOPAT_{i,t}}$) and the second ratio ($\frac{NOPAT_{i,t}}{Sales_{i,t}}$) suggest again capital markets dynamics and implications on firms weighted cost of capital, which become more expensive, on the basis of higher risk premium assumed by shareholders in pandemic times. Therefore, the higher the net operating income is, the lower we expect to be the economic value-added, because of the higher cost of capital.

Table no. 4. Pearson correlation matrix

	EVA deflated	R1	R2	R3	R4
EVA deflated	1	-0.022	.256**	-0.022	-.087*
R1	-0.022	1	-.257**	0.034	-0.030
R2	.256**	-.257**	1	-0.006	-.180**
R3	-0.022	0.034	-0.006	1	0.005
R4	-.087*	-0.030	-.180**	0.005	1
**. Correlation is significant at the 0.01 level (2-tailed).					
*. Correlation is significant at the 0.05 level (2-tailed).					

Source: Authors' projection

We observe as well that the correlation between R1 and R2 (-0.257) is similar in absolute value with the correlation between R1 and the ratio of EVA deflated (0.256). The correlation of 0.256 gives us some clues related to the importance of assets efficiency in terms of value creation. In case of $EVA_{o/k}$ the economic value-added is deflated by the capital affected to operations, whereas in case of R1 the economic value-added is deflated by the net operating income. The low association indicate a significant gap in the dynamics of the capital affected for operations and the operational profitability between firms

in our sample. However, it is essential to underline that the higher firms' liquidity, the higher is expected to be the operating profit, with indirect positive impact on the economic value-added, based on lower financing needs and lower cost of debt.

4.3. Testing for differences in firms' resilience drivers

In **Table no. 5** we summarize the statistics of the ANOVA on the ratio of the economic value-added deflated by the capital affected to period operations.

Overall, the results suggest that the only statistically significant driver incorporated in the DuPont analysis is the ratio of the operational profitability ($F_{stat.}$ =84.82, Sig.<0.01). The rest of the factors included in the analysis show no statistically significant influence on the ratio of the $EVA_{\%}$

In *Figure no. 3* we synthesize the differences on the deflated economic value-added, driven by either the country institutional framework, or by the characteristics of the business models specific for each economic area.

On one hand, the representations reveal no significant differences between firms with headquarters in different countries. All firms have reported negative economic profits. Instead, German firms have recorded a slight decrease on the economic profit, compared with the other firms included in the sample, for the first year of the COVID-19 pandemic, denoting a shock on firms' revenue that decreased drastically and an increase of the cost of capital, as consequence of higher economic uncertainty and additional risk premium expected by shareholders.

Table no. 5. MANOVA results on EVA deflated

Source	Type III Sum of Squares	df	Mean Square	F stat.	Sig.	Partial Eta Squared	Noncent. Parameter	Observed Power[b]
Intercept	0.255	1	0.255	44.42	0.000	0.056	44.416	1.000
R1	0.009	1	0.009	1.642	0.200	0.002	1.642	0.249
R2	0.487	1	0.487	84.82	0.000	0.102	84.822	1.000
R3	0.004	1	0.004	0.781	0.377	0.001	0.781	0.143
R4	0.002	1	0.002	0.336	0.563	0.000	0.336	0.089
Country	0.016	3	0.005	0.919	0.431	0.004	2.758	0.253
Industry	0.047	8	0.006	1.033	0.409	0.011	8.263	0.487
Country x Industry	0.058	16	0.004	0.630	0.861	0.013	10.075	0.441
a. R Squared = .145 (Adjusted R Squared = .109)								
b. Computed using alpha = .05								

Source: Authors' calculation

Figure no. 3. Evolution in time of EVA% by country and economic area
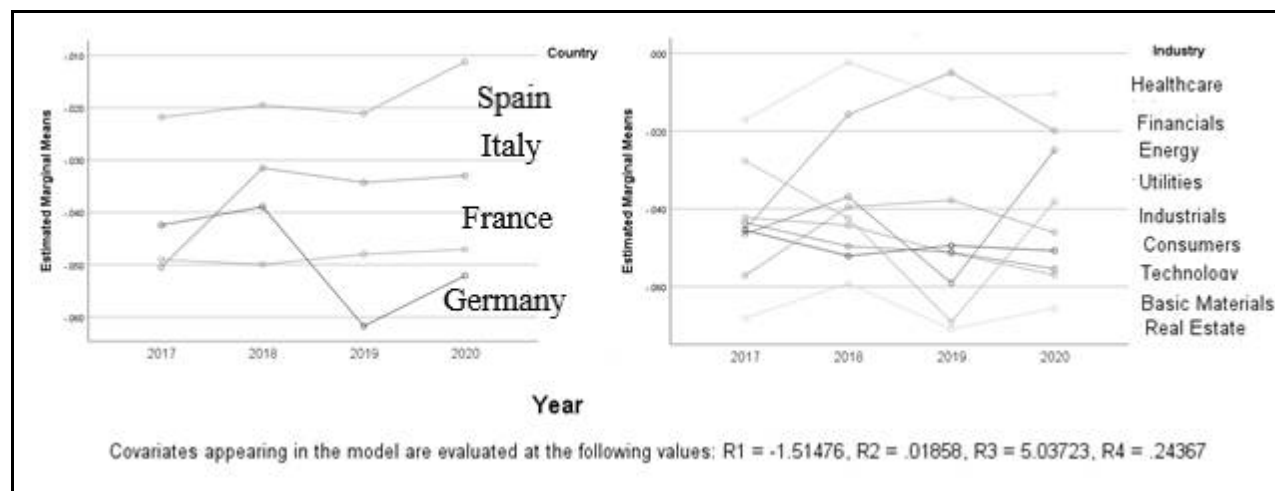
Source: Authors' projection

On the other hand, industry specific characteristics of the business models have determined differences on the evolution in time of the economic value-added, during period under analysis. Despite those differences are not statistically significant, it worth to mention that economic areas, such as utilities, energy of financial sector have reported visible changes in time. The higher changes seem to be even higher in times of pandemic, in case of firms operating in the sector of utilities and the one of energy production and distribution. The rest of the firms have reported only slight changes on the economic value-added in time, with low impact of economic area characteristics.

We obtain similar small differences related to the second and the fourth financial ratio, as described in *Figure no. 4*. However, high difference is visible in case of firms

operating in healthcare are and energy in case of the first financial ratio, that described the way the economic value-added is explained by the operational profit. In case of healthcare economic area, firms have reported lower weight of the economic value-added on the NOPAT reported, which could be mainly explained by the high additional costs of COVID-19 pandemic. Instead, differences between all economic areas seem to be visible especially concerning the weight the working capital has in the total assets affected for business operations, which is expected because of various reason, reminding here the differences in cash cycle, business processes complexity, or firms' financial resources aimed to facilitate flawless implementation of digitalization, optimization, or automation projects.

Figure no. 4. Differences in DuPont model financial ratios
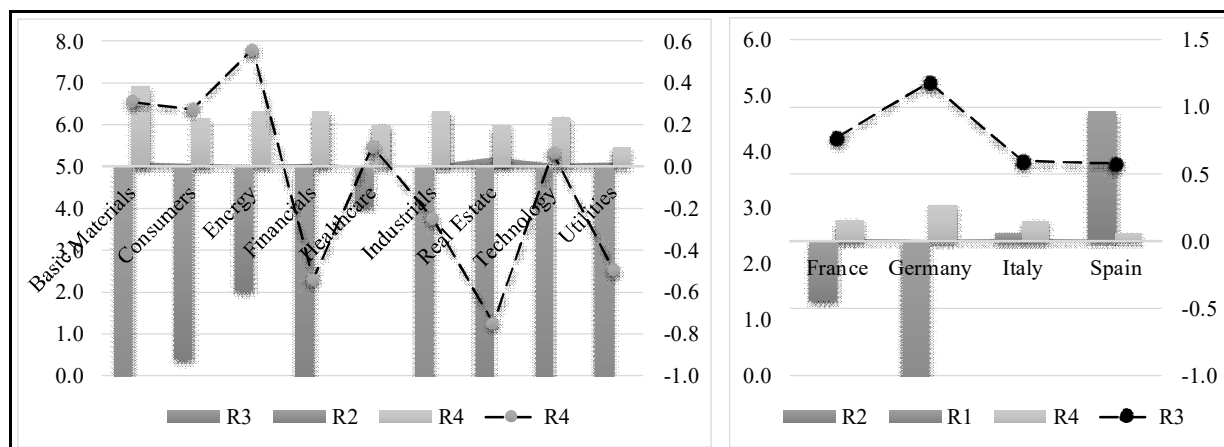
Source: Authors' projection

DuPont financial ratios show some differences as well between firms with headquarters in different countries, especially related to the first financial ratio which describes how the economic value-added is explained by the operational profit. As drastic changes in revenue were expected to impact both R2 and R3 financial ratios, we appreciate that on our sample of firms, there were only slight changes on revenue for most of the firms. Instead, we observe that in case of R1 the differences are visible across countries, especially that in case of Spanish firms the ratio is positive, while in case of the French and German firms the ratio is negative. As in **Figure no. 3** we already observed that the economic value-added is

negative for all firms, we deduce that Spanish firms have reported negative operational profits as well, whereas in case of German and French firms the operational profits reported are positive on average for our sample.

On a first sight, we would appreciate that accounting policies chosen by German and French firms are more aggressive, while the Spanish ones decide on more conservative accounting policy choices. Additionally, we highlight how important is the component of the economic value-added indicator driven by evolution of capital markets, as in times of pandemic crisis the economic uncertainty is significantly higher (Hope et al., 2022), with

implications on the cost of equity and the cost of debt and effects on the economic value-added.

4.4. Hierarchical analysis of DuPont ratios relevance

The last step of our analysis consists of estimation of a decision tree that allows us to understand the importance of each of the financial ratios incorporated in the DuPont factorial model on explaining the economic value-added for each firm. In *Figure no. 5* we provide the decision tree obtained using the C&RT algorithm.

Overall, the results show that relevant difference between firms appear in case of the first and the second financial ratios included on the DuPont factorial model, that are looking for financial performance perspective of the process of value creation. Instead, ratios related to firms' financial position, concerning their resilience capabilities through optimal dimensioning of the net working capital in high

economic uncertainty conditions, prove to be insignificant along the period before and after COVID-19 pandemic analyzed in this study. Therefore, challenges firms have faced during the COVID-19 pandemic to ensure value creation, are rather related to efforts on ensuring conservation of the revenues recorded before the pandemic. Further, beside the concerns on revenue management, managers had to prove their managerial abilities to gather positive feedback from investors, as the cost of equity is mainly driven by movements on capital markets, able to measure firms' risk exposure and investors' expectation for the risk premium remuneration. Nonetheless, this pandemic crisis has confirmed once again how important are managers' abilities of forecasting and accounting estimations, as the higher economic uncertainty could have led to repetitive revisions which induce an increase on the cost of capital and reduction of investors' confidence.

Figure no. 5. Decision tree based on DuPont factorial model components
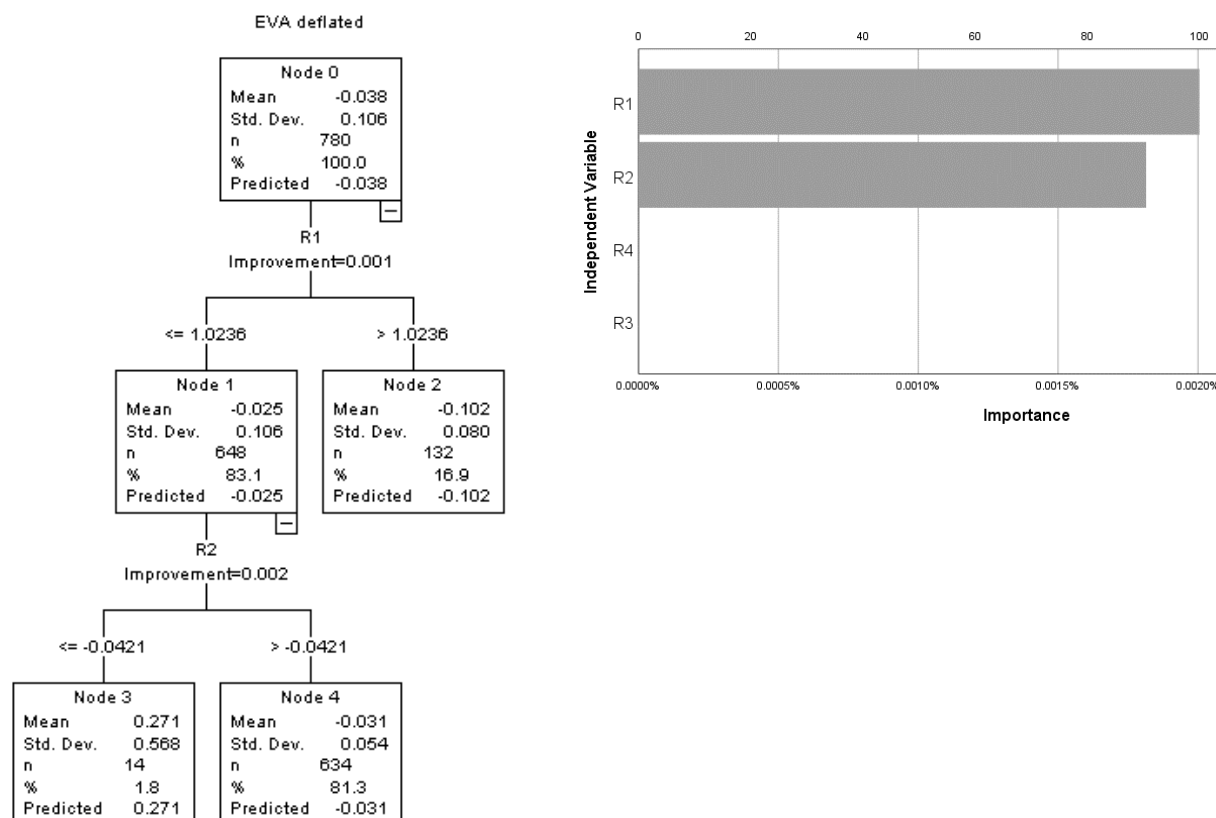
Source: Authors' estimation

If the first ratio is rather related to economic value-added, the second ratio that determine a significant impact on the $EVA_{\%}$ is rather related to accounting-based measures, such as the net operating income and the revenue. Both measures are subject to potential creative accounting techniques, especially in periods of crisis, such as the COVID-19 pandemic period, that gives managers the opportunity to manage earnings through aggressive revenue recognition and discretionary accruals (Lassoued and Khanchel, 2021). Therefore, as the net operating income is positive, seems that managers are not engaged into big bath accounting, but rather on aggressive income accounting policies.

Relevant information that can be observed in the estimated decision three is related to the 3rd node, that shows a positive mean of 0.271 for the economic value added deflated by the capital affected in operations, whereas the rest of the nodes are characterized by negative means of the same indicator. This result shows that the $EVA_{\%}$ is positive if both the nominal value of the economic value-added and the net operating income are negative. The node describes the firms with a ratio of NOPAT in sales that is lower than -0.0421, counting only 14 such firms, that represent an insignificant weight in our sample, respectively approximately 1.8% of the total observations. In case of those firms, on one hand we could appreciate that managers might proceed to big bath accounting. On the other hand, these results could be a result simply caused by a negative shock on the level of the revenue reported on yearly basis, in the absence of any aggressive accounting policy of revenue recognition.

The second node of the decision tree suggest as well that only in case of 16.9% of the observations reviewed in the analysis, the economic value-added is higher than the net operating income, with a financial ratio of more than 1.2036. On those circumstances, as the NOPAT is positive, the root-cause could be found in the higher confidence investors have in case of those firms, translated into a significantly lower cost of equity. Similar behavior could be perceived in case of creditors as well, that can reduce the cost of debt significantly if firms' credit score suggest firms are financially sustainable on medium and long-term, no matter the temporary implications of the COVID-19 pandemic on their financial position and financial performance reported. However, those results show significant heterogeneity in the subsample of 132 observations, covering approximately 16.9% of the total sample, with a standard deviation of 0.08, that cover most part of the mean absolute value. These results could be associated with the already underlined perspective of differences that are driven by the industry specific of the business models and processes, which induce on their turn differential firms' risk exposure and distinct investors' expectations of returns, based on stocks evolutions.

5. Conclusions

Through this study, we highlight several perspectives related to the company's ability to generate economic added value, in times of a pandemic such as the one caused by the COVID-19 virus. First, the results show that the only significant effect determined on profitability, using economic value added as a measure of profit, is the operating margin ratio. Therefore, in times of a pandemic, the main problem for managers is not balancing the financial structure reflected in the financial statements, the main target of the companies not being focused on optimizing the financing decision, but rather on maintaining an acceptable level of operational profitability. Through this operational profitability, firms ensure their continuity and cover much of their fixed costs. The results of the undertaken study highlighted the fact that the ways of ensuring this operational profitability were partially covered by the expansion of the product portfolio. Other paths were mainly related to the implementation of digitization and various innovation projects, which led to significant cost savings. Governments have also offered companies support, through various subsidies. However, managers have understood the importance of industry-wide guidelines provided by professional organizations and associations, which have created the basis for better cooperation within firms and a higher speed of implementation of various best practice models from industry.

Our study highlights, however, that some differences appear depending on the characteristics of the industry and, in particular, on the public policies of the country. The high heterogeneity of the results is mainly explained by the high degree of economic uncertainty, which could not make any ad-litteram guide applicable, which means that managers had to get creative and optimally explore the dynamic capabilities of firms, such as the intellectual capital, information systems, continuous process redesign initiatives, etc. Therefore, for the future, we emphasize that it is essential, in order to deal with such shocks with repercussions on the economy, for governments to be more proactive when deciding on specific public policies.

REFERENCES

1. Al-Matari, A.S., Amirrudin, R., Aziz, K.A., Al-Sharafi, M.A. (2022). The Impact of Dynamic Accounting Information System on Organizational Resilience: The Mediating Role of Business Processes Capabilities, *Sustainability*, 14, 4967;

2. Amit, R. and Zott, C. (2001). Value creation in E-business. *Strategic Management Journal*, 22: 493-520. https://doi.org/10.1002/smj.187

3. Bose, S., Shams, S., Ali, M.J., Mihret, D. (2021). COVID-19 impact, sustainability performance and firm value: international evidence, *Accounting & Finance*, Vol. 62, Issue 1, 597-643

4. Chen, X., Cho, Y.H., Dou, Y., Lev, B. (2022). Predicting future earnings changes using machine learning and detailed financial data. *Journal of Accounting Research*, 60: 467-515

5. Corrales-Estrada, A.M., Gomes-Santos, L.L., Bernal-Torres, C.A., Rodriguez-Lopez, J.E. (2021). Sustainability and Resilience Organizational Capabilities to Enhance Business Continuity Management: A Literature Review, *Sustainability*, 13, 8196;

6. Deloitte (2020). https://www2.deloitte.com/ro/en/ pages/business-continuity/articles/ce-poate-face-managemen-tul-societatii-pentru-a-diminua-riscul-raspunderii-personale-in-contextul-pandemiei-COVID-19.html

7. Dumitrescu, A.S. (2014). Contabilitate creativă. De la idee la bani. Cu exemple practice, *Editura Economică*, Bucureşti;

8. Eurostat (2021). Date şi cifre privind economia Uniunii Europene disponibil https://european-union.europa.eu/principles-countries-history/key-facts-and-figures/economy_ro

9. EY. (2020). Supervisory perspectives and regulatory approaches to enterprise resilience; disponibil on-line: https://www.ey.com/ro_ro/banking-capital-markets/why-enterprise-resilience-is-more-critical-to-banks-than-ever-before

10. Hasan, A.R. (2022). Artificial Intelligence (AI) in Accounting & Auditing: a Literature Review, *Open Journal of Business and Management*, 10;

11. Heredia, J., Rubinos, C., Vega, W., Heredia, W., Flores, A. (2022). New Strategies to Explain Organizational Resilience on the Firms: A Cross-Countries Configurations Approach, *Sustainability*, 14, 1612;

12. Hope, O.K., Li, C., Ma, M.S., Su, X. (2022). Is silence golden sometimes? Management guidance withdrawals during the COVID-19 pandemic. *Rev Account Stud, Aug 9: 1-42*

13. Hope, O.-K., Wang, J. (2018). Management Deception, Big-Bath Accounting, and Information Asymmetry: Evidence from Linguistic Analysis, *Accounting, Organizations and Society*, vol. 70, pp. 33-51;

14. Lassoued, N., Khanchel, I. (2021). Impact of COVID-19 pandemic on earnings management: an evidence from financial reporting in European firms, *Global Business Review*;

15. Mahi, M., Mobin, M.A., Habib, M., Akter, S. (2021). A bibliometric analysis of pandemic and epidemic studies in economics: future agenda for COVID-19 research, *Social Sciences & Humanities Open*, 4;

16. Miceli, A., Hagen, B., Riccardi, M.P., Sotti, F., Settembre-Blundo, D. (2021). Thriving, Not Just Surviving in Changing Times: How Sustainability, Agility and Digitalization Intertwine with Organizational Resilience, *Sustainability*, 13, 2052;

17. Naqvi, A. (2020). Artificial Intelligence for Audit, Forensic Accounting and Valuation. A trategic Perspective, *Wiley*, New Jersey, Canada;

18. Ozili, P.K. (2021). Accounting and Financial Reporting during a Pandemic (2021). Available at SSRN: https://ssrn.com/abstract=3613459 or http://dx.doi.org/10.2139/ssrn.3613459;

19. Parast, M.M., Sabahi, S., Kamalahmadi, M. (2019). The Relationship Between Firm Resilience to Supply Chain Disruptions and Firm Innovation. In: Zsidisin, G., Henke, M. (eds) Revisiting Supply Chain Risk. Springer Series in Supply Chain Management, vol 7. *Springer*, Cham. https://doi.org/10.1007/978-3-030-03813-7_17

20. Salignac, F., Marjolin, A., Reeve, R., Muir, K. (2019). Conceptualizing and Measuring Financial Resilience: A Multidimensional Framework, *Social Indicators Research* (2019) 145:17–38;

21. Settembre-Blundo, D., Gonzalez-Sanchez, R., Medina-Salgado, S., Garcia-Muina, F.E. (2021), Flexibility and Resilience in Corporate Decision Making: A New Sustainability-Based Risk Management System in Uncertain Times, *Global Journal of Flexible Systems Management*, 22 (Suppl 2);

22. Sombultawee, K., Lenuwat, P., Aleenajitpong, N., Boon-itt, S. (2022). COVID-19 and Supply Chain Management: A Review with Bibliometric, *Sustainability*, 2022, 14, 3538.

Corporate Governance Issues in a Pandemic Context

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Abstract

The economic effects of the pandemic, the financial difficulties of companies, but also the expectations of investors and other stakeholders are the prerequisites for implementing and strengthening corporate governance. The research has two components: the first component includes conceptual approaches to corporate governance. The second component includes qualitative research investigating specific aspects of corporate governance at the company level in the pandemic context. The results revealed heterogeneous approaches to corporate governance depending on the sector of activity of the companies and the typology of the corporate governance model.

Key words*: corporate governance; companies; Bucharest Stock Exchange; compliance; pandemic;*

JEL Classification*: M48, M10, L21, G01, G38*

Introduction

The premise of the research is the importance of corporate governance at the level of economic entities, which is considered a panacea for maximizing financial performance, increasing credibility and sustainability for investors, and preventing economic crises through more effective risk management. Also, the economic turmoil generated by the COVID-19 health pandemic impacting the continuity and predictability of the business of economic entities, the confidence of existing and potential investors, and other stakeholders adds value to corporate governance.

In this context, the present research aims to identify and analyze the transparency of corporate governance systems and the degree of compliance of companies operating in Romania with corporate governance requirements from a two-dimensional time perspective, i.e. normal and pandemic periods.

The article is structured in the following sections: the first section presents the conceptual approaches to corporate governance; the second is devoted to the research methodology, followed by the analysis and processing of the data. The last section is devoted to the final research conclusions, limitations, and future research directions.

Literature review

Conceptual approaches of the corporate governance are multifaceted at the level of both literature and related regulations.

Conceptually, corporate governance has its origins in the private sector and is referred to as agency theory (Jensen & Meckling, 1976). Thus, agency theory reflects the conflictual relationship between the shareholders (principal) and the managers of the entity (agent), given the discretionary interests they may have (Jensen & Meckling, 1976).

Corporate governance is the interface that through its mechanisms mitigates the information asymmetry between principal and agent. The role of corporate governance is to promote ethical behavior and transparency, to stabilize the balance of power between shareholders, directors, and management, to prevent the occurrence of fraud, and to improve the trust of people, of society, in the business environment (Matei and Drumaşu, 2014).

With the number of companies involved in financial scandals increasing year by year, it has become necessary to implement or strengthen the concept of corporate governance. According to the Cadbury Report, "corporate governance is the coordination, direction, and management of all activities carried out within an entity" (Cadbury, 1992).

Albu (2015) defines corporate governance as the set of risk management/risk management and internal control procedures applied/used by stakeholder representatives to present an image as clear and comprehensive as possible.

Concerning corporate governance mechanisms, Charreaux (1994) structures them into external mechanisms and internal mechanisms. External mechanisms include the market for goods and services, the financial-banking market, the labor market, and the legal, political, and regulatory environment. Internal mechanisms include shareholder control, mutual supervision between managers, and formal and informal control by subordinate employees and the board of directors.

From the perspective of the principles of corporate governance, Ghiţă (2008) considers that corporate governance is a complex concept that includes elements such as internal control, risk management, and financial management, including internal audit.

Dumitraşcu (2013) argues that good corporate governance can lead to improved stakeholder relations, providing confidence in financial reporting and governance practices.

Studies conducted on the composition of Corporate Governance Committees in emerging countries in the period immediately following the introduction of the provision on the constitution of the two boards, i.e. 2007-2011, in Romania, the corporate governance committees were identified as follows: Audit Committee – 64%, Nomination Committee – 20%, Remuneration Committee – 40%. Compensation Committee was not found in any of the sampled entities (Dumitraşcu, 2013).

From another perspective, Feleagă (2011) considers that most companies in Romania do not ensure the independence of the Audit Committee/Board of Directors, not respecting the provisions of the Corporate Governance Code. For example, in a research that aimed to analyze the importance given to corporate governance in Romanian companies, 13 companies (80%) out of 16

analyzed do not ensure the independence of the Audit Committee. At the same time, the independence of the Board of Directors, as well as compliance with the regulations in force regarding its composition, is only achieved in 27% of cases (Feleagă, 2011).

The results of the research conducted by Mateescu (2015) on the analysis of the inclusion in national corporate governance codes of provisions regarding the independence of boards of directors, as well as the application of these provisions in 4 emerging European countries (Romania, Estonia, Hungary, Poland) revealed that in Romania 8 (47%) out of 17 entities do not comply with the corporate governance provision regarding the appointment of Audit Committees.

Other approaches (Feleagă, 2011) argue for associating the concept of corporate governance with a set of "rules of the game", designed to support the Board of Directors in achieving the objectives and satisfying the interests of all stakeholders.

In terms of implementing the concept of corporate governance within an entity, agent theory is often used. According to this theory, corporate governance encompasses the set of systems and procedures through which both objectives are determined and achieved and techniques for monitoring effectiveness are established (Ghiță, 2008).

Although corporate governance has taken shape and is significantly developed in the private sector, it is also applicable to the public sector, having a significant role generated by the functioning and financing mechanism of this sector. In the context of its limitation both conceptually and terms of regulations, Ştefănescu and Tănase (2016) developed a model for assessing public sector governance in Romania, structured on the following assessment criteria: organization, activity, control/supervision, financial and non-financial reporting, transparency, the model identifies the hotspots of good governance in the public sector and responds to the real information needs of stakeholders regarding the efficiency and effectiveness of public resource management, accountability, transparency, financial and non-financial reporting, performance, sustainability.

In terms of the role of internal audit in corporate governance, according to the Internal Auditing Standards (IIA, 2017; CAFR, 2014) the internal audit activity should assess and make appropriate recommendations for improving governance processes in: making strategic and operational decisions, overseeing the management of risks and controls, promoting appropriate ethical conduct and values within the organization, ensuring effective performance management within the organization and accountability; communicating risk and control information to appropriate areas within the organization; coordinating activities and communicating information between the board, internal auditors, external auditors, other assurance providers, and management.

International Standards on Auditing, addresses corporate governance from an accountability perspective. In this understanding, corporate governance describes the role of the person(s) or organization (s) with responsibility for overseeing the entity's strategic direction and accountability obligations (IAASB, 2018).

At a national level, the main regulation on corporate governance is the Companies Act No 31/1990, as amended. It defines two models of corporate governance applicable to joint stock companies, namely the unitary model and the dualist model. Dobroțeanu and Dobroțeanu (2007) consider that corporate governance models have been modified to limit shareholders' fears of being deceived by their agents, and implicitly to strengthen control mechanisms over the management of entities. Through these mechanisms, "one-tier", "two-tier", or hybrid models of corporate governance have emerged (Dobroțeanu and Dobroțeanu, 2007).

From a descriptive point of view, the two models of corporate governance, provided for in the national regulations, namely the Companies Act No. 31 of 1990, as amended, have the following aspects:

• *The unitary corporate governance model*

Under this model, the management must be carried out by the Board of Directors, i.e. directors, appointed for a 4-year term by the General Meeting of Shareholders.

Concerning the structure of the Board of Directors, it must be composed of an odd number of members, at least 3, appointed by the General Meeting of Shareholders for a term of 4 years, with the opportunity of re-election. Members may be either executive or non-executive directors, provided that a majority of the members are non-executive directors. Within the Board of Directors, the member with coordinating and reporting duties is called "Chairman" and is appointed by the General Meeting of Shareholders;

- *The dualist model of corporate governance*

Under the dualist model, management is carried out by the Executive Board and the Supervisory Board. The General Meeting of Directors appoints the members of the Supervisory Board for a 4-year term, appointing one of them as "Chairman of the Board". The General Meeting of Directors may also both re-elect the same members of the Board and remove members by a 2/3 majority of the total votes cast by the shareholders present. The Supervisory Board in turn appoints and dismisses the members of the Board of Directors, where the member with managerial powers is called "Chairman of the Board of Directors" and is also appointed by the Supervisory Board. Members of the Executive Board are appointed for a 4-year term of office and may be re-elected. They are also the only structure within the organization with an executive function.

For entities whose financial statements are subject to statutory audit, the Management Board must be composed of an odd number of members, at least 3, who may not be members of the Supervisory Board, and the composition of the Supervisory Board may be composed of a minimum of 3 to a maximum of 11 members, the number of which is set out in the entity's Articles of Incorporation. It is also mandatory for these entities to set up an Audit Committee.

Given that both the Board of Directors and the Supervisory Board are responsible for setting objectives, monitoring their achievement, supervising management and its remuneration, and reporting to the shareholders, the Board may set up advisory committees to carry out the above tasks. Thus, the following advisory committees may be established within an entity:

- Remuneration Committee: is responsible for developing and implementing a remuneration policy designed to motivate employees within the company to achieve shareholder objectives in the best possible way;

- Nomination Committee: its main task is to appoint candidates with the right skills and training for a management position.

- Audit Committee: is responsible for monitoring and coordinating the internal control system, risk management, and all financial activities.

The committees set up as specified above must have a minimum of two members, one of whom must be an independent non-executive director. In the Audit Committee and the Remuneration Committee, it is mandatory that all members are non-executive directors. Since one of the most important principles underlying corporate governance is "shareholder involvement", it is advisable to involve all shareholders in activities related to management remuneration or activities related to the setting of objectives and strategy, regardless of their shareholding in the company.

Therefore, taking into account all the above-mentioned aspects, it can be stated that the application of a corporate governance system leads to the establishment of relationships between management, directors, and shareholders. Hence the purpose of corporate governance is to manage and control the entity as a whole.

The Bucharest Stock Exchange also plays an important role in the corporate governance equation and has issued a set of principles and recommendations under the name of "Corporate Governance Code". This applies to companies that are traded on the regulated market, intending to promote governance principles designed to strengthen investor confidence in companies, and everything related to their business. Thus, within the companies adhering to its application, it is mandatory to draw up and submit annually to the Bucharest Stock Exchange the *Corporate Governance Statement* "Apply or Explain", which includes a self-assessment on compliance with the general principles and rules of conduct, respectively the manner of their implementation. It includes the following sections: Section A – Accountabilities; Section B – Risk Management System and Internal Control; Section C – Fair Reward and Motivation; Section D – Adding Value through Investor Relations.

The "Apply or Explain" principle is applied in many Governance Codes, originating in the UK in the 1992 Cadbury Code. Both the concept of corporate governance and its associated principles emerged as a response to the portfolio of failures in the public and private sectors, as a resolution to them, and as a reassurance to investors.

Research methodology

Given the current focus on corporate governance and the mechanisms that ensure its effectiveness, the overall objective of the research is to identify and analyze the principles of corporate governance and the importance attached to them by management. The specific objectives of the research are: to analyze compliance with the

provisions of the Corporate Governance Statement and to establish the correlation between the extent to which companies have complied with the provisions of the Corporate Governance Statement and their quality.

To this end, we have used qualitative research methodology. Thus, we analyzed the information presented in the Declarations on compliance or non-compliance with the provisions of the Corporate Governance Code ("Apply or Explain" Declaration) publicly available, reporting obligation imposed by the Corporate Governance Code.

For the analysis, 11 companies traded on the regulated market in Romania were selected for a period of 3 years, i.e. 2019-2021. The period selection criterion considered the normal course of business, i.e. the impact of the COVID-19 pandemic on business.

Based on the period analyzed, companies from different sectors of activity were selected based on the following criteria: coverage of a diverse range of sectors of activity, coverage of both corporate governance models,

companies of different sizes (selection based on turnover and a number of employees), impact of the pandemic on the sector of activity. Therefore, the sectors of activity selected and analyzed are Pharmaceuticals, HoReCa, Energy, Oil, and Gas.

The structure by sector analyzed is as follows: pharmaceuticals – 36%, oil and gas – 27%, energy – 18%, HoReCa – 18%.

In terms of source of information, we have used the Annual Reports of the Directors and Declarations of Compliance with the provisions of the Corporate Governance Code "Apply or Explain", for the period 2019-2021, publicly available on the website of the Bucharest Stock Exchange (BVB). Thus, a total of 33 Annual Reports and 33 Compliance Statements were sampled and analyzed.

The analyzed companies related to the selected business sectors and the specific information are presented in **Table no. 1**.

Table no. 1. List of analyzed companies

Activity sector	Company name	Annual turnover 2019 (lei)	Annual turnover 2020 (lei)	Annual turnover 2021 (lei)	Relative index 2021 – 2019 (lei)	Absolute index (%)
Pharmaceutical	S.C. BIOFARM S.A	195,390,812	216,451,696	239,086,666	43,695,854	122%
	ROPHARMA S.A.	500,985,725	448,636,046	469,374,047	(31,611,678)	94%
	ZENTIVA S.A.	541,440,353	557,960,940	683,865,264	142,424,911	126%
	TERAPAST	372,826,808	418,054,268	550,643,376	177,816,568	148%
HoReCa	SIF HOTELURI SA	26,574,659	8,331,086	16,400,485	(10,174,174)	62%
	TURISM FELIX S.A.	93,085,092	53,825,459	82,241,715	(10,843,377)	88%
Oil and gas	OMV PETROM S.A.	19,793,585,306	14,795,525,494	23,586,087,255	3,792,501,949	119%
	S.N.G.N. ROMGAZ S.A.	4,924,879,529	3,926,033,569	5,725,213,673	800,334,144	116%
	ROMPETROL WELL SERVICES S.A.	66,310,995	47,622,182	44,230,468	(22,080,527)	67%
Energy	ELECTRICA S. A.	2,379,424,484	2,448,712,083	3,118,375,083	738,950,599	131%
	NUCLEARELECTRICA S.A.	19,177,662	3,583,559	285,696	(18,891,966)	1%

Source: Own processing

The investigation of the declarations through which entities fulfill their corporate governance obligations, namely the "Apply or Explain" compliance statements, highlights the degree of compliance with the provisions

contained in the BVB Corporate Governance Code and the attitude of entities towards them. In this regard, aspects such as the degree of compliance with the provisions, the quality of explanations provided by entities

in case of non-compliance, and the evolution of compliance in the period 2019 – 2021 were followed.

In order to determine the degree of compliance at the section level, we have assigned values correlated to the degree of compliance and non-compliance with the provisions of the Corporate Governance Code. A value of 1 was given for compliance with the provisions of the Corporate Governance Code and 0 for non-compliance. The degree of compliance per section was calculated as the ratio of the number of provisions complied with to the total number of provisions contained within a section. Annual compliance was also calculated for each company as the ratio of the total number of provisions complied with to the total number of provisions in the Compliance Statement "Apply or Explain".

At the same time, in order to assess the explanations provided by the entity regarding non-compliance with the provisions of the code, i.e. to establish an annual score/entity, following the model developed by Arcot, Bruno and Faure-Grimaud (2010) we structured the explanations provided by the entity and awarded scores as follows:

- The explanation has been classified in the category "No explanation", giving a value of "1" if the entity gave no reason for non-compliance;

- The explanation has been classified in the "General" category, giving a value of "2" if the entity has not given a particular, company-specific reason, but gives a general reason;

- The explanation has been classified in the category "Transitory", giving a value of "3" if the reason given shows that the entity is in a transitional situation that results in temporary non-compliance with the Code;

- The explanation has been classified as "Specific", giving a value of "4" if the reasons given are considered specific to the entity and in line with the Code.

The annual explanation score was calculated as the ratio of the sum of the values given to explanations vs the sum of the maximum values that could be given.

Data analysis and processing

By investigating the information presented in the Annual Reports for the period 2019-2021, respectively in the Compliance Statements "Apply or Explain" publicly available on the website of the Bucharest Stock Exchange, the degree of compliance with the provisions of the Corporate Governance Code was determined for the selected companies on an annual basis (expressed in percentages), the information being structured in **Table no. 2**.

Table no. 2. Degree of compliance with the Corporate Governance Statement				
Activity Sector	**Company**	**Period**		
		2019	**2020**	**2021**
Energy	ELECTRICA S. A.	100%	100%	100%
	NUCLEARELECTRICA S.A.	92%	92%	92%
Pharmaceutical	S.C. BIOFARM S.A.	53%	53%	59%
	ROPHARMA S.A.	94%	94%	94%
	ZENTIVA S.A.	50%	50%	50%
	TERAPAST	91%	85%	85%
HoReCa	SIF HOTELURI S.A.	62%	68%	71%
	TURISM FELIX S.A.	47%	62%	76%
Oi land gas	OMV PETROM S.A.	88%	88%	91%
	S.N.G.N. ROMGAZ S.A.	88%	94%	88%
	ROMPETROL WELL SERVICES S.A.	79%	79%	79%

Source: Own processing

Also, in addition to the above-mentioned aspects, aspects related to the attributes of the board of directors (e.g. board structure, work performed, independence, frequency of meetings, etc.) as well as aspects related to the internal audit activity carried out in the sampled companies were analyzed during the research.

At the same time, the direct or indirect link between the number of provisions complied

with and the quality of the explanations provided was analyzed.

In the following, we will present for each business area the analysis of the degree of compliance at the section level, as well as the assessment of the explanations provided by the entity on the provisions that were or were not complied with.

Energy business area

For the companies selected for testing, Electrica and Nuclearelectrica, the level of compliance with corporate governance provisions for each section is shown in **Table no. 3**.

Companies	Electrica S.A.		Nuclearelectrica S.A.	
Section/ Prevision Respected	**Provisions Fulfilled**	**Score per action (%)**	**Provisions Fulfilled**	**Score per action (%)**
Section A. Responsibility (11 requirements)				
2019	11	100%	9	82%
2020	11	100%	9	82%
2021	11	100%	9	82%
Section B. Risk management and internal control system (12 requirements)				
2019	12	100%	12	100%
2020	12	100%	12	100%
2021	12	100%	12	100%
Section C. Fair rewards and motivation (1 requirement)				
2019	1	100%	1	100%
2020	1	100%	1	100%
2021	1	100%	1	100%
Section D. Building value through investors' relations (10 requirements)				
2019	10	100%	9	90%
2020	10	100%	9	90%
2021	10	100%	9	90%

Table no. 3. Frequency analysis – compliance with the Statement on Corporate Governance in the Energy sector

Source: Own processing

For the companies selected for testing, *Electrica* and *Nuclearelectrica*, the level of compliance with corporate governance provisions for each section is shown in **Table no. 3**.

Frequency analysis – compliance with the Statement on Corporate Governance in the Energy Sector

Nuclearelectrica S.A. showed during the period under review a constant degree of compliance with the provisions of the Corporate Governance Code, i.e. approximately 92%, mainly influenced by non-compliance with provision D.3. on the adoption of the forecasting policy. At the same time, the degree of compliance was also influenced by the partial compliance with A.8 and A.11 respectively regarding the evaluation of the board of directors and the independence of the nomination/reward committees.

As regards the evaluation of the explanations provided for the 3 non-compliant provisions, we awarded the maximum score in all cases, classifying them in the "Specific" category,

considering the explanations provided to be in line with the field of activity. For example, concerning the non-elaboration of the forecasting policy the company explained that in the context of forecasting, it would have a high degree of uncertainty because the company is not a participant in the energy market and is not a price maker.

The entity's Board of Directors is composed of 5 members (1 executive and 4 non-executive) of which 2 members are independent. According to the Articles of Association of the company, 4 advisory committees have been established, namely the Nomination and Remuneration Committee, Audit Committee, Nuclear Safety Committee, Strategy, Development and Projects Committee.

In terms of composition, the Committees are composed of at least 2 members of the Board of Directors.

The economic disruption caused by the Covid-19 pandemic in 2020 has brought several constraints on some of the activities carried out by society. However, the impact on financial performance is not significant. According to the

information published in the Directors' Annual Report for 2021, the company has maintained a high level of performance. Therefore, in day-to-day operations, we can consider that the pandemic has not had a major impact that would significantly affect business continuity.

Concerning *Electrica S.A.,* it was found that all the provisions of the Corporate Governance Code were fully complied with throughout the period under review, thus generating a 100% compliance rate. The explanations provided by the company were assessed throughout the period analyzed as specific.

According to the Annual Report (2021), the Board of Directors consists of 7 non-executive members, 4 of whom are independent. In order to maximize the effectiveness of the results of its activities, the Board of Directors decided to set up advisory committees as follows: Strategy and Corporate Governance Committee; Audit and Risk Committee; Nomination and Remuneration Committee.

From a financial point of view, during the period under review, at the macroeconomic level, the COVID-19 pandemic led to a slowdown in the economy and a

decrease in electricity demand, especially from non-household consumers. Trade receivables increased in 2021 by about 30% compared to 2020. This change is driven by increased sales, especially in the supply segment plus the impact of COVID-19 on receivables collection. With this in mind, the Company has identified default risk, taking into account a number of factors to ensure that it performs default classification not only based on expected credit losses but also on circumstances where economic losses are likely.

Also, according to the information published in the Directors' Annual Report for 2021, the energy distributed and supplied in 2020 was significantly reduced compared to 2019, and investment projects in the distribution business were in line with forecasts.

Pharmaceuticals business sector

Based on the selection criteria of the companies presented, we selected Biofarm, Ropharma, Zentiva, and TeraPlast for testing compliance with corporate governance provisions. For these, we calculated the degree of compliance per section (**Table No. 4**):

Companies	Biofarm S.A.		Ropharma S.A.		Zentiva S.A.		TeraPlast S.A.	
Section/ Prevision respected	Provisions fulfilled	Score per action (%)	Provisions fulfilled	Score per action (%)	Provisions fulfilled	Score per action (%)	Provisions fulfilled	Score per action (%)
Section A. Responsibility (11 requirements)								
2019	8	73%	11	100%	7	64%	10	90%
2020	8	73%	11	100%	7	64%	8	73%
2021	8	73%	11	100%	7	64%	8	73%
Section B. Risk management and internal control system (12 requirements)								
2019	3	15%	12	100%	4	33%	12	100%
2020	3	15%	12	100%	4	33%	12	100%
2021	3	15%	12	100%	4	33%	12	100%
Section C. Fair rewards and motivation (1 requirement)								
2019	0	0%	1	100%	0	0%	1	100%
2020	0	0%	1	100%	0	0%	1	100%
2021	1	100%	1	100%	0	0%	1	100%
Section D. Building value through investors' relations (10 requirements)								
2019	7	70%	8	80%	6	60%	8	80%
2020	7	70%	8	80%	6	60%	8	80%
2021	7	70%	8	80%	6	60%	8	80%

Tabelul no. 4. Frequency analysis – compliance with the Statement on Corporate Governance in the Pharmaceuticals Business Sector

Source: Own processing

In the case of *Biofarm S.A.*, an improvement in compliance can be observed, i.e. an increase of 6 percentage points in 2021, compared to 2020 and 2019 when the compliance rate was 53%. Concerning the factors that led to the increase in the value of the degree of compliance, we specify compliance with section C.1 from 2021, which provides for the development of the remuneration policy.

In the case of sections A, B and D respectively, the degree of compliance remained constant throughout the period under review.

Concerning the explanations provided by the company, these have been treated as follows: the provisions complied with have been classified as "No explanation" and assigned a value of "1"; the provisions not complied with have been classified as "General" and assigned a value of "2".

The company applies a unitary system of corporate governance and is governed by a Board of Directors composed of 5 non-independent members, 4 of whom are non-executive and 1 executive. No such committees have been set up at the company level to advise the Board of Directors.

As regards the internal audit activity, according to provision B11, at the company level, it is carried out by the internal audit department. We note that no details of its composition or activity were identified in the 2021 annual report.

Throughout the period under review, *Ropharma S.A.* showed a consistent level of coverage of the provisions of the Corporate Governance Code of 94%, with 100% compliance with the provisions contained in sections A, B, and C, except for section D where 8 out of 10 provisions were met. The provisions not complied with were D8 on the foresight policy and D12 on the regulation/policy of artistic/cultural activities carried out at the entity level.

It is worth noting that during the period under review, the company generally did not provide detailed explanations in the "Do you apply or explain" statement, with most of the answers being of the "Yes"/"No" type, which can be considered as having a negative impact on the company, given the interest shown by users in financial/non-financial information.

As regards the Board of Directors, it is composed of 7 members, 3 of whom are executive. It should be noted that no details on the independence of the members of the Board of Directors and the structure or activity of the Advisory Committees of the Board of Directors were identified in the annual reports.

Zentiva S.A. recorded during the period 2019-2021 a constant degree of compliance with the provisions of the Corporate Governance Code, i.e. approximately 50%,

mainly influenced by non-compliance with the provision of section B, where only 4 provisions (33%) out of a total of 12 were met.

At the same time, the degree of compliance was also influenced by the fulfillment of section C "Fair reward and motivation" and partial compliance with sections A – "Responsibilities" (64%) and D – "Adding value through investor relations" (60%).

As regards the assessment of the clarifications provided by the company in case of non-compliance or partial compliance, these were classified as "Specific" considering the explanations provided in line with the scope of activity.

The company is governed by a unitary corporate governance system, with a Board of Directors consisting of 5 directors of which only 1 is an independent director.

In the case of *Teraplast S.A.*, there is a change that negatively influenced the degree of compliance in the period 2020 – 2021, compared to 2019, mainly due to non-compliance with the provisions of Section A.

Thus, in the period 2020-2021, out of the 11 requirements, only 8 have been met: provision A.8. on the development of a board evaluation policy/guideline containing at least the following aspects: purpose, criteria and frequency of the evaluation process; provision A.9. on the corporate governance statement.

Also, for the period 2020-2021, non-compliance with provision A11 that Premium Category companies must establish a Nominating Committee was noted.

On the first unmet requirement, I awarded 1 point because the company does not provide additional details, such as whether they intend to comply in the near or distant future, and for the A11 unmet requirement, I awarded 2 points because they provide the succinct information that they are not part of the Premium category.

Concerning the provisions of Section B, the entity has complied with them throughout the period under review, with a consistent compliance rate of 100%.

Section C maintains compliance throughout the review period concerning the remuneration policy, but we have awarded 1 point because the company does not provide any additional information.

For Section D, the company complied with all requirements with 10 out of 10 being met for the entire period under review. Also, compared to Sections A and B, we have given 1 point for each requirement as no specific information is provided.

Note that there has been a change in the structure of the Declaration of Conformity in 2021 in terms of the details

provided. Thus, the Declaration of Conformity for the year 2021 does not present an explanation heading, i.e. the provision detail heading, only the codification of the provision and whether it is complied with or not is specified.

As regards the composition of the Board of Directors, it consists of 5 members, 2 of whom are independent non-executive members. In addition, the following advisory committees have been set up within the entity: Audit Committee of 4 members, Remuneration and Nomination Committee of 4 members.

The COVID-19 pandemic has been and remains a challenge for the pharmaceutical sector, but not from the perspective of reducing or stopping activity, but on the contrary, from the perspective of continuing or improving activity. Patients' ailments have remained the same, but they have also multiplied during the pandemic period, so companies operating in this industry have taken every measure to ensure that their business runs smoothly.

According to the information published by *Biofarm S.A.* in the Annual Report for 2021, the company's management considers that there are no issues affecting business continuity, sales volume, cash flow and profitability and will take all measures to ensure business continuity under optimal conditions in the context of the pandemic.

The financial statements published by *Ropharm* disclose an increase in operating income of 4% in 2021, i.e. an increase in revenue on the main business segment of 7%, although the revenue achieved under the National Cost-Volume-Result (CVR) Program in 2021 was significantly affected by the Covid-19 pandemic (the value recorded in 2021 was approx. 13 million lei, down from the value recorded in 2019 of approx. 23 million lei). Concerning the aspects impacting the continuity of the business, the management team assesses that the entity has improved its liquidity position in the short and medium term, and forecasts indicate its functioning at current funding.

In the case of *Teraplast*, during the period 2020 – 2021, the results were not impacted by the pandemic, as the entire company's activity was carried out under normal conditions, with all production units operating at normal capacity.

Oil and Gas activity sector

The degree of compliance by section for the companies selected (OMV, Romgaz, Rompetrol) for analysis is presented in **Table no. 5**.

Table no. 5. Frequency analysis – compliance with the Statement on Corporate Governance in the Oil and Gas activity sector						
Companies	**OMV Petrom S.A.**		**Romgaz S.A.**		**Rompetrol Well Services S.A.**	
Section/ Prevision respected	**Provisions fulfilled**	**Score per action (%)**	**Provisions fulfilled**	**Score per action (%)**	**Provisions fulfilled**	**Score per action (%)**
Section A. Responsibility (11 requirements)						
2019	10	91%	10	91%	9	82%
2020	10	91%	10	91%	9	82%
2021	10	91%	9	82%	9	82%
Section B. Risk management and internal control system (12 requirements)						
2019	10	83%	9	75%	10	83%
2020	10	83%	11	92%	10	83%
2021	10	83%	10	83%	10	83%
Section C. Fair rewards and motivation (1 requirement)						
2019	0	0%	1	100%	0	0%
2020	0	0%	1	100%	0	0%
2021	1	100%	1	100%	1	100%
Section D. Building value through investors' relations (10 requirements)						
2019	10	100%	10	100%	8	80%
2020	10	100%	10	100%	8	80%
2021	10	100%	10	100%	7	70%

Source: Own processing

OMV Petrom S.A. showed a constant compliance rate in 2019-2020, i.e. around 88%.

During the whole period under review, 10 out of 11 provisions were complied with in Section A, i.e. 91% of them. For the non-complied provision regarding the constitution and composition of the Nomination Committee, the entity explained that although the provision is partially met, in 2021 there was an improvement compared to the previous period, with the Nomination Committee consisting of 2 independent members compared to 1 independent member in 2020. The explanations provided by the entity under this section were assessed as specific, therefore the maximum score was awarded.

With regard to section B, for the period 2019-2020, a constant situation was observed, with 10 provisions out of a total of 12, i.e. a percentage of 83%. Following the analysis of the explanations provided for the non-compliant provisions, the following values were given: value "3" to the provision on the reporting of the Internal Audit Department as it is mentioned that the company is considering the possibility of aligning with the provision; value "4" to the provision on the independence of the members of the audit committee, this provision being partially complied with during the period under review.

Section C contains a single provision that has been complied with since 2021. The explanations provided in the first 2 years analyzed were classified in the "Transitional" category, while in 2021 the explanation provided was classified in the "Specific" category.

In the case of Section D, throughout the period under review, the company complied with all the provisions, thus generating a compliance rate at the section level of 100%. As regards the explanations provided, most of them were assessed as being specific to the field of activity.

With regard to the compliance rate recorded in 2021, it was approximately 94%, 6 percentage points higher than in the previous period, an increase driven by the development and implementation of the remuneration policy, a condition set out in Section C.

OMV Petrom S.A. applies the dual system of corporate governance, being managed by the Executive Board, and the Supervisory Board. The Supervisory Board is composed of 9 non-executive members of which 3 independent members. The Advisory Committees of the Supervisory Board are the Audit Committee (composed of 5 non-executive members of which 3 independent

members), and the Presidential and Nomination Committee (composed of 4 members). Internal audit work is carried out within the Internal Audit Department.

According to information published in the Annual Report of the Directors as at 31 December 2021, the company is monitoring the effects of the pandemic and cash flows. Although operating profit for 2021 increased compared to 2020, mainly as a result of the favorable market environment, the Group's performance for 2020 was adversely impacted by lower prices, the crisis generated by COVID-19, and net impairment adjustments driven by updated price estimates.

In the case of *Romgaz S.A.*, for the 2019-2020 corporate governance reporting period, there was a significant improvement in the first section. Compared to 2019, the degree of adoption of the provisions on risk management and oversight of internal control activity increased from 75% to 92%, reflecting the importance given by management in fulfilling its responsibilities to stakeholders.

However, looking at the information contained in the Annual Report for 2021, we found an unfavorable situation, i.e. a decrease in the annual compliance rate by about 6 percentage points, from 94% in 2020 to 88% in 2021. Among the provisions not or partially complied with in 2021 compared to 2019 we mention provisions A4, A11, B1 regarding the composition of the Board of Directors and the Advisory Committees established by it, respectively the percentage of independent non-executive members in the total members.

As regards Section C, a constant compliance rate of 100% was observed throughout the period under review. A similar situation was found for Section D, where the compliance rate over the period 2019 – 2021 was 100%, with all provisions of the section being met.

Considering that all the provisions have been complied with for these 2 sections, the entity did not provide any further explanation, therefore they have been classified as "No explanation". The exception is provision D5 where both in 2019 and 2020, it was mentioned that the external audit team is presented to the General Meeting of Shareholders at the time of presenting the audit reports. In this case, we have considered the explanation as specific, giving it a value of 4.

Note that as of 2021, the Board of Directors was composed of 7 non-executive members, of which 2 independent members. With regard to the structure of the advisory committees set up to support the work of the Board of Directors, the situation was as follows: Audit

Committee – 3 members, of which only one is an independent non-executive member; Nomination and Remuneration Committee – 3 members, of which only one is an independent non-executive member; Strategy Committee – 5 members, of which only one is an independent non-executive member.

With regard to an internal audit, is an independent and objective activity carried out within the Public Internal Audit Service, which was set up to provide the company with assurance of the degree of control.

Throughout the period analyzed, it is noted that explanations were provided only in the case of provisions not or partially fulfilled, explanations which were considered in line with the scope of work and specific to the provision assigned.

Rompetrol S.A. showed a compliance rate of approximately 79% throughout the period under review, complying with 27 out of a total of 34 provisions of the Corporate Governance Code.

With regard to the provisions that have not been met, we mention provision A8 on the Board's evaluation policy and provision A11 on the establishment of the nomination committee in companies belonging to the Premium Category. The explanations provided by the company for the period under review were treated as follows: a value of "2" was given to the explanation related to provision A8 because the timeframe in which the policy will be developed is not mentioned and a value of "4" to the explanation related to provision A11 where the entity explained that it is part of the Standard category and not Premium.

For the period under review, compliance with the provisions of Section B is identical, with 9 provisions being

complied with, i.e. 82% of them. The explanations provided by the entity for non-compliant provisions were classified as "Transitory".

With regard to the remuneration policy, a requirement under Section C, according to the explanations provided in both 2020 and 2021, it has been developed and implemented since April 2021.

With regard to Section D "Value creation through investor relations", there was a decrease of approximately 10 percentage points compared to 2019, due to non-compliance with provision D2 regarding the policy of annual distribution of dividends to shareholders, a provision that was complied with in the previous period. According to explanations provided by the company, it is intended to re-implement it in the future. Please note that this explanation has been classified as "Transitory".

In 2021, the oil services industry was heavily impacted by reduced investment in the oil and gas industry as a result of the prolonged decline in oil prices that started in the first part of 2020, given the economic situation generated by the pandemic. These issues had a significant impact on the company's performance. Nevertheless, *Rompetrol* managed during 2021 both to maintain its leading position in the business and to record positive financial results.

HoReCa activity sector

The selected entities (SIF Hoteluri S.A., Turism Felix S.A.) included in this business sector were strongly affected by the pandemic in the period 2020 – 2021, and are at risk regarding business continuity. The degree of compliance by section for the companies selected for analysis are shown in **Table no. 6**.

Table no. 6. Frequency analysis – compliance with the Statement on Corporate Governance in the HoReCa activity sector				
Companies	**SIF Hoteluri**		**Turism Felix S.A.**	
Section/ Prevision respected	**Provisions fulfilled**	**Score per action (%)**	**Provisions fulfilled**	**Score per action (%)**
Section A. Responsibility (11 requirements)				
2019	3	27%	5	45%
2020	4	36%	7	64%
2021	5	45%	7	64%
Section B. Risk management and internal control system (12 requirements)				
2019	11	92%	6	50%
2020	11	92%	9	75%
2021	11	92%	11	92%

Companies	SIF Hoteluri		Turism Felix S.A.	
Section/ Prevision respected	Provisions fulfilled	Score per action (%)	Provisions fulfilled	Score per action (%)
Section C. Fair rewards and motivation (1 requirement)				
2019	0	0%	1	100%
2020	1	100%	0	0%
2021	1	100%	1	100%
Section D. Building value through investors' relations (10 requirements)				
2019	7	70%	5	50%
2020	7	70%	5	50%
2021	7	70%	7	70%

Source: Own processing

With regard to the degree of compliance presented by *SIF Hoteluri S.A.*, during the analysis of the year, we noted an improvement in 2021 compared to the first year analyzed, i.e. an increase in the degree of compliance by approximately 9 percentage points.

Thus, in 2021, compared to 2019, the company's compliance was observed: A7 complied with as of 2021 regarding the establishment of the Secretary function within the Board of Directors; A9 complied with as of 2020 regarding the drafting of the Corporate Governance Statement, as well as the drafting of reports on the work of the Board of Directors and the Advisory Committees established by it; C1 complied with as from 2020 regarding the drafting of the remuneration policy.

With regard to the explanations provided by the entity for the whole period under review, it provided details only in the case of unfulfilled provisions. Thus, maximum marks were given to all explanations provided, except for two explanations that were classified as "No explanation" or "General", such as provision A4 on the composition of the Board of Directors, i.e. the percentage of non-executive members in the total membership and provision A11 on the establishment of the Nomination Committee.

Please note that as of 31 December 2021, the Board of Directors consisted of 3 non-independent and non-executive members, which formed the Audit Advisory Committee consisting of 2 members. Also, with regard to the internal audit activity, it is provided by a third-party entity.

Throughout 2021, the company was exposed to risks specific to its current operations, as well as risks from the COVID-19 pandemic that have grown exponentially. As of December 31, 2021, the Company's management assures investors and other stakeholders that the Company has sufficient liquidity to meet its obligations over the next 12 months. With regard to future cash flows, management estimates that they will be negatively impacted by the consequences of the pandemic, which are impossible to quantify at the reporting date.

Turism Felix S.A. recorded an upward trend during the period under review in terms of compliance with the provisions of the Corporate Governance Code. Thus, in 2020 an increase of approximately 15 percentage points was recorded, i.e. from a degree of compliance of approximately 47% (value recorded in 2019) to approximately 62% (value recorded in 2020). The upward trend continued in 2021 when the compliance rate was around 76%, which is about 29 percentage points higher than in 2019. The difference was mainly marked by the improvement of the management and internal control system (section B), where 11 out of a total of 12 provisions were complied with in 2021. The exception is provision B4 on the criteria to be considered by the audit committee when assessing the internal control system, which is to be implemented.

An improvement was also noted in section A, due to the compliance from 2020 with the provisions of A3 according to which the Board of Directors must consist of 5 members, and A11 according to which the companies belonging to the Premium Category must set up a nomination committee.

As of 2021, the company has developed and included in the Annual Report, the remuneration policy, which has resulted in 100% compliance with Section C.

In the case of Section D, a compliance rate of around 70% was shown for 2021, compared to 2019-2020 when the coverage level was only 50%. With regard to the factors influencing its increase, we recall the fulfillment as of 2021

of the following provisions: D2 regarding the dividend distribution policy; D3 regarding the making and publication of forecasts regarding the impact of all factors that may influence the activity carried out.

After reviewing the explanations provided by the entity in the Compliance Statements, we noted that the entity does not provide extensive or specific explanations. For example, more than 70% of the explanations of non-implemented requirements are in the form of "Provision to be implemented". Thus, the explanations were categorized as "General".

According to the Annual Report for 2021, as of December 2021, the Board of Directors was composed of 5 members. Please note that the report does not specify details of their independence.

With regard to the impact of the economic crisis generated by the pandemic, the company suspended its activity based on the decisions issued by the governmental authorities according to the law from 16 March 2020 and partially from 15 July 2020. The company's activity during 2021 was drastically affected by the outbreak and extension of the crisis generated by the pandemic, which had a significant impact on the company's activity as a result of the institution of the state of emergency and alert at a national level. One of the measures adopted by the government authorities that supported the hotel industry was the settlement of technical unemployment and other forms of financial support for employees, as well as other aid schemes, such as the deferral of taxes and duties due to the state budget.

Given the significant impact that the pandemic has had on HoReCa companies, to have a comprehensive and relevant picture of business continuity, the published third quarter reports for 2022 of the two companies providing the information were investigated:

- In the case of *Turism Felix S.A.*, the management team stated that its activity was still affected by the health and economic crisis generated by COVID-19, but the operating income increased by approx. 7% compared to 2021. Structurally, revenues increased in the segments of accommodation, catering, and treatment.

- In the case of *SIF Hotels S.A.*, the management team stated that in the first nine months of 2022, its activity had recovered substantially compared to 2021, with turnover increasing by 63% compared to the same period of 2021, generated by the resumption of hotel activities once the pandemic restrictions were eased.

Conclusions

Given the turbulent environment from both a health and economic point of view, companies continue to face different challenges that impact corporate governance in different ways. Also, the current context, exposed to emerging risks and the need for sustainable development brings new demands on governance, requiring a rethinking of strategy and business processes. New challenges require strengthened corporate governance implementations.

The research results show that in the Energy sector, the degree of compliance with the provisions of the Corporate Governance Code was very high throughout the period under review. Compliance with the provisions of the unitary system of corporate governance was also noted with regard to the composition of the Board of Directors and its work.

Previous studies have shown that entities in the pharmaceutical industry and in the energy, oil, and gas industry score well on Corporate Governance practices (Albu, 2014).

With regard to the Pharmaceuticals business sector, the research results revealed cases where compliance was close to maximum, namely for Ropharma and TeraPlast, but also cases where companies were at a constant coverage level of around 50%, namely Biofarm. An unfavorable situation was observed in the case of TeraPlast, in which case a decrease of 6 percentage points was observed in 2021 compared to 2019.

Similar results were obtained for companies in the oil and gas sector. For example, in the case of OMV Petrom, annual compliance increased by about 3 percentage points in 2021 compared to the first year included in the analysis, and a constant level of compliance in the case of Romgaz (79%). Although for Romgaz, in 2020 compliance increased by about 5 percentage points, a continuous upward trend was not observed.

The study also revealed that entities with a high degree of compliance treated the explanations in the same way, such as OMV, Electrica, and Nuclearelectrica. However, there were also situations where the entity provided general explanations related to non-compliant provisions (HoReCa companies) or even situations where no explanation was provided (TeraPlast company, in the case of 2021).

From a temporal point of view, the research revealed that during the period analyzed, 2019 – 2021, the situation of

compliance in the 11 companies analyzed was as follows: 6 companies showed a constant situation, 4 companies showed an increase in compliance; 1 company showed a decrease in compliance.

As future research directions, we propose to continue the research with the extension of the sample by companies and business sectors.

Regarding the limitations of the research, we consider that one of the limitations is the small sample compared to the number of companies listed on the Bucharest Stock Exchange. However, we consider that the structure of the sample covered a significant proportion of the sectors of activity analyzed, and thus the research results are not affected.

REFERENCES

1. Albu C.N., Gârbină M.M. (2015) Compliance with corporate governance codes in emerging economies. How do Romanian listed companies "comply-or-explain"?, *Corporate Governance International Journal of Business in Society*, Vol. 15, n5.1, p. 185-107

2. Arcot, S., Bruno, V., F.G., A. (2010) Corporate governance in the UK: is the comply or explain approach working?, *International Review of Law and Economics*, Vol. 30. no. 2, p. 193-201

3. Bursa de Valori Bucureşti (2015) Codul de Guvernanţă Corporativă. [online] available at : <https://www.bvb.ro/info/Rapoarte/Diverse/RO_Cod %20Guvernanta%20Corporativa_WEB_revised.pdf>, [Accessed 01.02.2022]

4. Cadbury Report (1992) Report of the Committee on the Financial Aspects of Corporate Governance, 1992

5. Camera Auditorilor Financiari din România, Hotărârea nr. 48/ 26 iunie 2014 pentru adoptarea Normelor obligatorii din cadrul internaţional de practică profesionale (IPPF), emise de Institutul Global al Auditorilor Interni

6. Charreaux, G. (1994) Conseil d'administration et pouvoirs dans l'entreprise, *Revue d'Économie Financière*, vol. 31, no. 4, pp.44-79

7. COSO, WBCSD (2018) Enterprise Risk Management – Applying enterprise risk management to environmental, social and governance-related risks [pdf], available at: <https://www.coso.org/ Documents/COSO-WBCSD-ESGERM-Guidance-Full.pdf> [Accessed at 01.12.2021]

8. Dobroţeanu, C.L., Dobroţeanu, L. (2007) Audit Intern, *Ed. InfoMega*, Bucureşti

9. Dumitraşcu, M., Feleagă, L., Feleagă, N. (2015) Implementarea practică a principiilor de guvernanţă corporativă pentru companiile româneşti de stat, *Audit Financiar* no.1(121), 26 – 34

10. Dumitraşcu, M., Gajevszky, A. (2013) Corporate Governance Committees în European Union emerging economies. *Accounting Department, Faculty of Accounting and Management Informatics System University of Economic Studies*, Bucharest

11. Feleagă, N., Feleagă, L., Dragomic, V. şi Bigioi, A. (2011). Guvernanţa corporativă în economiile emergente: cazul României. *Economie Teoretică şi Aplicată*, Vol. XVIII, No. 9, p. 3-15

12. Ghiţă, M. (2008) Guvernanţa Corporativă, *Ed. Economică*, Bucureşti

13. IAASB (2018) Manualul de reglementări internaţionale de control al calităţii, audit, revizuire, alte servicii de asigurare, şi servicii conexe, Vol. I, Romanian translation, pg. 23

14. Jensen, M.C, Meckling, W.H. (1976) Theory of the firm: Managerial Behavior, Agency Costs and Ownership Structure, *Jornal of Financial Economics*, pg.305-360

15. Ştefănescu, A., Tănase, L.D. (2016) The development of a corporate governance assessment model for the Romanian public sector, *Audit Financiar* vol. 14, no.143/2016, pg. 1227-1334

Rapoarte şi reglementări

1. BIOFARM S.A., (2019). Raport Anual 2019. [online] Available at: <https://bvb.ro/infocont/infocont20/ BIO_20200428174839_Raport-anual-2019.pdf [Accessed 05.05.2022]

2. BIOFARM S.A., (2020). Raport Anual 2020. [online] Available at: <https://bvb.ro/infocont/infocont21/ BIO_20210426180616_Raport-anual-2020.pdf> [Accessed 05.05.2022]

3. BIOFARM S.A., (2021). Raport Anual 2021. [online] Available at:<https://bvb.ro/infocont/infocont22/ BIO_20220428170028_Raport-anual-2021.pdf> [Accessed 05.05.2022]

4. BVB (2015). Codul de Guvernanță Corporativă. [online] Available at: <https://www.bvb.ro/info/ Rapoarte/Diverse/RO_Cod%20Guvernanta%20Corp orativa_WEB_revised.pdf>, [Accessed 01.02.2022]

5. Electrica S.A. (2019). Raport Anual 2019. [online] Available at: <https://bvb.ro/infocont/infocont20/ EL_20200430091222_ELSA-RO-Raport-anual-2019-BVB.pdf> [Accessed 01.05.2021]

6. Electrica S.A. (2020). Raport Anual 2020. [online] Available at:<https://bvb.ro/infocont/infocont21/ EL_20210429124655_Raport-Anual-2020-RO-10MB.pdf> [Accessed 01.05.2021]

7. Electrica S.A. (2021). Raport Anual 2021. [online] Available at: <https://bvb.ro/infocont/infocont22/ EL_20220421160903_ELSA-RO-Raport-Anual-2021-Electrica-compressed.pdf> [Accessed 01.05.2021]

8. Legea societăților comerciale nr. 31/1990 privind societățile comerciale, Monitorul Oficial al României, Partea I, până la 10 iunie 2011

9. NUCLEARELECTRICA S.A. (2019). Raport Anual 2019. [online] Available at:<https://bvb.ro/infocont/ infocont20/SNN_20200427122837_Raport-anual-2019.pdf>[Accessed 04.05.2022]

10. NUCLEARELECTRICA S.A. (2020). Raport Anual 2020. [online] Available at:<https://bvb.ro/infocont/ infocont21/SNN_20210426131045_Raport-anual-2020-RO.pdf> [Accessed 04.05.2022]

11. NUCLEARELECTRICA S.A. (2021). Raport Anual 2021. [online] Available at:<https://bvb.ro/infocont/ infocont22/SNN_20220428163959_Raport-anual-2021-integrat-RO.pdf> [Accessed 04.05.2022]

12. OMV PETROM S.A. (2019). Raport Anual 2019. [online] Available at:<https://bvb.ro/infocont/ infocont20/SNP_20200427151712_Rapoarte-anuale-situatii-financiare-si-plati-catre-guverne.pdf> [Accessed: 03.05.2022]

13. OMV PETROM S.A. (2020). Raport Anual 2020. [online] Available at:<https://bvb.ro/infocont/ infocont21/SNP_20210427162254_Rapoarte-anuale-situatii-financiare-si-plati-catre-guverne.pdf >[Accessed: 03.05.2022]

14. OMV PETROM S.A. (2021). Raport Anual 2021. [online] Available at:<https://bvb.ro/infocont/ infocont22/SNP_20220427214045_Rapoarte-anuale-situatii-financiare-si-plati-catre-guverne.pdf > [Accessed: 03.05.2022]

15. ROMGAZ S.A. (2019). Raport Anual 2019. [online] Available at:<https://bvb.ro/infocont/ infocont20/SNG_20200422221132_SNG-Raport-anual-2019.pdf> [Accessed: 03.05.2022]

16. ROPHARMA S.A. (2020). Raport Anual 2020. [online] Available at: <https://bvb.ro/infocont/ infocont20/RPH_20200430195135_Raport-anual-2020.pdf> [Accessed 05.05.2022]

17. ROPHARMA S.A. (2021). Raport Anual 2021. [online] Available at: <https://bvb.ro/infocont/ infocont21/RPH_20210428181633_Raport-anual-2021.pdf> [Accessed 05.05.2022]

18. ROPHARMA S.A. (2019). Raport Anual 2019. [online] Available at: <https://bvb.ro/infocont/ infocont22/RPH_20220428190548_Raport-anual-2019.pdf > [Accessed 05.05.2022]

19. ROMGAZ S.A. (2020). Raport Anual 2020. [online] Available at:<https://bvb.ro/infocont/ infocont21/SNG_20210427163510_Raportul-anual-2020.pdf> [Accessed: 03.05.2022]

20. ROMGAZ S.A. (2021). Raport Anual 2021. [online] Available at:<https://bvb.ro/infocont/ infocont22/SNG_20220428215142_Raportul-anual-2021.pdf> [Accessed: 03.05.2022]

21. ROMPETROL WELL SERVICES S.A. (2019). Raport Anual 2019. [online] Available at:<https://bvb. ro/infocont/infocont20/PTR_20200427183032_RWS-Raport-anual-2019.pdf> [Accessed: 06.05.2022]

22. ROMPETROL WELL SERVICES S.A. (2020). Raport Anual 2020. [online] Available at:<https://bvb. ro/infocont/infocont21/PTR_20210426190321_RWS-Raport-anual-2020-RO.pdf> [Accessed: 06.05.2022]

23. ROMPETROL WELL SERVICES S.A. (2021). Raport Anual 2021. [online] Available at:<https://bvb. ro/infocont/infocont22/PTR_20220427191845_Romp etrol-Well-Services-SA---Raportare-anuala-2021-RO.pdf> [Accessed: 06.05.2022]

24. SIF HOTELURI S.A. (2019). Raport Anual 2019. [online] Available at:<https://bvb.ro/infocont/ infocont20/CAOR_20200429102355_2020-04-29-Raport-anual-2019.pdf> [Accessed 08.05.2022]

25. SIF HOTELURI S.A. (2020). Raport Anual 2020. [online] Available at:<https://bvb.ro/infocont/infocont21/CAOR_20210429134553_2021-04-29-Raport-anual-2020.pdf> [Accessed 08.05.2022]

26. SIF HOTELURI S.A. (2021). Raport Anual 2021. [online] Available at:<https://bvb.ro/infocont/infocont22/CAOR_20220429115519_00-Raport-anual-2021---total.pdf> [Accessed 08.05.2022]

27. TERAPLAS S.A. (2019). Raport Anual 2019. [online] Available at: <https://bvb.ro/infocont/infocont20/TRP_20200429182358_Raport-Anual-2019-TeraPlast-Group-RO.pdf> [Accessed 01.05.2022]

28. TERAPLAS S.A. (2020). Raport Anual 2020. [online] Available at:<https://bvb.ro/infocont/infocont21/TRP_20210428184801_Raport-Anual-TeraPlast-Group-2020.pdf> [Accessed 01.05.2022]

29. TERAPLAS S.A. (2021). Raport Anual 2021. [online] Available at:<https://bvb.ro/infocont/infocont22/TRP_20220428202809_Raport-Anual-2021-Grup-TeraPlast-compressed.pdf> [Accessed 01.05.2022]

30. TURISM FELIX S.A. (2019). Raport Anual 2019. [online] Available at:<https://bvb.ro/infocont/infocont20/TUFE_20200406163742_TUFE-RaportAnual-2019.pdf> [Accessed 08.05.2022]

31. TURISM FELIX S.A. (2020). Raport Anual 2020. [online] Available at:<https://bvb.ro/infocont/infocont21/TUFE_20210420185831_TUFE-AGOA-19042021-Raport-anual-2020.pdf > [Accessed 08.05.2022]

32. TURISM FELIX S.A. (2021). Raport Anual 2021. [online] Available at: <https://bvb.ro/infocont/infocont22/TUFE_20220419175703_TUFE-Raport-Anual-2021.pdf > [Accessed 08.05.2022]

33. ZENTIVA S.A. (2019). Raport Anual 2019. [online] Available at: <https://bvb.ro/infocont/infocont20/SCD_20200429120429_SCD-Raport-Anual-2019.pdf> [Accessed 03.06.2022]

34. ZENTIVA S.A. (2020). Raport Anual 2020. [online] Available at: <https://bvb.ro/infocont/infocont21/SCD_20210428143813_SCD-Raport-Anual-2020.pdf> [Accessed 03.06.2022]

35. ZENTIVA S.A. (2021). Raport Anual 2021. [online] Available at: <https://bvb.ro/infocont/infocont22/SCD_20220428184943_SCD-31-12-2022-Raport-Anual-RO.pdf> [Accessed 03.06.2022]

The Corporate Attitude Regarding the Impact of Artificial Intelligence in the Financial Sector

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Abstract

The objective of this paper is to analyze if the financial sector is ready for implementation of Artificial Intelligence-based solutions through a qualitative study. The scope of this paper is to contribute to the spatiality literature by bringing in front of the reader a guide who comprises research of the most important elements of financial domain which will be impacted by the implementation of Artificial Intelligence-based solutions. The used research methodology is the qualitative analysis based on a structured interview, whose responses were analyzed using Grounded Theory. To the interview have answered 27 representatives of top Romanian companies, these representing only a beginning of future wider studies. After analyzing the answers, the author concluded that in the financial field solutions based on artificial intelligence can be implemented very easily because it involves a lot of repetitive tasks that can be easily carried out with the help of these solutions in a shorter time and with fewer errors. The number of jobs involving these repetitive activities will also be significantly reduced over the next ten years.

Key words: *financial specialist; digitalization; automatization; Artificial Intelligence; key performance indicators;*

JEL Classification: *G40, M40, M41, M15*

Introduction

Due to rapid evolutions of digitalization in financial sector, the employees and the company representatives are subject to a very fast change process. In the case of daily activities, IT systems have become essential (Galy et al., 2014). Business organization systems such as ERP – *Enterprise Resource Planning* are used by large companies because they have the necessary resources and have a larger volume of data to process (Chang et. al., 2014; Zhang et al., 2020; Ionescu et al., 2021).

Beyond digitization systems, companies have started implementing artificial intelligence (AI)-based systems to process large volumes of data without human intervention. According to a study by CEECAR (2020), AI uses *Machine Learning* or *Deep Learning* to change all industries. In the financial sector these solutions are used very easily because they work with large volumes of data (Gartner, 2022; Huang et al., 2021).

Although 85% of CFOs of the "Transforming Paradigms" study believe that in the coming years they will implement AI solutions in their companies, they also name the biggest challenges: access to data, its quality, competition for qualified employees to use it (Eleonora et al., 2019).

As a result of the large volume of data, cloud computing has recently started to be used very often (Christaukas et al., 2012). In this case, companies purchase their AI-based solutions and store their data on the IT company's servers, which also promises greater data security (Dimitriu et al., 2015).

This article consists of 4 parts: the first is a review of the specialized literature, the second – in which the data-based research method is presented; the third – in which the concepts and categories resulting from the interview analysis are discussed and the answers to the three general questions of the study are commented on, the last part being dedicated to the conclusions of the study.

1. Literature review

In the financial field AI has a consistent history, AI-based solutions being developed over time to improve the services offered. Some of these solutions have been successful in financial reporting and analysis, auditing and insurance. Researchers have begun studying the impact of AI systems in accounting and finance since the 1980s. These applications have been developed and used in auditing, financial and managerial accounting, and financial analysis (Bean, 2018; Duffy, 2018).

The financial sector was changed by the rise of automation once technologies such as the *Application Programming Interface* (API) along with other computer-readable instructions came into use and also changed, domains as fintech. Fintech is an emerging industry that uses financial technologies to provide people with solutions that banks or other financial services cannot provide. APIs (application programming interfaces) have revolutionized the banking industry, giving rise to the 'Banking-as-a-Service' ecosystem along with a whole new suite of products, techniques and services (PwC, 2020; Bouchetara, 2022; Eleonora et al., 2019).

The increase in the level of automation is perceived by some employees as a threat, but it represents an opportunity for the whole business and society, because it helps people to advance in that field (Liu-Lindberg et al., 2022; Clarence et al., 2019).

The evolution of automation has been discussed for a long time already, but now the industries that use it have started to bear fruit: a report on the vision of the chief financial officers (CFO) in high tech, carried out by "Accenture" in 2022, found that 60% of financial tasks are now automated, compared to 2018 when only 38% of them were automated.

Benefits such as operational excellence, business agility and data reliability are driving more and more financial companies to implement AI solutions. Although AI is increasingly used, studies in this field are limited (Zheng et al., 2018; Gulin et al., 2019).

2. Research methodology

In this article, qualitative research was carried out based on a structured interview considered a reflection guide with 16 questions, with the help of which the impact of AI solutions on the financial sector of activity is studied. The interviews were carried out on a sample of 27 financial specialists from top companies in Romania with CAEN code 6920 – *Accounting and financial audit activities, consulting in the tax field*, presented in **Annex A** – "List of interviewed persons and the companies which they represent".

For the analysis of the results of the conducted interviews, a strategy based on Grounded Theory – GT (Glaster, 1967) is used as a research methodology. This theory involves some methodical data collection followed by inductive theory building (Goulding, 2002).

2.1. Research framework

Three research questions were defined using five themes and thirteen sub-themes. The synthetic representation of

the questions, themes and subthemes of this research are presented below in **Table no. 1**.

The thirteen sub-themes correspond to the five themes, and in addition to the tabular representation that structures the categories assigned to each subtheme there is also a theory-based explanation. Based on a subtheme, a concept was defined and, based on the concept, the categories that are explained in each table are chosen, by analyzing the answers.

The general research questions used are:

Research Question 1 (Q1): What is the current state of awareness and implementation of AI in financial services and the impact on business?

Research Question 2 (Q2): What changes are AI solutions bringing to financial roles and activity?

Research Question 3 (Q3): What is the attitude towards the results provided by AI solutions?

In *Figure no. 1* the steps followed in carrying out the research are represented.

Figure no. 1. The steps followed in the analysis of the structured interview

Step	Description
1. Literature Review	Selection of the most important scientific papers based on established keywords.
2. Questions	1. What is the current state of awareness and implementation of AI in financial services and the impact on business? 2. What changes are AI solutions bringing to financial roles and activity? 3. What is the attitude towards the results provided by AI solutions?
3. Conducting an interview	Carrying out the interview (Reflection Guide) with 27 managers and executives from Big4, corporations and accounting companies with Code CAEN 6920. Writing down the answers in an Excel table.
4. Labeling and representation	Manual coding in Excel using Grounded Theory. Dividing the research questions into 5 themes and 13 subthemes and assigning each sub-theme one Concept (C) and to each concept - the corresponding categories.
5. Rezults and discussions	Brief presentation of interview responses together with data from specialized literature.
6. Conclusion	Presenting conclusions and establishing future research directions of the implementation framework of AI-based solutions.

Source: Adaptation after Kallio et.al., (2016), Massaro et. al., (2016), Stoica et.al., (2022)

The research framework represented by **Table no. 1** represents a formal guide for structuring the research instrument.

GT is a synthetic approach whereby theory is developed inductively, using a process of classification and category development (Glaster 1967). For this research the GT theory is suitable, being context dependent in space and time. The classifications and categories derived from this research are presented in the "Results and Discussion"

section. The use of the GT methodology in this work began with the identification of repetitions in the collected data that are labelled. After this, the tags that are represented by concepts were developed with the help of more categories, following standard GT terminology.

Table no. 1. Themes investigated and their relationship to the research questions			
Study questions	**Themes**	**Sub-themes**	**Interview questions**
RQ1	Influential factors for AI implementation	Organizational structure	4
		Level of implementation	5
		Determinant factors	8
RQ1	AI solutions characteristics	Limitative factors	6
		Implementation models	7
		Key performance indicators	12
RQ2	Characteristics of financial services with AI	Industry changes	9
		Junior roles changes	10
		Executive roles changes	11
RQ2	Future of financial services	Necessary skills	13
		Industry future	16
RQ3	Quality of data obtained using AI	Data accuracy	14
		Error correction	15

Source: Author representation, using GT

3. Results and Discussion

3.1. Influence factors for AI implementation

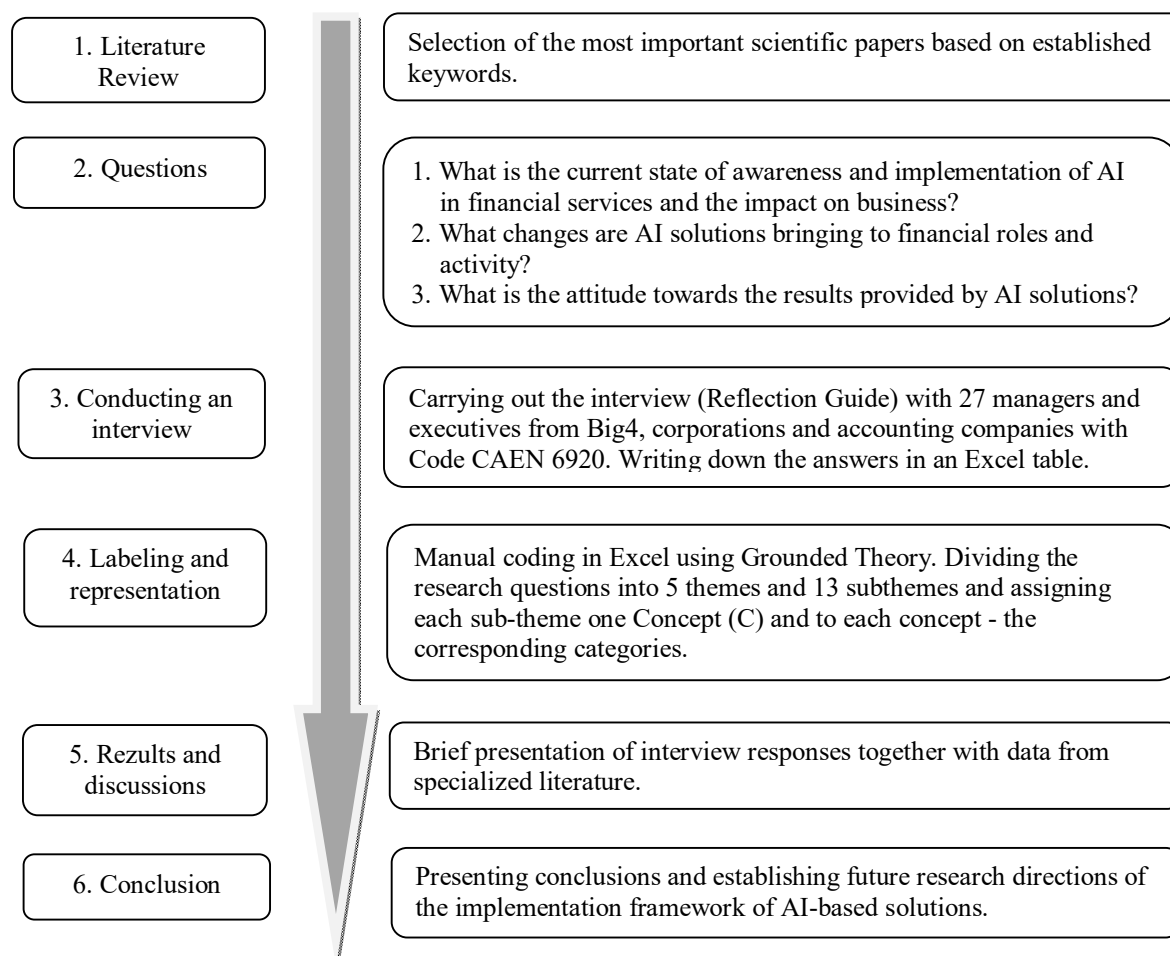In sections 3.1 and 3.2 are presented, through text and summarized in **Tables no. 2 – 7**, results related to Research Question 1: What is the current state of awareness and implementation of AI in financial services and the impact on business?

In **Figure no. 2** it is schematically represented the development by themes and sub-themes of RQ1, together with the corresponding concepts and categories.

Figure no. 2. Research question no. 1
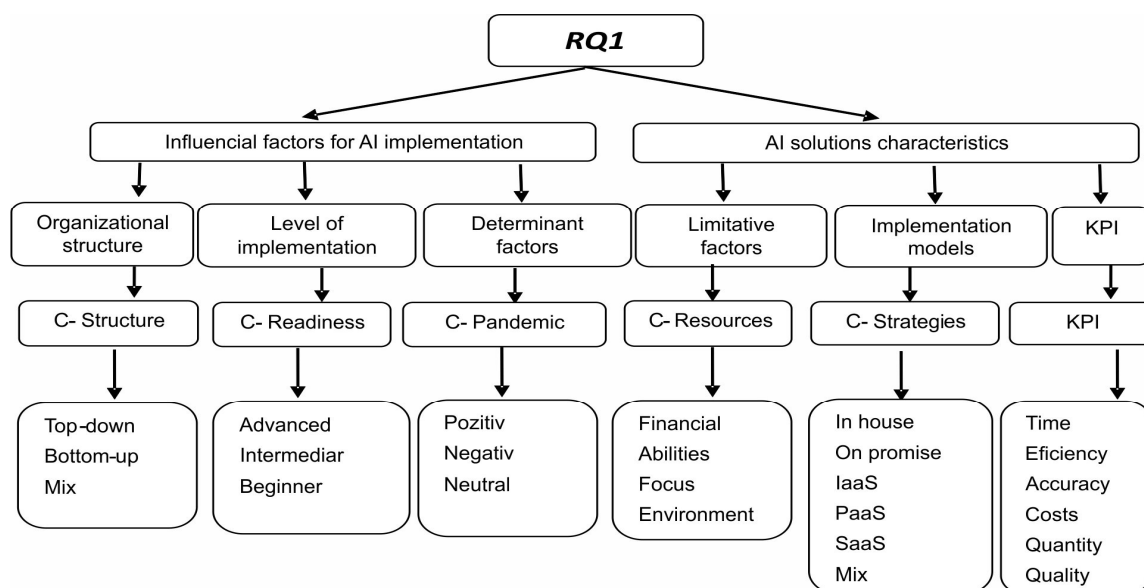
Source: Author representation, using GT

Within the companies included in this study, in 85% of cases the decisions to implement AI are taken at group level, and in the rest middle management is also involved, according to **Table no. 2**.

Table no. 2. Organizational structure	
C- Structure	
Top-down	The implementation decisions are taken at executive or group level
Bottom-up	The initiation of the decision to implement AI-based solutions comes from employees
Mix	The employees are involved in the decisional process

Source: Author representation, using GT

In the conducted research, half of the respondents consider the departments or company they work for as already using AI solutions. 40% of respondents use automation solutions. Only 10% are in the situation of a process of strong digitization of their activities, according to **Table no. 3**.

Table no. 3. Level of implementation	
C – Readiness	
Beginners	Companies are using digitalization solutions
Intermediary	Companies are using automations solutions
Advanced	Companies are using AI solutions

Source: Author representation, using GT

During the pandemic, 30% of respondents accelerated the automation process for: the need for remote collaboration, integrating work with multiple systems, increasing work visibility, communicating with colleagues and customers. In the case of companies that were already in a process of technology implementation during the crisis, the peak of this process has been reached. There were also companies that already had the necessary tools to adapt to the new way of working and were not influenced by this period, according to **Table no. 4**.

Table no. 4. Determinants factors for change	
C – Pandemic	
Positive	During the pandemic, the implementation of the technology was accelerated
Negative	The crisis did not influence this process
Neutral	Companies have been operating as before the pandemic

Source: Author representation, using GT

3.2. Features of AI solutions

Financial resources are very important and companies usually lack them when it comes to implementing new projects. 95% of responses mention financial resources as an important feature when implementing a new system. The second characteristic mentioned in 85% of cases is the know-how of financial specialists, as they are the ones who support the transition, project implementation and maintenance.

The environment has an important impact on the pace at which technological adoption takes place, and here the solutions present in the market and customer requirements are taken into account, according to **Table no. 5**.

Table no. 5. AI solutions – Limiting factors	
C – Resources	
Financial	Budget, available solutions, knowledges
Skills	Implementation, interdepartmental collaboration, maintenance, audit
Focus	Inability of understanding AI benefits, resistance to change
Environment	Changing legislation, cybers security

Source: Author representation, using GT

In 20% of cases companies have the necessary resources to develop AI solutions by themselves. 30% of respondents buy licenses and custom software from developers. 50% prefer to purchase AI-based solution packages in cloud (IaaS, PaaS, SaaS) because they generate a large volume of data and want to ensure their safety in this way, according to **Table no. 6**.

Table no. 6. Implementation models	
C – Strategy	
In-house	Develop internally the programs
On-promise	Buy the programs and install them on their own infrastructure
IaaS	Programs are installed on company infrastructure with back-up in cloud
PaaS	Develop programs using cloud platforms
SaaS	Buy programs installed on service provider infrastructure
Mix	Two or more of the above models combined

Source: Author representation, using GT

The most important KPIs mentioned by respondents are: processing time, efficiency, accuracy of data generated, reduced costs in the long term, a greater amount of data analyzed and processed, as well as its quality and reduction of errors. In this research, 71% of respondents considered the time required to complete an activity as the most important Key Performance Indicator (KPI).

AI solutions are more efficient because, once implemented and trained, they are able to do the job faster than a person. The results generated by an AI solution or just automation are considered to be more accurate than manual work.

In the long run, the decision to implement an AI solution or automation will result in lower costs compared to the salaries paid to employees. AI solutions are able to perform a greater number of tasks in a shorter period of time compared to an employee. Data quality depends on several factors. Once AI solutions significantly reduce errors, employees will be able to work with the generated data and bring additional value to customers through consulting, according to **Table no. 7**.

Table no. 7. AI advantages	
C- Advantages	
Time	Activities realized by employees will be faster performed by AI
Efficiency	AI can do the same amount of work as employees, with less resources
Accuracy	Between automation and manual labor, the resources generated by automation have less errors
Costs	On short term costs with technology are higher but on long run represent a saving.
Quantity	AI can process larger amounts of data than employees
Quality	AI solutions are capable of generating useful reports for the decision-making process

Source: Author representation, using GT

3.3 Characteristics of financial services with AI

In sections 3.3 and 3.4 there are presented in text and summarized in **Tables no. 8 – 12** results related to Research Question 2: What changes are AI solutions bringing to finance roles and activity?

Figure no. 3 shows schematically the development of RQ2 by themes and sub-themes together with the corresponding concepts and categories.

Figure no. 3. Research question no. 2
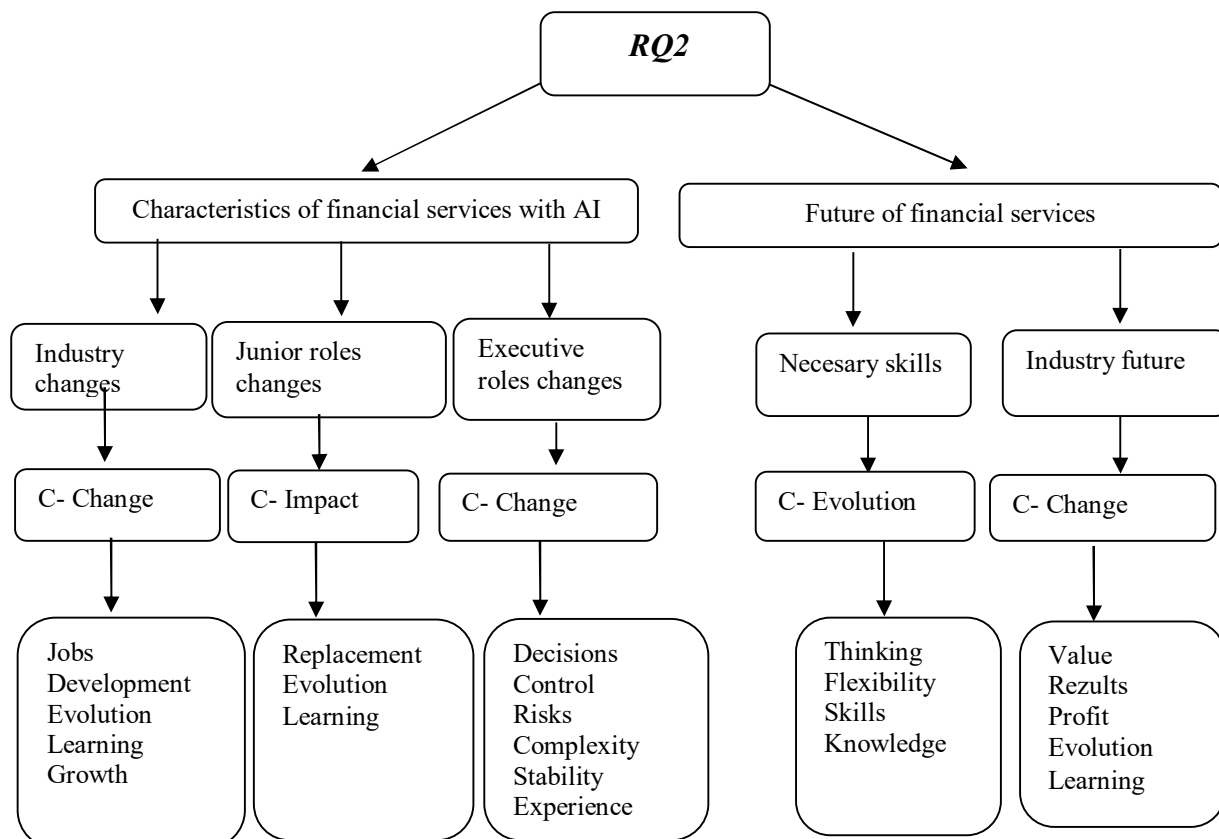
Source: Author representation, using GT

Jobs involving repetitive activities will be changed in terms of their number and description. Employees have the opportunity to perform more complex activities. There will be no need for manual data entry, but more work on data validation. There is a risk that people will do things mechanically and will not have the opportunity to understand the logic of what they are doing, so it is a requirement of employers that employees have critical and analytical thinking. AI helps companies work with more clients with the same number of employees, according to **Table no. 8**.

Table nr. 8. Changes

C- Changes	
Jobs	Number of jobs for juniors will be replaced with AI
Development	Employees needs to learn to work with technology
Evolution	Data entry jobs will evolve to data analysis, maintenance
Learning	Greater learning and development opportunities for newcomers and for management positions
Growth	The number of customers will increase as well as the financial resources

Source: Author representation, using GT

A new technology, once tested and implemented, still needs a financial specialist to ensure maintenance and continuous improvement. Thus, jobs with repetitive activities will evolve because new roles will require a new set of skills and involve new activities that can bring greater value to the business and employees. They will evolve towards data analysis and interpretation, according to **Table no. 9**.

Table no. 9. Roles for juniors	
C- Impact	
Replacement	AI solutions will replace data entry roles
Evolution	Data entry roles will evolve into data analysis and maintenance
Learning	There is an opportunity and a threat to learn how to work with AI

Source: Author representation, using GT

Management team members are able to work with better data, resulting in fewer errors, and they can now make more informed decisions. Risk assessment is important, internal control and quality control management have become as important as the company's mission. The risk of losing accounting skills and knowledge is cited in 75% of cases for entry-level roles.

When technology takes over all the repetitive tasks, there will be a higher barrier to entry in financial domain. Executives have more responsibility for their team and how they ensure good implementation. They need to control and maintain the technology solutions and also ensure the business continuity plan in any situation. There will be no changes to the number of executive roles over the next ten years. AI solutions simplify the work of CFOs and create autonomy for them, according to **Table no. 10.**

Table no. 10. Executive roles	
C- Impact	
Decisions	Better data for decision making in a short period of time, more reports automatically generated
Control	The need to control much more complex activities
Risks	The need for a better understanding of possible risks
Complexity	They will work in a much more complex environment
Maintenance	They must ensure process continuity using technology
Stability	No replacement or change in the number of roles at this level
Experience	It is harder to get experience for management roles

Source: Author representation, using GT

3.4. The future of financial services

Analytical and critical thinking will help the employee to have a clear picture of the process for which he is responsible. Management sees resistance to change and low motivation as real problems. They hire people who are flexible to change, adaptable and eager to learn. New financial professionals need to have technology skills. Since the technology will make the activities repetitive, the employees must be very well trained to implement them, test them, find the causes of errors and fix them, according to **Table no. 11**.

Table no. 11. Evolution	
C- Evolution	
Thinking	Critical and analytical thinking
Flexibility	Self-motivation for learning
Skills	Technological, communication, sales, collaboration
Knowledge	Accounting theory and rules

Source: Author representation, using GT

Accounting companies will be able to provide more business advice based on the data already generated. By using technology, companies will generate better results and higher quality of service, which will support customers

to make more informed business decisions. At the junior level, all jobs will be replaced with AI solutions. There will be fewer employees, but able to catch and correct AI systems flaws. Employees must focus more on data analysis, decisions, business advice, according to **Table no. 12**.

Table no. 12. The future of AI	
C- Change	
Value	AI-generated reports have a higher percentage of accuracy and complexity
Results	The company will provide quality services to customers in a shorter time
Profit	More work processed by AI will increase the number of customers
Evolution	Job evolution, more maintenance, implementation, data control
Learning	New opportunities for working with AI-generated data are emerging

Source: Author representation, using GT

3.5. Quality of data obtained with AI

In this section, are presented in text and summarized in **Tables no. 13 and 14** results corresponding to Research Question 3: What is the attitude towards the results provided by AI solutions?

In *Figure no. 4* is schematically represented the development by themes and sub-themes of RQ3 together with the corresponding concepts and categories.

Figure no. 4. Research question no. 3
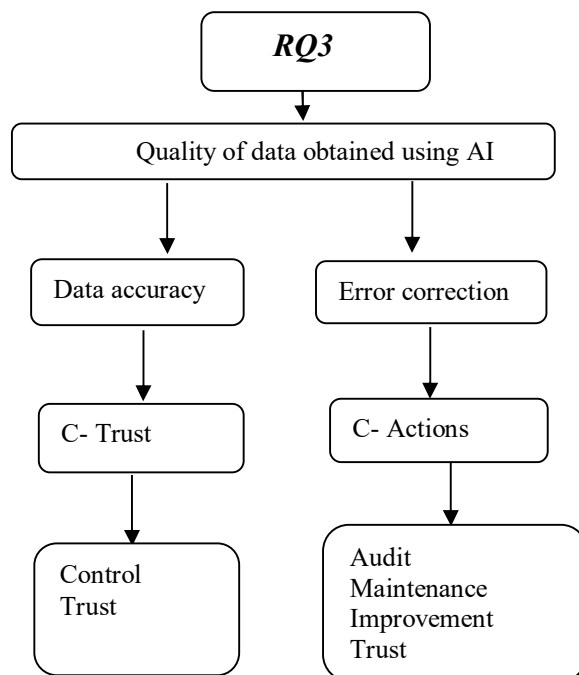
Source: Author representation, using GT

Respondents generally trust data generated by AI systems; however, they strongly support the idea of designing strong internal controls to overcome potential malfunctions of automated processes. There are companies that use simple AI solutions and studies show that automatically generated data has a higher level of accuracy than manually generated data (McKinsey, 2017), according to **Table no. 13**.

Table no. 13. Data accuracy	
C- Trust	
Control	They trust the generated data but check for errors
Trust	Once the program is installed, they have 100% confidence in the data generated

Source: Author representation, using GT

Most respondents strongly support the idea of designing strong internal controls to overcome any potential malfunctions in automated processes. In this case, the respondents believe that it is necessary to check how the program works, because there were situations where the algorithms of the machines were not set correctly. In this case they go and analyze the program to update it according to changes at the data level. Once the test part worked well, the results after implementation will be accurate according to **Table no. 14**.

Table no. 14. Error correction	
C- Actions	
Audit	When data contradicts intuition, employees begin the verification process
Maintenance	They control the programs during the process
Improvement	When the program reports bugs, they improve, fix, or change it
Trust	They 100% believe the data generated by AI solutions

Source: Author representation, using GT

4. Conclusions

The research questions established at the beginning helped us to better understand the current situation regarding the implementation of AI solutions from a managerial and executive perspective.

Information about the benefits of AI solutions is known even if respondents know about them from the company or have studied on their own. In most cases, the technology implementation process was started before the Covid-19 virus crisis.

When it comes to AI solutions, companies need to find a lot of resources that are not readily available, such as financial, labor and technological resources.

Once AI solutions are implemented, the company can measure the impact and see the value brought, and some of the benefits are: shorter processing time, lower costs, higher efficiency, more amount of data processed, fewer errors and an increased number of customers.

All respondents expect a reduction or even total replacement of roles involving repetitive tasks by AI solutions in the next ten years. In the case of these roles, they mentioned a list of skills that employees need to develop: technological skills, communication skills and theoretical accounting knowledge.

In the case of executive roles there will be a change because they will be able to make decisions in a shorter time. Executives must control more complex activities, assume greater business continuity risk, and work in a more complex environment.

The attitude towards the results of AI solutions is positive. Most respondents consider it necessary to have a designated person for program maintenance and data control to ensure quality results and a continuous process. But at the same time, they trust the data generated by AI solutions to a large extent, between 75% and 85%.

To ensure a smooth transition to AI solutions, company representatives must consider several important aspects, such as: allocating the necessary resources, investing in people development, and ensuring a quality transition process.

As future studies, I aim to analyze the implementation framework of AI solutions through the Technological-Organizational-Environmental Framework method.

REFERENCES

1. Accenture, (2022). High Tech CFOs: Evolving into the future, Accessed on 12.01.2023, at: https://www.accenture.com/_acnmedia/PDF-176/Accenture-High-Tech-CFOs-Evolving-Into-the-Future.pdf

2. Bean, R., (2018), How Big Data and AI are Driving Business Innovation in 2018. *MIT Sloan Management Review*, 47, 777-780.

3. Bouchetara, M., (2022), The Impact of Digitalization on the Quality of Accounting Information. The Case of Algeria, *Audit Financiar*, vol. XX, no. 2(166)/2022, pp. 295-303, DOI: 10.20869/AUDITF/2022/166/009

4. CECCAR Business Magazine, (2020), Studiu: Inteligența artificială va redefini sectorul serviciilor financiare în următorii doi ani. Nr.6. Conectarea la Era Digitală

5. Chang, S.I., Yen, D.C., Chang, I.C., Jan, D. (2014), Internal control framework for a compliant ERP system, *Information & Management*, no. 51, pp. 187-205

6. Christaukas, C., & Miseviciene, R. (2012), Cloud – Computing Based Accounting for small to Medium Sized Business. *Engineering Economics*, 23(1), doi:10.5755/j01.ee.23.1.1220

7. Duffy, E. (2018), Artificial Intelligence and its positive impact on the accounting profession, *Accountancy Plus*, March 2018, No. 1, pag. 44-45

8. Eleonora, P., Stancheva, T. (2018). How artificial Intelligence is challenging accounting profession, *Journal of International Scientific Publications, Economy & Business*, ISSN 1314-7242, Volume 12.

9. Galy, E., Sauceda, M.J. (2014), Postimplementation practices of ERP systems and their relationship to financial performance, *Information & Management*, nr. 51, pp. 310-319

10. Gartner, (2022), Accessed at: https://www.gartner.com/en/topics/artificial-intelligence

11. Glaster, B.G.; Strauss, A.L. (1967), The Discovery of Grounded Theory; *Transaction Publishers New Brunswick*: London, UK.

12. Goh, C., Pan, G. Seow, P. S., Lee, B. H. Z., Yong, M. (2019), Charting the future of accountancy with AI, *Research Collection School of Accountancy*, 7

13. Goulding, C. (2002), Grounded theory, ethnography and phenomenology: A comparative analysis of three qualitative strategies for marketing research, *European Journal of Marketing*, Vol. 39, No. 3/4, pp. 294-308. https://doi.org/10.1108/03090560510581782

14. Gulin, D., Hladika, M., Valenta, I., (2019), Digitalization and the challenges for accounting profession, *Proceedings of the ENTRENOVA – ENTerprise REsearch InNOVAtion Conference, Rovinj, Croatia, 12-14 September 2019,* Vol. 5, Pag. 502-511, http://hdl.handle.net/10419/207712

15. Huang, J.Y., Gupta, A., Youn, M., (2021), Survey of EU ethical guidelines for commercial AI: case studies in financial services, *AI and Ethics*, 1:569–577 https://doi.org/10.1007/s43681-021-00048-1

16. Ionescu, B.-Ş., Barna, L.-E.-L. (2021), Digitalization in the Accounting and Auditing Profession through ERP Systems, *Audit Financiar*, vol. XIX, no. 4(164)/2021, pp. 769-778, DOI: 10.20869/AUDITF/2021/164/027

17. Jeb, Su (2018), Why Artificial intelligence is the future of accounting: Study, *Forbes Media LLC. https://www.forbes.com/sites/jeanbaptiste/2018/01/22/why-artificial-intelligence-is-the-future-of-accounting-study/?sh=13891954337b*

18. Li, Z., Zheng, L (2018), The Impact of Artificial Intelligence on Accounting, *Proceedings of the 2018 4th International Conference on Social Science and Higher Education (ICSSHE 2018)*, Series „Advances in Social Science, Education and Humanities Research", https://doi.org/10.2991/icsshe-18.2018.203

19. Liu-Lindberg A., Lykke M.B., Nilsson B.U., (2022), Welcome to finance function 4.0, *Business Partnering Institute,* https://stsdanismanlik.com/en/welcome-to-finance-function-4-0/

20. Luo, J., Meng, Q., Cai, Y. (2018), Analysis of the Impact of Artificial Intelligence Application on the Development of Accounting Industry, *Open Journal of Business and Management*, 2018, 6, 850-856

21. McKinsey & Co. (2017), The rise of digital challengers. How digitalization can become the next growth engine for Central and Eastern Europe.

Perspective on Romania.
https://digitalchallengers.mckinsey.com/files/Rise-of-Digital-Challengers_Perspective-on-Romania.pdf

22. Pugna, I. B., Duțescu, A., Stănilă, O.G., (2019), Corporate Attitudes towards Big Data and Its Impact on Performance Management: A Qualitative Study. *Sustainability* 2019, 11, 684; doi:10.3390/su11030684

23. PwC's 22nd Annual Global CEO Survey (2020), CEO's curbed confidence spell cautio, https://www.pwc.com/gx/en/ceo-survey/2019/report/pwc-22nd-annual-global-ceo-survey.pdf

24. Riley, C., (2020). 60 million Europeans could suffer furloughs, layoffs or wage cuts. https://edition.cnn.com/2020/04/19/business/europe-jobs-coronavirus-mckinsey/index.html

25. Sastararuji, D., Hoonsopon, D., Pitchayadol, P. et al.(2022), Cloud accounting adoption in Thai SMEs amid the COVID-19 pandemic: an explanatory case study. *J Innov Entrep*, 11, 43 (2022). https://doi.org/10.1186/s13731-022-00234-3

26. Stoica, O. C., Ionescu-Feleagă, L. (2022), Accounting and Auditing Profession in the Era of Digitalization, *Audit Financiar*, vol. XX, no. 1(165)/2022, pp. 134-146, DOI: 10.20869/AUDITF/2022/165/003

27. Transforming Paradigms: Global AI in Financial Services Survey,(2020), https://www.jbs.cam.ac.uk/wp-content/uploads/2020/08/2020-ccaf-ai-in-financial-services-survey.pdf

28. Zhang, Y., Xiong, F., Yi, X., Fan, X., Gu, H.. (2020), The impact of artificial intelligence and blockchain on the accounting profession, *IEEE Access*. Volume 8, p. 110461

No.	Position in company	Company type	No. of employees
	Appendix A. List of interviewees and the companies they represent		
1	Audit manager	Corporation	Over 250
2	CEO	Accounting company	Between 10-50
3	Head of section IT RPA	Big4	Over 250
4	Managing Partner and Administrator	Corporation	Over 250
5	CEO audit company	Audit company	Between 10-50
6	Accounts Payable Manager	Corporation	
7	Senior Finance Manager for Procurement	Corporation	Over 250
8	Executive Financial Director in Banking	Bank	Over 250
9	Manager ERP	Corporation	Over 250
10	Owner, manager and CFO	Accounting company	Over 250
11	Distribution Finance Director	Corporation	Over 250
12	Manager internal audit	Big4	Over 250
13	Head of Retail Lending Operations	Corporation	Over 250
14	Financial manager	Corporation	Over 250
15	Project Manager for Enterprise Resource Planning	Corporation	Over 250
16	Independent M&A Director	Mergers and acquisitions company	Between 10-50
17	Accounting manager		Between 10-50
18	Senior Manager Cash Order	Corporation	Over 250
19	Risk, Control and Compliance Manager	Corporation	Over 250
20	Deputy Director of Big4 external audit	Corporation	Over 250
21	Manager RPA	Corporation	Over 250
22	Financial systems manager	Corporation	Over 250
23	External audit manager	Big4	Over 250
24	Financial director	Big4	Over 250
25	Financial director	Accounting company	Over 250
26	CFO	Accounting company	Between 10-50
27	Manager external audit	Big4	Over 250

Effect of Big Data Analytics on Audit Evidence

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Abstract

The purpose of this study is to determine the effect of the application of big data analytics (BDA) on audit evidence. A descriptive/cross sectional survey design was adopted while random sampling was used to distribute 514 structured questionnaires drawn on four Likert scale to auditors in private practice in South-West, Nigeria. 362 copies of the questionnaire were validly returned and successfully tested for reliability and validity. These were analysed using regression analysis and the results revealed that all elements of audit evidence considered – control tests, sufficiency, assertions on financial statements and relevance/reliability – were positively and significantly affected by the application of BDA. The study recommends that audit firms of all tiers should embrace the application of BDA in sourcing for audit evidence and that, as a matter of urgency, standard setting boards should consider issuing a standard to drive the process.

Key words: *big data; big data analytics; audit evidence;*

JEL Classification: *M42*

1. Introduction

With the introduction of electronics in accounting systems, traditional audit is no longer adequate. The procedures remain the same, but the difference lies in the adoption of appropriate audit software for the execution of auditing assignments. In this context, Kamil and Nashat (2017) consider as new challenges to audit activities issues such as: the loss of audit trail, the need for protection of information and the exposure of data to viruses. Modern audit brings new methods for collection and evaluation of data for compliance and substantive tests. There will definitely be a paradigm shift in accounting and auditing with the emergence of artificial intelligent (AI) as "auditing is particularly suited for applications of data analytics and artificial intelligence because it has become challenging to incorporate the vast volumes of structured and unstructured data to gain insight regarding financial and nonfinancial performance of companies" (Kokina and Davenport, 2017, p. 116). "The quantity of data produced by and available to companies, the replacement of paper trails with IT records, cloud storage, integrated reporting and growing stakeholder expectations for immediate information – any one of these alone would affect the auditing process, but Big Data is bringing them all, and more, at the same time" (ACCA, 2015 quoted by Salijeni et al. 2018).

Similarly, when a comprehensive view on big data is considered, big data should be described as high-volume, high-velocity and high variety information assets that demand cost-effective and innovative forms of information processing (Rai, 2020; Omitogun and A-Adeem, 2019). This enhances insight, decision – making and process of automation. Data available in today's business space is not limited to structured data but also include vast unstructured data such as data sourced from email, Twitter, Google and other social media platforms, as these are continuously increasing in volume and there is a need for a sophisticated tool called *Big Data Analytics* (BDA) to retrieve and generate useful information.

BDA has become a major game changer in both financial reporting and auditing. Yoduwati and Alamsyah (2018) assert that with the help of BDA, structured and unstructured data can be processed faster, and BDA tools also support data mining, social network analysis and test analysis which eventually enhances business value. This highly welcome development through information technology has brought new opportunities and challenges for the accounting system. The ever-increasing volume of generated data brought in the concept of *big data* (BD) the application of which, in accounting and auditing, rides on the existence of automated accounting systems. This is to say that big data analytics can only be implemented through automated accounting systems, which, in turn, promotes real time audit. This age of information technology is characterised by an abundance of data and, at the same time, accountants and decision makers face the difficulty of processing this vast data to derive its full benefits (Younis, 2020).

The advent of big datasets raises the need for a robust analytical tool with which to draw useful inferences from arrays of data and this brings the need for big data analytics (BDA). The need for BDA is pronounced in auditing as much as it is in other facets of live, and it is no wonder that the big tier audit firms have already designed appropriate tools for its use. It is reported that PwC uses Halo for general ledger analysis and audit, while KPMG uses IBM's Watson for general ledger analysis and audit of clients' data. Deilotte employs Argus for AI and Optix for data analytics (Kokina& Davenport, 2017), while Ernst & Young developed Helix which is programmed to analyse the general ledger and to help audit teams present and organize financial data, such as inventories, payables, revenue, trade payables etc. (E/Y Web, 2022). Medium and small tier audit firms use off-the-shelf software such as Lavastorm, Alteryx, Microsoft's SQL (ICAEW, 2016).

Audit practices in Nigeria are not in any way different from what can be observed in other parts of the world as the economy is confronted with the benefits and challenges of big data and the public accounting firms in Nigeria adopt the same software for the management of big data requirements. This study is therefore carried out to provide an empirical investigation into the effect of big data analytics on audit evidence in Nigeria using the South-West Zone as a research setting.

The following hypotheses were formulated and tested at 95% confidence level:

H1: Big data analytics has a significant effect on compliance tests.

H2: Big data analytics has a significant effect on the sufficiency of audit evidence.

H3: Big data analytics has a significant effect on the relevance and reliability of audit evidence.

H4: Big data analytics has a significant effect on the assertions on financial statements.

2. Review of related literature

2.1. Big Data and Big Data Analytics

The ever-increasing volume of data has given birth to the concept of Big Data (BD). Big data refers to structured and unstructured data sets that are commonly described in terms of four Vs: Volume, Veracity, Velocity and Variety (Gepp *et al*, 2018). BD has gone steps further in term of description as extant literature no longer describes it in terms of four, but rather seven Vs: Volume, Velocity, Variety, Veracity, Visualisation, Value and Variability (Riati *et al.*, 2016).

Volume: This is the size of data being processed in nanoseconds. For the data to be regarded as big, the database should exceed Petabyte. A petabyte is one million quadrillion bytes which is equivalent to 20 million filing cabinets worth of text (Nwadialor and Nwadi, 2020). In terms of size, the next phase is Exabyte which is already in the waiting. The generation of data is expected to be continuous and to expand faster. This is one of the reasons why the traditional sampling technique may no longer be adequate; hence the need for the deployment of big data analytics tools that will guarantee seamless interaction with the available vast data. This is the essence of control and substantive testing through which a public accountant confronted with the big data phenomenon obtains evidence to justify expression of opinion.

In fact, Omitogun and Al-Adeen (2019) reason that: "with business operations expanding globally, the role of the audit profession has become more prominent, and the greater amount of captured data has resulted in massive transaction volumes. The real time capture of transaction data, including location, time, amount and medium, can ease the process of gathering substantive evidence for development of an audit opinion."

Velocity: This is the speed or rate at which data are generated from different sources in an instantaneous and continuous manner. Nwadialor and Nwadi (2020) report that "Walmart collects more than 2.5 petabytes of data every hour from its customers' transactions". To audit such operations is beyond the capabilities of traditional sample testing which makes it imperative to deploy BDA, which permits continuous and complete testing of data.

Variety: In a big data environment, data available to management is not only structured and financial but also includes unstructured and non-financial data, which is generated from various sources such as Journal, Twitter, Google etc.

Veracity: This, according to Young (2020) is all about the reliability of data, as the interest of the beneficiary is about the quality of data. Application of BDA stands to enhance data quality in a BD database.

Value. According to Wamba et al. (2015) value is "the extent to which big data generates economically worthy insights and/or benefits through extraction and transformation".

The available data must be amenable to analysis otherwise it is a useless and worthless data.

Visualisation. According to Chu and Young (2021), "auditors have begun to use visualisation as a tool to look at multiple accounts over multiple years to detect misstatements". To derive useful information from image, video and audio data and to interrogate unstructured data, BDA becomes a very necessary tool.

Variability: Big data are characterised by intrinsic variability. Variability can also refer to the inconsistent speed at which big data is loaded into a database. There is therefore the need to find anomalies and to deploy outlier detection methods in order for any meaningful analysis to occur. Sun, Strong and Li (2018) bring another dimension into the description of big data as the study suggests ten classifications of big data and these are: big volume, big velocity, big variety, big veracity, big intelligence, big analytics, big infrastructure, big service, big value and big market.

However, with all these descriptions and classifications of big data, what is paramount for auditors is to successfully interrogate big data in such a way as to enhance the outcome of audit services. BDA becomes the effective tool through which auditors, whether internal or external, can interact with clients, of which operations are largely driven on big data platforms.

Notable changes to accounting practices are mostly as a response to changes in the business environment and to business accounting needs. According to Omitogun and Al-Adeem (2019), book-keeping, a written manifestation of merchants' affairs was developed to meet business needs. Financial accounting reporting represents the supply of information to both internal and external users, especially to the management of an organisation to appraise its performance and for the investors to determine the overall value of their investment in an organisation. The process of this information disclosure warrants that accountants collect, process and analyse vast financial and non-financial data. Furthermore

Omitogun and Al-Adeem cited Alles (2015) which states that accounting and data "have a strong interdependency, which is a consequence of ongoing business transactions", and with the increasing volume of transactions and of the data available, a review of audit approaches and procedures is necessary.

The quantum of data being generated to support business operations, decisions and measures of performance is becoming enormous. The requirements of audit to meet the necessities of a changing operating environment together with the significant growth in the volume of transactions and the increase (in complexity and volume) of available audit evidence, motivated auditors to seek more cost-effective approaches to audit planning.

If advanced economies are coping with the challenges of big data in accounting and auditing, the same cannot be claimed of emerging economies such as Nigeria. While there is evidence that the big four are relying on the use of modern tools in the conduct of their business, yet the same cannot be asserted of numerous small tier audit firms in Nigeria. The latter are forcefully confronted with big data challenges as their clients are small sized businesses, but there are off-the-shelf BDA software that could be used and there is also a pool of technically capable professionals that such firms can engage in the execution of their audit engagements, if their clients' operations are best fitted into big data description.

The importance of big data in auditing lies on the platforms that serves as analytical tools, hence the term big data analytics (BDA). Big data is the process of analysing data with the objective of drawing meaningful conclusions (Ernst & Young, 2015). Technological advances and new procedures, such as the exploration of large sets of relevant data from internal and external sources, may produce audit evidence, which, according to Siroisa and Savovska (2017), can be used in risk assessment, analytical procedures or substantive and control testing These provide for the importance of BDA, especially in the process of obtaining audit evidence through compliance and substantive tests.

2.2. Big Data analytics and audit evidence

Audit evidence in a big data environment has positive and negative sides. There is an increase in reliability, as the most reliable sources of evidence are those which allow for the data to be obtained from outside the organization and, with the advent of big data, sources of data are now

formal and informal, as external data can be sourced from Facebook, Twitter, Path, Instagram, Email etc. Both structured and unstructured data are now stored and retrieved from the cloud.

The flows of such data are not so easy to trace or follow as within a traditional accounting system, hence the major usefulness of BDA which is expected to provide reliable evidence needed to support the expression of audit opinion. According to Mathew (2006), cited by Saljeni (2019), BDA has the potential to improve technical efficiency in audits by enhancing the quality of both the evidence that auditors collect and their professional judgments based on that evidence. This is made possible as, in the era of big data, the volume and veracity of data available to auditors can be reasonably accessed and processed in an efficient manner with the application of BDA tools.

In the traditional paradigm, auditing relies mostly on direct verification of transactions, i.e.: receipts, counting of inventory at regular intervals which could be monthly, quarterly, semi-annually or annually, but this has changed as this approach is no longer efficient or relevant any more under present conditions, especially for clients that are big companies or for some medium sized firms. Technology-enabled audit come with higher quality of evidence, and Moffitt and Vasarhelyi (2013) asserts that this is "derived from many new sources including big data, exogenous data, and the ability to analytically link different processes, database-to-database confirmation, and continuous monitoring alerts".

However, BDA has changed the paradigm of audit evidence that auditors gather both in term of nature and competence in a big data environment. Dagiliene and Kloviene (2019) suggest that external auditors now possess a very powerful tool most especially for audit of big business enterprises, as BDA stands to enhance the effectiveness and reliability of audit results. In fact "auditors have more resources available in order to gather evidence needed for their audits and opinion statements" (Balios, et al. 2020). BDA is relevant for audit evidence both in terms of sufficiency, as sufficiency is all about 'Volume and Variety of data', and appropriateness, as the latter provides means for testing of reliability and relevance. Hence, BDA is appropriate for the evaluation of different types of businesses as well as different forms of evidence (IAASB, 2016).

Audit evidence sourced through both control and substantive tests were limited to sampling under the

traditional accounting system, especially for large size clients. This procedure of statistical sampling was portrayed as addressing the alleged inability of traditional techniques of gathering evidence in a timely manner to satisfy the demands of a changing corporate environment, which was marked by a considerable increase in the amount of transactions, in the early 1960s (PCAOB (2004). Moreso, it is reasoned that auditors cannot assume that data from third party sources is complete and accurate because IAASB (2016) provides that external data obtained from third party providers may only be an "aggregation of data obtained from multiple sources and may not have been subject to procedures to validate completeness, accuracy and reliability of data", yet these are cornerstones of appropriate evidence.

According to International Standards of Audit (ISAs) (PCAOB 2004) evidence obtained from independent, external source is stronger and more appropriate than evidence obtained from other sources. However, that position appears no longer tenable in the context of BDA. The major challenge for BDA in the establishment of evidence is the fact that the ISAs do not indicate what type of evidence analytics should provide (Ernst & Young 2015). The lack of such provisions is restricting the use of BDA by auditors, especially in the case of statutory (external) auditors.

Similarly, the auditors' concern is related to the manner in which they can obtain appropriate and reliable audit evidence with the effective application of BDA in this era of high volume, velocity and veracity of data available from sources that were hardly imagined a couple of years back. For example, the fair value of intangible assets can no longer be reasonably established using traditional processes. BDA is the most appropriate tool to collect and analyse vast amounts of data on intangible assets. Alteration of transactions' details in the ledger can easily attract auditors' attention in traditional audit procedures, but it is not so easy to identify/locate any alteration in a big data environment, except with the use of BDA tools. In addition, auditors could decide to replicate the accounting system of a client to ascertain the reliability of the system but this poses a challenge in a big data environment. The combined effect of the above is the undermining of reliability and appropriateness of evidence obtained in a BD environment.

Ernst & Young (2015) asserts that BDA "will now transform audit beyond sample-based testing to include analysis of entire populations of audit-relevant data

(transaction activity and master data from key business processes), using intelligent analytics to deliver a higher quality of audit evidence." The importance of BDA tools in audit evidence becomes undeniable for public auditors to source and obtain necessary assurance to support overall expression of opinion. ISA No. 500 – *Audit Evidence* grants priority on obtaining appropriate, reliable, relevant and sufficient evidence. Regardless of the size of a business organization or its complexity, independent auditors are professionally bound to the letter of the standards and the execution of audit engagements must be conducted in compliance with such standards. BDA has the capacity to assist auditors to comply with these requirements when auditing a client which operates in a big data setting.

2.3. Theoretical review

The importance of auditing and audit evidence has over the years been supported with the agency theory. The industrialisation of the early eighteenth century brought the challenge of what could be termed as a conflict of interest. The size and scope of big enterprises introduced the need to engage others (i.e., the managers) to manage business interest, whose own interest may conflict with that of the owners. These appointed managers are regarded as agents of the owners (i.e., the principal). This is the root of agency theory popularised by Ross (1973), Mitnicks (1975) and Jenkens & Meckling (1976). In fact, Hair et al. (2021) summarised four theories related to auditing, as follows: agency, inspired confidence, policeman and lending credibility. The agents, due to their daily interactions with the activities of the businesses tend to know more than the owners and they are duty bound to render account of their stewardship to the principal. The owners intend to ensure that the reports of activities as presented by the managers are a true reflection of the business.

A common misconception about agency theory in connection to auditing main purpose is that it gives financial statements more credibility. This is what is referred to as the Lending Credibility Theory. Management uses audited financial statements to increase stakeholders' trust in its stewardship. If decision-makers like investors, the government, or creditors must base their decisions on the information they get, they must have confidence that it accurately depicts the economic worth of the company. In terms of audit research, this lessens 'information asymmetry'. However, the efficient markets

hypothesis asserts that investors' decisions are not primarily based on audited information (Mitnicks, 1975).

The theory of lending credibility is very crucial to this study as there is a need for auditors to obtain appropriate and reliable evidence to corroborate findings on both compliance and substantive examination of clients' activities which will enhance the ability of independent auditors to express an opinion deemed appropriate.

2.4. Empirical review

Alrashidi, Almutairiand and Zraqat (2022) conducted a study in order to investigate how BDA affects external audit procedures in the Middle East. The study employed PLS-SEM (3.3.3) for the analysis of data. The study used a questionnaire on a sample of 361 auditors who work in auditing companies in Kuwait, Saudi Arabia, the United Arab Emirates, Jordan, Bahrain, Egypt, Lebanon, and Iraq. To choose the sample, the researchers used a stratified random sampling procedure. The findings showed that BDA has an impact on audit procedures at all phases of the auditing process, where it contributes to information delivery that helps auditors understand the client's internal and external environments, which in turn influences the choices to accept audit assignments. Furthermore, by providing essential information, BDA enables auditors to simply run analytical procedures, estimate client risks, and understand and evaluate the internal control system. As a result, the study recommended that auditors should develop their abilities in the BDA field, as it adds to the creation of additional value for both auditors and their clients. This study did not however address the effect of BDA on audit evidence.

Omitogun and Al-Adeem (2019) carried out an empirical investigation on the auditors' perceptions and competencies related to big data and data analytics. An electronic questionnaire distributed to accountants showed that auditors have good information technology skills and are well-acquainted with big data and data analytics. However, they lack relevant technical skills and are unfamiliar with related data analysis tools, excluding Excel. The results revealed that 64.71% of accountants have not attended any training on big data and data analytics, while 31.37% plan to enhance their related knowledge. Auditors need to obtain training on substantive audit risk assessments using big data and data analytics. The study'sfocus was not on audit evidence, but rather on the need to develop auditors' technical skills for application of data analytics in audit engagements.

A study on Big Data and changes in audit technology by Salijeni *et al.* (2019) explored the most recent episode in the evolution of audit technology, namely the incorporation of BDA into audit firms 'procedures. Drawing on 22 interviews with individuals with significant experience in developing, implementing or assessing the impact of BDA in auditing, together with the analysis of publicly available documents on BDA published within the audit field, the paper provides a holistic overview of BDA-related changes in audit practice. In particular, the paper focused on three key aspects, namely the impact of BDA on the nature of the relationship between auditors and their clients, the consequences of technology on the execution of audit engagements and the common challenges associated with implementing BDA in auditing activities. The study's empirical findings were then used to establish an agenda of areas suitable for further research on the topic. The study is one of the first empirical accounts providing a perspective on the rise of BDA in auditing. The study was a step further compared to existing studies on BDA, but its main focus was not on the effect of data analytics on audit evidence.

Eilifsen *et al.* (2020) carried out an exploratory study on the use of audit data analytics (ADA) in current audit practice. Firstly, heads of professional practice of five international public accounting firms in Norway were interviewed. The study found out that the firms differ in their strategies on how to implement ADA and the general managers report significant uncertainty about the supervisory inspection authorities' response to the use of ADA. Secondly, a questionnaire was administered to 216 engagement partners and managers about their perceptions of ADA and their actual ADA usage on 109 audit engagements. Overall, the attitude towards ADA's usefulness was positive. The analysis of the audit engagements suggests the use of ADA is relatively limited and the use of more 'advanced' ADAs is rare. More ADA tools are used for clients with integrated ERP/IT systems and for newly acquired audit engagements. The study provides details of ADA use on each auditing phase, while findings were mostly analysed from an institutional theory perspective.

Appelbaum (2016) carried out a study on securing big data provenance for auditors, with the purpose of highlighting a main issue regarding reliable audit evidence derived from Big Data – that of secure data provenance. Traditionally, audit evidence external to the client has been regarded as superior to other forms of evidence. However, external 'messy' big data sources that may be material to aspects of the audit may lack provenance and verifiability. That is, the origins of the data may be unclear and its log files incomplete. According to the standards, such evidence should be considered as less reliable as audit evidence. External

auditors, as outsiders of the client, should be able to reproduce the data lifecycle or transaction path, which may not be possible in an electronic environment with incomplete provenance. Furthermore, this mapping or provenance of the data origins and history should be securely maintained so that it cannot be thwarted. This need for secure data provenance has been largely ignored by the business community in its haste to use BDA, but has been acknowledge by extant systems research as being an area that requires attention. The study contributes to the discussion of big data provenance through the lens of public company auditing, where the provenance and reliability of data sources and audit evidence are of paramount importance. Also, it proposes a system of secure provenance collection, the Big Data Provenance Black Box, which is derived from several streams of extant research. The study's major concern was how to ensure that evidence obtained through the application of BDA can beat least as reliable and secured as that which is obtained under a manual auditing. The study fails to empirically determine the effect of BDA on audit evidence.

Brown-Liburd and Vasarhelyi (2015) conducted an archival study on big data and audit evidence and the study highlighted that the traditional view on evidence may no longer be adequate in this information age as data can

now be automatically captured. The study identified a series of tools such as GPS (tracking devices) that may be relevant for the establishment of evidence of online transactions. The study does not examine the effect of BDA on the audit evidence.

It is clear from the extant literature reviewed that there is an apparent knowledge and empirical gap on the effect of BDA on audit evidence. The purpose of the study is to investigate the existence of such an effect, as the results could be helpful to external auditors, professional bodies and to other institutions.

3. Research methodology

This study employs a cross sectional survey method which permits a one-time collection of data from participants. From a population of chartered/professional accountants, a minimum sample size of 393 was determined. In total, 514 structured questionnaires were administered to randomly selected auditors in private practice in six states of South West Nigeria. 389 were returned but only 362 (70% response rate) were found valid for the purpose of the study. The research instrument was subject to reliability and validity tests and the results are shown in **Table no. 1**.

Table no. 1. Reliability and Validity result					
Variables	**Items**	**Factor Loading**	**Cronbach's Alpha**	**Composite Reliability**	**AVE**
BD and BDA:					
Application in External Auditing	2	0.928	0.894	0.998	0.997
	3	1.064			
BDA – Audit Evidence:					
Compliance Test	1	0.632	0.913	0.851	0.491
	2	0.644			
	3	0.693			
	4	0.635			
	5	0.830			
	7	0.747			
Sufficiency of Audit Evidence	4	0.997	0.927	0.982	0.965
	5	0.967			
Relevancy and Reliability of Audit Evidence	1	0.653	0.816	0.884	0.725
	3	1.032			
	4	0.827			
Assertions on Financial Statements	4	0.906	0.910	0.709	0.563
	6	0.553			

Source: Authors' computation, using SPSS (2022)

Data presented in **Table no. 1** shows that the values for the Average Variance Extract (AVE), Composite Reliability (CR) and Cronbach's Alpha (CA) are below the acceptable benchmarks of 0.5, 0.7 and 0.7, respectively. These confirm the reliability and validity of the instrument.

Table no. 2. Sample structure			
		Freq.	**P (%)**
Category of staff	Audit Staff	362	93.1
	Others	27	6.9
Audit Staff	Junior	44	12.2
	Associate	64	17.7
	Semi-Senior Associate	50	13.8
	Experienced/Senior	102	28.2
	Assistant Manager	33	9.1
	Manager	14	3.9
	Consultant	11	3
	Associate Director	3	0.8
	Partner	22	6.1
	Principal Partner	11	3
	Managing Partner	8	2.2

Source: Authors' field survey (2022)

As shown in **Table no. 2**, of the total 389 respondents, only 362 (approx. 93%) serve in audit related functions and their opinions are classified as valid for the purpose of this study, while the remaining 27 respondents (approx. 7%) work in non-audit services (NAS) and therefore are regarded as not useful for this study. Data on the status of respondents reveals that 41 of them (8.6%) are found to be partners and this lend credence to the opinions obtained from them. Furthermore, 61 respondents (16.9%) are managers or equivalent and 102 (28%) are experienced audit staff. The overall implication is that about 56% of the respondents are well experienced in audit engagement activities. Also, about 80% of the respondents are chartered (professional)

accountants and generally only about 17% could be regarded as less experienced as they had less than three years working experience in audit service engagements. The cumulative effect of these socio-demographic analyses is that respondents possess the required professional and field experiences needed for expressing their opinions on the matter investigated.

The questionnaire contains various questions diligently constructed based on recommendations from the relevant literature and in accordance with the expectations of standards. The questions were reviewed by academics with research interests in electronic accounting and auditing along with practicing public accountants.

Table no. 3. Measurement of the research instruments			
Independent variable	**Predictive parameters**	**No. of items**	**Sources**
1. BDA:	Application in External Audit	2	Appelbaum et al. (2017, 6)
2. Dependent variables: i. Control testing		7	Appelbaum et al. (2017, 6) PACOB 2018-005 (AS 1105.03-08
ii. Sufficiency of audit evidence	Substantive Test	5	Eilifsen et al. (2020,42) Brown-Liburd & Vaharhelyi (2015, 7) Balois et al. (2020, 214) PACOB 2018/2020-005 (AS 1105.03-08, 11& 12)

Independent variable	Predictive parameters	No. of items	Sources
iii. Relevance and reliability of audit evidence	Substantive Test	4	Appelbaum et al. (2017, 6) Halois et al. (2020, 214) PACOB 2018/2020 -05 AS1105, 03-08)
iv. Assertion on financial statements	Substantive Test	6	Appelbaum et al. (2017, 6) Murphy (2014, 1) PACOB 2018/2020 – 005 (AS 1105, 11 & 12)

Source: Authors' projection (2022)

Table no. 3 reflects the summary of various previous studies and of standards that serve as a basis for the formulation of this study's questions. The questions were addressed order to capture the perceptions of the practitioners on the use of BDA in the sourcing of evidence through the conduct of control and substantive tests.

3.1. Quantitative analysis

Regression analysis was adopted for testing the hypotheses of this paper, the results being presented in **Tables no. 4 to 7**.

3.2. Regression results

H1: Big data analytics has a significant effect on compliance tests.

Table 4 (a): Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.884[a]	.781	.781	.54348
a. Predictors: (Constant), BDA: Application in Audit Evidence				
b. Dependent Variable: Audit Evidence in BDA: Compliance test				

Table 4(b): ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	379.758	1	379.758	1285.699	.000[b]
	Residual	106.333	360	.295		
	Total	486.091	361			
a. Dependent Variable: Audit Evidence in BDA: Compliance Test						
b. Predictors: (Constant), BDA: Application in Audit Evidence						

Table 4(c): Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	.712	.102		6.945	.000
	BDA: Application in audit evidence	.815	.023	.884	35.857	.000
a. Dependent Variable: Audit Evidence in BDA: Compliance Test						

Source: Authors' projection (2022)

According to **Table 4(a)**, the coefficient of determination (R^2) is 0.781 which implies that about 78.1% of the variation in compliance testing is explained by the application of big data analytics in audit evidence, while the remaining 21.9% may be due to other factors not considered in this study's model.

The F-value (1,360) = 1285.699 has a related P-value of 0.000 < 0.05. Therefore, the first hypothesis is confirmed, i.e., there is statistical support to state that BDA has a significant effect on compliance testing (**Table no. 4(b)**).

Table no. 4(c) presents the coefficient of the independent variable (Audit Evidence in BDA: Compliance Test): β1 = 0.884; t-value = 35.857 and p-value = 0.000. This suggests a positive and significant impact of BDA on compliance testing. In addition, it shows that a unit increase in BDAs will cause an increase of 0.884 in the compliance test of audit evidence.

H2: Big data analytics has a significant effect on the sufficiency of audit evidence.

Table 5(a): Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.926[a]	.858	.858	.43761
a. Predictors: (Constant), BDA: Application in Audit Evidence				
b. Dependent Variable: Audit Evidence: Sufficiency of Audit Evidence in BDA				

Table 5(b): ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	417.151	1	417.131	2178.313	.000[b]
	Residual	68.941	360	0.192		
	Total	486.091	361			
a. Dependent Variable: Audit Evidence: Sufficiency of Audit Evidence in BDA						
b. Predictors: (Constant), BDA: Application in Audit Evidence						

Table 5(c): Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	.421	.085		4.948	.000
	BDA: Application in External Auditing	.901	.019	.926	46.672	.000
a. Dependent Variable: Audit evidence: Sufficiency of Audit Evidence in BDA						

Source: Authors' projection (2022)

According to **Table no. 5(a)**, the coefficient of determination (R^2) is 0.858 which suggest that the application of BDA is responsible for 85.8% of the variation in sufficiency of audit evidence and the remaining 14.2% can be attributed to other factors not considered in this study.

The analysis of variance in **Table no. 5(b)** shows an F-value (1,360) of 2178.313 and a P-value of 0.000<0.05. Therefore, the second hypothesis is confirmed that states

that BDA significantly affects sufficiency of audit evidence. **Table no. 5(c)** also shows that β1 = 0.926; t-value = 46.672 and p-value =0.000. This suggests a positive and significant impact of BDA on the sufficiency of audit evidence. In addition, it shows that a unit increase in BDAs will cause an increase of 0.926 in sufficiency of audit evidence.

H3: Big data analytics has a significant effect on the relevance and reliability of audit evidence.

Table 6(a): Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.942[a]	.888	.887	.38921
a. Predictors: (Constant), BDA: Application in Audit Evidence				
b. Dependent Variable: Audit Evidence: Relevance and Reliability of Audit Evidence in BDA				

Table 6(b): ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	431.557	1	431.557	2848.848	.000[b]
	Residual	54.534	360	.151		
	Total	486.091	361			
a. Dependent Variable: Audit Evidence: Relevance and Reliability of Audit Evidence in BDA						
b. Predictors: (Constant), BDA: Application in Audit Evidence						

Table 6(c): Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	.227	.078		2.919	.000
	BDA: Application in Audit Evidence	.945	.018	.942	53.375	.000
a. Dependent Variable: Audit Evidence: Relevance and Reliability of Audit Evidence in BDA						

Source: Authors' projection (2022)

According to **Table no. 6(a)**, the coefficient of determination (R^2) is 0.888 and this suggests that 88.80% of the variation in relevance and reliability of audit evidence is caused by BDA, while 11.2% is due to other factors not considered in this study.

Table no. 6(b) reveals an F-value (1,360) of 2848.848 with a p-value of 0.000<0.05. This result indicates that the third hypothesis is confirmed, which states that BDA has a significant effect on the relevance and reliability of audit evidence. **Table no. 6(c)** reports the coefficient of the

independent variable β_1 of 0.945, t-value of 53.375 and p-value of 0.000, suggesting a positive and significant impact of BDA onthe relevance and reliability of audit evidence. Moreover, a unit increase in BDA will cause a positive increase of 94.2% on relevance and reliability of audit evidence.

H4: Big data analytics has a significant effect on the assertions on financial statements.

Table 7(a): Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.726[a]	.528	.526	.79869
a. Predictors: (Constant), BDA: Application in Audit Evidence				
b. Dependent Variable: Audit Evidence: Assertion on Financial Statements in BDA.				

Table 7(b): ANOVA[a]					
Model	Sum of Squares	df	Mean Square	F	Sig.
1 Regression	256.447	1	256.447	402.017	.000[b]
Residual	229.644	360	.638		
Total	486.091	361			
a. Dependent Variable: Audit Evidence: Assertion on Financial Statements in BDA					
b. Predictors: (Constant), BDA: Application in Audit Evidence					

Table 7(c): Coefficients[a]					
	Unstandardized Coefficients		Standardized Coefficients		
Model	B	Std. Error	Beta	t	Sig.
1 (Constant)	1.096	.162		6.755	.000
BDA: Application in Audit Evidence	.744	.037	.726	2.050	.000
a. Dependent Variable: Audit Evidence: Assertion on Financial Statements in BDA					

Source: Authors' projection (2022)

According to **Table no. 7(a)**, the coefficient of determination (R^2) is 0.528 and this suggests that 52.80% of the variation in assertions on financial statements is caused by BDA while 41.2% is due to other factors not considered in this study.

Table no. 7(b) reports results on the analysis of variance: F-value (1,360) = 402.017 with a p-value = 0.000<0.05. This result indicates that the regression model significantly predicts assertions on financial statements, and the fourth hypothesis is also confirmed.

Table no. 7(c) provides data on the coefficient of the independent variable: β_1 of 0.726, t-value of 20.050 and p-value of 0.000 and this translates to the fact that a unit increase in BDAs will cause a positive increase of 72.6% on assertions on financial statements.

4. Discussion on findings

The results of the analysis show that there is a substantial, significant and positive effect of BDA on control testing (R^2 = 0.781). These results provide empirical evidence to support the fact that the application of BDA tools by auditors to interrogate big data will enhance compliance tests and thereby improve audit evidence. The findings are consistent with the suggestions in Appelbaum *et al.* (2017, 6) and provide empirical evidence to support the requirement of PACOB 2018-005 (AS 1105 .03-08).

The study also shows that there is a substantial, significant and positive effect of BDAs on the sufficiency of audit evidence (R^2 = 0.858). Sufficient audit evidence can be obtained in big data database with the application of BDA. These empirical results are consistent with the literature reports (Eilifsen *et al.*, 2020, 42 and Balios *et al.* 2020, 214).

In addition, the results show that the application of BDA in audit evidence has a substantial, significant and positive effect on the relevance and reliability of audit evidence (R^2 = 0.888). This means that BDA has the capacity to enable auditors to obtain relevant and reliable audit evidence from big data. This aligns with the expectation of Appelbaum *et al.* (2017,6) and Balios *et al.* (2020, 214).

Finally, the use of BDA to interrogate financial statements is found to have a moderate (R^2 = 0.528), but significant and positive influence. This empirical evidence supports various qualitative studies on the effect of big data analytics on audit evidence (Appenbaum, 2016; Yadav, 2020; Salijeni*et al*, 2019).

5. Conclusion and further research

The results of this study showed that the implementation of BDA by auditors will enhance compliance and substantive tests by which appropriate, reliable and relevant evidence can be sought and obtained. It is therefore recommended that appropriate standards should be developed that will provide for the adoption of BDA tools in auditing-related services, specifying the process and the minimum benchmarks in term of clear objectives

in accordance with the usual approach of the existing ISAs. In addition, appropriate in-house training should be organised for those involved in audit engagements by audit firms, while the Nigerian National University Commission, as well as other educational regulatory agencies elsewhere outside Nigeria, should make it mandatory for all tertiary institutions to introduce Big Data Analytics into their existing curricula.

It is suggested that further research should be carried out on big data analytics that will provide comparative findings from different settings, e.g., Europe, Asia, America or other African countries. Big 4 audit firms and accounting professional bodies should also initiate such studies to provide more comprehensive empirical evidence.

REFERENCES

1. Alrashidi, M., Almutaiara, A & Zraqat, O (2022). Impact of big data analytics on audit procedures: Evidence from the Middle East. *Journal of Asian Finance, Economics and Business*. 9(2), 93-102., https://doi.org/13106/jafeb.2022.vol9.no2.0093

2. Appelbaum, D (2016). Securing big data provenance for auditors: The big data provenance black box as reliable evidence. *Journal of Emerging Technologies in Accounting*. 13(1), 17-36., http://dx.doi.org/10.2308/jeta-51473

3. Appelbaum, D., Kogan, A. & Vasarhelyi. M. A. (2017). Big data and analytics in the modern audit engagement: Research needs. *Auditing: A Journal of Practice & Theory*. 36 (4), pp 1-27, http://dx.doi.org/10.2308/ajpt-51684

4. Balios, D., Kotsilaras, P., Eriotis, N &Vasiliou, D (2020). Big data, data analytics and external auditing. *Journal of Modern Accounting and Auditing*, 16(5), 211-219., http://dx.doi.org.10.17265/1548-6583/2020.05.002

5. Dagiliene, L. & Kloviene, L (2019). Motivation to use big data and big data analytics in external auditing. *Managerial Auditing Journal*, 34 (7). 750-782., https://doi.org/10.1108/MAJ-01-20181773

6. Eilifsen, A., Kinserdal, F., Messier Jr. W. F & McKee, T. E (2020). An exploratory study into the use of audit data analytics on audit engagements. *Accounting Horizons*. 34 (4), 75-103. http://dx.doi.org/10.2308/HORIZONS-19-121

7. Ernst and Young – EY Reporting (2015). How big data and analytics are transforming the audit. (April, 2015), 1-5., available at: https://www.google.com/url?sa=t&rct=j&q=&esrc=s&source=web&cd=&ved=2hukewfh_g9smz1ahudurokhr6saguqfnoecagqaq&url=https%3a%2f%2fassets.ey.com%2contet%2fdam% 2fey-sites%2fey-com%2fen_gl%2ftopics%2 fassurance%2fassurancepdfs%2fey-reporting-big-data-transform-audit.pdf%3fdownload&usg= aovvaw2jgmswbplatpb0z0Pc95

8. Ernst and Young Web, (2022). EY Helix, available at: https://publish-ey-prod-cdn.adobecqms.net/en_ly/audit/technology/helix

9. Fosso Wamba, S., Akter, S., Edwards, A., Chopin, G., & Gnanzou, D. (2015). How Big Data can make big impact: Findings from a systematic review and a longitudinal case study, *International Journal of Production Economics*. 165, 234-246. Available at: https://papers.ssrn.com/sol3/papers.cfm?abstract_id=2577073

10. Gardi, B (2018). The effect of computerised accounting system on auditing process: A case study from the Northern Iraq. A M.Sc. Thesis Submitted to the Department of Accounting, Institute of Graduate Studies and Research. *Cyprus International University*, https://dx.doi.org/10.2139/ssrn.3838327

11. Gepp, A, Linnenlueeke, M. K. O'Nell, T. J. & Smith, T. (2018). Big data techniques in auditing research and practice: Current trends and future opportunities. *Journal of Accounting Literature,* 40, 102-115., http://dx.doi.org/10.2139/ssrn.2930767

12. Hayes, R., Wallage, P. & Eimers, P. (2021). *Principles of International Auditing and Assurance*. 4th Ed., Amsterdam University Press.

13. IAASB (2006). *Exploring the Growing Use of Technology in the Audit, with a focus on Data Analytics*. Exposure Drafts and Consultation Papers, Sep. 01, available at: https://www.iaasb.org/publications/exploring-growing-use-technology-audit-focus-data-analytics

14. ICAN (2022). FM list as at May 31, 2022 up to Year 2022 Subscription. https://icanig.org/members/documents/FMLIST_310522.pdf

15. Jensen, M. C. & Meckling, W. H (1976). Theory of the firm: Managerial behavior, agency costs and ownership structure. *Journal of Financial Economics,* 3 (July), 305-360, available at: https://papers.ssrn.com/sol3/papers.cfm?abstract_id=94043

16. Kamil, O. A & Nashat, N. M. (2017). The impact of information technology on the auditing profession – Analytical study. *International Review of Management and Business Research*. 6(4), 1338-1340, available at: https://www.researchgate.net/publication/333568385_The_Impact_of_Information_Technology_on_the_Auditing_Profession-Analytical_Study

17. Kokina, J & Davenport, T. H, (2017). The Emergence of Artificial Intelligence: How Automation is Changing Auditing. *Journal of Emerging Technologies in Accounting.* 14(1): 115-122, http://dx.doi.org/10.2308/jeta-51730

18. Miles, A. D. (2017). Research Methods and Strategies Workshop: A Taxonomy of Research Gaps: *Doctoral Student Workshop: Finding Research Gaps – Research Methods and Strategies*, August, available at: https://www.researchgate.net/publication/319244623_ARTICLE_Research_Methods_and_Strategies_Workshop_A_Taxonomy_of_Research_Gaps_Identifying_and_Defining_the_Seven_Research_Gaps

19. Mitnick, B. M. (1975). The theory of agency: The policing "paradox" and regulatory behavior. *Public Choice*. 24 (Winter), https://papers.ssrn.com/sol3/papers.cfm?abstract_id=10211143

20. Moffit, K.C. & Vasarhelyi, M.A. (203) AIS in an age of big data, *Journal of Information System*, 27(2): 1-19, https://doi.org/10.2308/isys-10372,

21. Omitogun, A. & Al-Adeem, K. R. (2019). Auditors' Perceptions of and Competencies in Big Data and Data Analytics: An Empirical Investigation. *International Journal of Compute Auditing*.1(1), 92-113, https://doi.org/10.53106/256299802019120101005

22. PCAOB (2004). *Audit Documentation*. 6 (June). 1-49, https://pcaobus.org/Rulemaking/Docket012/2004-06-09_Release_2004006.pdf

23. Rai, A. (2020). What is big data – Characteristics, Types, Benefits &Examples. *upGrad,* available at: https://www.upgrad.com/blog/what-is-big-data-types-characteristics-benefits-and-examples/

24. Rialti, R., Ciappei, C., Boccardi, A. & Zollo, L. (2016). Big data oriented business models; the 7vs of value creation. *Conference Proceeding. XXVIII: Sinergie Annual Conference.* Volume: *Management in a Digital World. Decisions, Production, Communication,* http://dx.doi.org/10.7433/SRECP.EA.2016.18

25. Ross, S. A. (1973). The economic theory of agency: The principal's problem. *American Economic Review.* 62(2); 134-139, https://dx.doi.org/10.2139/ssrn.1020859

26. Salijeni. G. M. (2019). Big Data Analytics and the Social Relevance of Auditing: An Exploratory Study. *A thesis submitted to The University of Manchester for the degree of Doctor of Philosophy in the Faculty of Humanities. Alliance Manchester Business School.*; 1-262, https://pure.manchester.ac.uk/ws/portalfiles/portal/95492166/FULL_TEXT.PDF

27. Salijeni, G., Samsovona-Taddei, A. & Turley, S. (2019). Big data audit dynamite in Big Data Changes in audit technology: Contemplating a research agenda. *Accounting and Business Research* 49(1), 95-119, http://dx.doi.org/10.1080/00014788.2018.1459458

28. Siroisa, B.A. & Savovska, K. S. (2017). Audit Data Analytics: Opportunities and Tips. *International Federation of Accountant Committee* (IFAC), 1-3, available at: https://www.ifac.org/who-we-are/leadership/bonnie-ann-sirois

29. Yadav, S. (2020). The impact of big data on audit evidence and the level of assurance. *Honors Theses*. 735., https://aquila.usm.edu/honors_theses/735

30. Yudowati, S. P. & Alamsyah, A. (2018). Big data framework for audit process. *International Journal of Engineering & Technology,* 7 (4), 908-911, http://dx.doi.org/10.14419/ijet.v7i4.38.27606

31. Younis, N. M. M. (2020). The impact of big data analytics on improving financial reporting quality. *International Journal of Economics, Business & Accounting Research*. 4(3), http://jurnal.stie-aas.ac.id/index.php/IJEBAR

32. Zhaohao, S., Strang, K. & Li, R. (2018). 10 Bigs: Big Data and Its Ten Big Characteristics. *BAIS No. 17010, PNG University of Technology*, available at: https://www.researchgate.net/publication/322592851_10_Bigs_Big_Data_and_Its_Ten_Big_Characteristics

Implications of Financial Literacy on Entrepreneur-ship

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Abstract

Financial literacy is the focus of today's scientific research and has attracted considerable attention. The research focused almost on measuring and interpreting the financial literacy of individuals and households. Research on the general financial literacy of entrepreneurs has so far been limited. Entrepreneurs are drivers of innovation and growth and their ability to make the right financial decisions requires financial literacy among entrepreneurs.

The OECD has defined financial literacy of entrepreneurs as the combination of awareness, knowledge, skills, attitudes, and behavior that a potential entrepreneur or an owner or manager of a micro, small, or medium-sized enterprise should to make effective financial decisions to start a business, run a business and ultimately ensure its sustainability and growth. This defines the general need to understand whether entrepreneurs have the skills/abilities or are accessible to make "effective financial decisions". Such decisions may concern the use of short and long-term capital of their enterprises, working capital and investment decisions, and access to finance for the latter, financing decisions (OECD, 2018).

This paper examines the implications of financial literacy on entrepreneurship that emerge from contemporary research and provides approaches for further necessary research in this area.

KEY WORDS*: entrepreneurship; financial literacy; MSMEs; risk literacy; startups;*

JEL Classification*: G41, G53*

Introduction

"Financial literacy for entrepreneurs is the combination of awareness, knowledge, skills, attitudes, and behavior that a potential entrepreneur or an owner or manager of a micro, small or medium-sized enterprise should have to make effective financial decisions to start a business, run a business, and ultimately ensure its sustainability and growth" (OECD, 2018).

Policy and academic interest in financial literacy and entrepreneurship

The importance of financial literacy was officially recognized by OECD governments as early as 2002 with the launch of the first financial literacy project. In 2008, the project was further expanded by the creation of the International Network on Financial Education (INFE), a network of over 240 public institutions (including central banks, financial regulators and supervisors, and ministries of finance and education) in over 110 countries.

In 2014, INFE established a special expert sub-group focusing on financial literacy for potential entrepreneurs and MSMEs. In the context of INFE's research on what financial literacy can imply for MSMEs and potential entrepreneurs, a formal definition was adopted in 2018. INFE also published a Core Competency Framework on Financial Literacy for MSMEs and potential entrepreneurs (OECD 2018).

The framework aims to design some concrete, survey-based measures of entrepreneurs' financial literacy. The ultimate goal is to complement or improve the financial literacy of MSME owners and managers and of potential entrepreneurs in their experience of starting, running, or expanding a business.

Financial literacy of individuals and entrepreneurs

Academic research has so far focused primarily on the financial literacy of individuals and has only recently begun to develop models that differentiate the areas of competence of individuals and the related skills and abilities of successful entrepreneurs (Anderson et al., 2018; Bacigalupo et al., 2016; Gibb, 2008; Bätz et al., 2021). A central component of these studies is financial literacy, although the literature has only recently begun to test its influence on entrepreneurial skills (Anderson et al., 2018; Suparno & Saptono, 2018). Overall, there is only a limited range of empirical studies that have specifically

examined the relationship between financial literacy and entrepreneurship. From a scientific point of view, there is a large research gap to provide empirical and scientifically valid results.

Financial literacy, the cause of entrepreneurship

Existing scientific empirical evidence suggests that more financially literate individuals can make better financing, investment, and working capital decisions (Siegfried, 2021). Another hypothesis is that individuals with high levels of financial literacy are less reluctant to become entrepreneurs because they have a high level of understanding of alternative sources of finance in the market and are better able to talk to banks or other financial intermediaries. They may even become more successful entrepreneurs if they can secure and proactively manage the financial resources a start-up needs in the early stages of its development. These hypotheses lead to the conclusion that the level of financial literacy of entrepreneurs is crucial for entrepreneurship, thereby fostering innovation, growth, and prosperity (OECD, 2015).

1. Implications of financial literacy on entrepreneurship

1.1. Disruptive factors in entrepreneurship

The Asian Development Bank (ADB) listed several disruptive factors identified in its 2005 report. The main feature consisted predominantly of issues related to financing the venture. Even though it is not easy to obtain investors or bank financing for one's venture, the conditions that ultimately must be paid for the capital play a significant role for the company. Too poor terms and correspondingly high financing costs hurt the company's liquidity and thus its ability to invest in other projects. Brown et al. (2005) also identify equity and debt financing as a major obstacle during the nascent and growth stages of the firm. In addition, capital, and access to it are by far the most central resource (Huke et al., 2021). Capital can be converted into any desired resource and thus forms the basis for obtaining all other required resources (Dollinger, 2008). According to the ADB, in addition to capital, insufficient information about the market is also considered a factor that can contribute to the failure of the venture. Those who do not analyze their environment and anticipated business field sufficiently in advance may

encounter market entry barriers that are difficult to overcome, great competitive and price pressure, or market transaction costs that are excessively high. Other barriers include a lack of institutional support from the state and inadequate legislation.

In a report by the Gallup Organization (2007) commissioned by the European Commission, a survey found that almost half of small and medium-sized enterprises in Europe believe that they operate in an over-regulated environment. Administrative regulations are seen by them as one of the keys and biggest barriers to doing business. In a study, the European Commission (2018) shows the average number of days required in European countries to establish a limited liability company (GmbH). Germany in particular, with a duration of 7.6 days, is far above the European average of 3.1 days and ranks third behind Slovenia and Sweden (European Commission, 2018). In addition, the capital needed for the bureaucratic start-up influences the entrepreneurial start-up process. In Germany, an entrepreneur must include 383 euros for registration and notarization in addition to the share capital of 25,000 euros to establish a GmbH, whereas in the United Kingdom, for example, only a minimum contribution of one euro and a further 13 euros are required to register the "Private Limited Company" (European Commission, 2018). In addition, the Gallup Organization (2007) identifies the lack of implementation of innovative solutions to problems and product innovations, in addition to infrastructural problems such as connectivity and the position of the company. Another factor why many companies leave the market after a short life cycle and do not continue operating Is a lack of patience. After all, starting a company is the result of perseverance and long-term determination.

In addition, the location can also restrict the growth of the company. Due to the partially existing overregulation of individual countries, it becomes impossible for many companies to maintain their competitiveness abroad (Seipp et al., 2021). Restrictions such as export and import duties make it difficult to offer a competitive price in the respective target country. Apart from this, it is possible that the company's products may not be exported to the target country due to restrictions or may only be used there to a limited extent and not with all the intended functions.

Besides these points, the aspect of inadequate qualification and education forms the central factor that can cause the failure of an entrepreneur. A profound

education both in the anticipated business field as well as in general and financial terms provides essential assistance and contributes to identifying the other disturbing variables early on and developing solutions. In addition, financial literacy in particular contributes to overcoming the financing obstacle. Sufficient expertise in this field enables the entrepreneur to distinguish between good and unfavorable financing conditions and thus make the right financial decisions. Furthermore, the entrepreneur analyzes precisely which financial aspects stand in the way of the business and how to calculate or what exactly needs to be calculated to set up a solid financial plan for the first years of business. Thus, improving financial literacy is a key factor in the success formula for improving entrepreneurial performance (Adomako et al., 2016).

1.2. Effects of financial literacy on business performance

In a business world characterized by dynamism and uncertainty, entrepreneurs are confronted with a multitude of challenges daily, but most of them can be overcome or effectively solved with the help of financial literacy. Entrepreneurs should therefore be able to make complex financial decisions in daily. life, from private matters such as housekeeping to key business decisions (Siegfried, 2015). Most academics agree that entrepreneurs, regardless of their age, are routinely involved in decision-making that involves the acquisition and use of resources, which almost always include financial consequences. Therefore, in order to take efficient decisions, entrepreneurs must be financially literate (Oseifuah, 2010). In addition, Hartog et al. (2010) elicited the effects of various characteristics between (salaried) employees and self-employed entrepreneurs. The study found that mathematical, analytical, and technical skills in financial topics have a significant value for entrepreneurs, driving them in their ventures more than other traits.

However, the lack of knowledge in this area contributes to the low prevalence of start-ups or the resulting high failure rate of SMEs, as many would-be entrepreneurs are intimidated by the high financial administrative burden (Spinelli et al., 2015). In their work on financial literacy as an aid to start-ups, Leifels and Metzger (2015) describe the average dropout rates of German start-ups by analyzing start-up and dropout data between 2005 and 2014 using the KfW Start-up Monitor. It was found that the probability of a company breaking off after one year was

around 15% and after three years a total of 30% (Leifels & Metzger, 2015). Furthermore, it is described that financial knowledge has a major impact on the resilience and thus on the survival of the company (Siegfried, 2014). Statistically, the average dropout rate after a start-up is reduced by around one-third simply through profound financial competence (Leifels & Metzger, 2015).

Financial literacy is the ability to apply learned financial knowledge to manage financial resources effectively and efficiently to achieve lifelong financial well-being (PACFL, 2008). It includes knowledge of financial planning with factoring in interest rates, time value of money, borrowing, and assets and liabilities. According to various researchers, it is the decisive factor in financial well-being and entrepreneurial success. Moreover, it enables making informed decisions related to money. Wrong decisions about capital usage can have long-term and serious consequences and also jeopardize the survival of the company in the market.

Regardless of whether a country is developed or still in the process of development, financial literacy is becoming increasingly important worldwide, especially in entrepreneurship and the effective management of one's finances. Thus, the "President's Advisory Council on Financial Literacy" established in USA, in its annual report to the President also prompted the development of a plan to improve financial literacy domestically to strengthen the economy (PACFL, 2008). Furthermore, in many developing and emerging countries, efforts are being made to promote domestic financial literacy and use it as a tool to strengthen the economic activity of citizens and thus fight poverty in the countries.

Several studies prove that a positive correlation exists between financial education and entrepreneurial success. In his study, Njoroge (2013) investigates the relationship between financial literacy and entrepreneurial success in Nairobi, Kenya. For the study, he collected data from small and medium enterprises that measured the entrepreneur's level of financial literacy and entrepreneurial success. Financial literacy was analyzed using a "Big Three"-style survey consisting of questions related to interest rates, inflation, time value of money, risk and its diversification, and general knowledge of financial markets. Entrepreneurial success was determined by parameters such as the period of operation on the market, the number of permanent employees, the sales growth rate, and the general growth within the first five business years. After conducting and adjusting for unusable results, the sample size studied was of 79 companies.

Table no. 1. Survey Results according to Njoroge		
Company success [achieved score]	N	79
	Result Range	87
	Minimum	13
	Maximum	100
	Mean Value	65.97
	Standard Deviation	27,979
	Variance	782,864
Financial literacy [achieved score]	N	79
	Result Range	87
	Minimum	13
	Maximum	100
	Mean Value	68
	Standard Deviation	25,355
	Variance	642,897

Source: Own projection, based on survey results from Njoroge, 2013

As can be seen in **Table no. 1**, the minimum score achieved in financial literacy was 13%, while the highest level of education was 100%. The average score achieved was 68%, implying that most entrepreneurs have some level of financial literacy and understand at least basic financial concepts. A similar result emerged from the research regarding success. Again, the minimum score was 13%, while

the maximum score achieved was again 100%. The average score was 65.97%.

In analyzing the results, Njoroge was able to establish a strong positive correlation between financial education and the degree of success of the entrepreneur. The correlation between the dependent variable of success and the independent variable of financial literacy could be explained and fixed with an R^2 of 0.852 and thus 85.2%.

According to the study, the financial literacy of an entrepreneur thus contributes to a large extent to the success of the business. Successful SMEs are run by entrepreneurs who are financially literate and understand key financial concepts, such as risk management, interest rates, and the time value of money. Furthermore, the study concludes that financially literate entrepreneurs have a higher chance of success than their uneducated competitors (Njoroge, 2013).

It has been proven that financially educated individuals exhibit positive financial behavior when dealing with money (Hilgert et al., 2003). However, this effect does not only manifest itself in the private sector. Andoh and Nunoo (2011) interpret financial literacy as one of the main factors in the SME sector based on their study and show that the possession of this education has a direct impact on firm performance. Compared to more financially illiterate entrepreneurs, those with a high level of financial education also exhibit better savings behavior as well as better risk management and are more likely to engage in the purchase of any insurance policies. As a result, they are less susceptible to disruptive factors triggered by a financial bottleneck or other crises and are de facto more successful than their competitors in the long run due to the few setbacks.

However, it remains to be seen to what extent financial literacy plays a key role in entrepreneurship. So far, the effects have only been described based on developing countries such as Ghana and Kenya, where the majority of the population comes from the informal sector, where the general level of education is of a low standard. Many researchers studying developing countries often associate financial literacy only with basic principles such as simple bookkeeping regarding achieved sales of goods (Musah & Muazu, 2014). Therefore, there is reason to believe that an increased level of financial literacy has a higher effect on boosting business performance in developing countries than in developed countries, as many entrepreneurs based there lack a general basic knowledge of entrepreneurial practices.

The study by Li and Qian (2019) on the role of financial education in entrepreneurial participation confirms the previous findings using China as a case study. Even though the People's Republic of China is an emerging economy, it is undoubtedly one of the most entrepreneurially active countries in the world. The "Global Entrepreneurship Monitor" (GEM) notes an entrepreneurial intention index of 21.42% (GEM, 2019). The index is calculated as a percentage and represents the proportion of the population aged 18 to 64 that is latently entrepreneurial and intends to start a business within the next 36 months. This rate puts China just below the global average of 23.73% and well above many developed industrialized countries such as Germany, where the intention index is 9.12% (GEM, 2019). In addition, the GEM documents the "Total early-stage Entrepreneurial Activity" (TEA). This index describes the percentage of the 18- to 64-year-old population that is either budding entrepreneurs or owners of a new business. China also has a slightly higher value for the TEA index (8.66%) than Germany (7.52%). However, both countries are below the global average of 12.81% (GEM, 2019).

The 2014 "China Family Panel Studies" (CFPS) questionnaire served as the data basis for Li and Qian's study. The CFPS is a nationally representative survey conducted by the "Institute of Social Science Survey of Peking University", consisting of a variety of economic information. The 2014 CFPS questionnaire, which included questions related to both financial literacy and entrepreneurship, consisted of a sample size of 3575 households after adjusting for non-usable data. After analyzing the data as well as the statistical hypothesis tests, it was found that, again, financial literacy is strongly positively correlated with entrepreneurial success. The results prove that education positively influences the entrepreneurial process both in the entry phase and in the operational phase and contributes to the increase of the generated income. In addition, financial literacy was also shown to be strongly positively correlated with, significantly influence, and contribute to increasing the intention to become an entrepreneur (Li & Qian, 2019). It remains questionable to what extent the ratio is actually increased by financial literacy and whether its influence is manipulated by China's large informal sector, similar to developing countries, and consequently amplified many times over.

As part of her dissertation, Fernandes researched the correlation between the performance of small and medium-sized companies and the financial literacy level of

their directors in Portugal (Fernandes, 2015). Similar to the study of Njoroge (2013), this research used questionnaires, based on the "Big Three", as well as company ratios and their evolution to measure financial literacy and company performance. After analyzing the collected data, a significant positive correlation between the level of financial literacy of the entrepreneur and the performance of his business was also demonstrated in this case. Once again, the relevance of providing financial education opportunities is emphasized here by demonstrating that financially literate entrepreneurs also tend to be more successful with their businesses than their less-educated competitors.

In addition to the correlation between education and performance, Fernandes was able to demonstrate the discrepancy between the subjectively perceived and objectively assessed level of financial literacy. For this purpose, participants were asked to give a realistic self-assessment of their level of knowledge before answering the questions, which were then compared with the collected and categorized values.

Table no. 2. Discrepancy between Self-Assessment/Test Results according to Fernandes		
Score class [%]	Test results [%]	Self-assessment [%]
0 – 25	11	0
26 – 50	33	11
51 – 70	31	52
71 – 85	19	34
86 – 100	6	3

Source: Own projection, based on survey results from Fernandes, 2015

As can be demonstrated from Table no. 2, the results were divided into five different point ranges in each case. It can be deduced from the results that respondents tend to overestimate their knowledge. This is particularly evident in the category with low financial literacy. The entrepreneurs belonging to this category (11%) did not classify themselves in this category in advance. Only in the top category were comparable values achieved between the subjectively perceived and objectively measured levels of education (Fernandes, 2015). Overestimating one's entities, particularly in the area of the already low level of education, can pose a threat to the company through financially incorrect decisions and thus jeopardize its continued existence.

In addition, Fernandes was able to demonstrate that financial literacy tends to be higher in larger firms.

Table no. 3. Score achieved, categorized by Revenues, according to Fernandes	
Revenues	Mean Value (Test results) [%]
0 – 10,000 €	2.50
10,001 – 100,000 €	29.61
100,001 – 500,000 €	45.06
500,001 – 2,000,000 €	55.25
> 2,000,000 €	73.42

Source: Own projection, based on survey results from Fernandes, 2015

Based on the mapped results from Table no. 3, it can be deduced that the entrepreneurs of larger companies (in terms of revenues) were able to demonstrate a higher financial literacy level on average than entrepreneurs located in the lower revenues segment. The largest leap in the various mean values is recorded between the categories up to 10,000 € and between 10,001 – 100,000 €.

Further insight into the effect of financial literacy on developed countries is provided by the recent Dutch study by Alperovych et al. (2020). In this study, similar to the previous ones, the correlation between education level

and company performance was measured. However, in contrast to the previously mentioned studies, this one examined only the employee's reported level of knowledge instead of objective measurement. In the 2016 survey, financial literacy was examined using four categories: accounting, strategy, financing the firm, and taxation. Three variables were used to measure firm performance: gross profit margin from the previous year – 2015, revenue growth over the last three years before the survey, and annual revenue of the firm. A positive correlation between literacy level and business performance was also found in terms of self-reported financial literacy. Entrepreneurs who described themselves as financially literate tended to also own larger firms in terms of revenue, revenue growth rate, and higher profitability than those who rated themselves lower in terms of their knowledge level (Alperovych et al.; 2020). In addition to the correlation to financial literacy, a correlation between a university degree or a minimum of five years of entrepreneurial experience and the performance variables studied was also found. This correlation could not always be proven to be statistically significant. In most cases, however, experienced entrepreneurs have larger firms but are not necessarily more profitable than those inexperienced entrepreneurs.

Even though this study, published in 2020, is the most recent investigation of the issue based on an industrialized country, its representativeness remains an open issue. To measure financial literacy, Alperovych et al. used only subjective self-reported knowledge. The discrepancy between self-reported and objectively measured knowledge levels is a confounding factor that may skew the results of this study. Entrepreneurs, especially those with low financial literacy, tend to estimate their level of knowledge to be significantly better than it is (Fernandes, 2015).

Beyond this topic, Alperovych et al. (2020) analyzed the propensity of entrepreneurs to rely on financial advice from both professional advisors and private individuals. Here, it is suggested that financial advice of a professional nature is of higher quality than advice that comes from family or friends. The research found that a higher level of financial literacy results in less frequent seeking of professional help (Alperovych et al.; 2020). Efficient tax planning with professional help could also help to optimize the profit generated after the deduction of any taxes.

However, a lack of competence in financial sub-areas does not necessarily mean failure or failure of

entrepreneurial activity. In the event of a lack of skills or uncertainty regarding upcoming financially fraught decisions, entrepreneurs can turn to professional help from tax advisors, accountants, or business partners (BDC, 2017). If entrepreneurs recognize when they need to seek advice at the right time, the expertise of professionals can contribute greatly to business success. In addition to seeking paid assistance, there are low-cost alternatives. Due to access to the Internet, both entrepreneurs and private individuals now have an almost limitless, free source of information at their disposal and have the opportunity to educate themselves further in various sub-areas. Questionable remains, however, whether they are also in a position to filter out from the multitude of sources and information exactly the part that is relevant to their circumstances, let alone to be able to distinguish between reliable and unreliable sources (BDC, 2017).

1.3. Financial literacy and start-up financing

Hussain et al. (2018) describe financial literacy as a connective resource that reduces information asymmetry, particularly in evaluating and distinguishing between credit and financing options. With the extensive expertise gained as a result, financial literacy can be portrayed as a core resource that supports effective decision-making by owners. This capability helps optimize capital structures and contributes to the stable scaling of the company. By improving capital structures, cutting unnecessary costs, and obtaining improved financing options, financial literacy also makes a significant contribution to maintaining competitiveness.

There is still a financing gap, particularly in the SME sector. This is determined by limits on the amount of funding sought by potentially viable and profitable businesses that cannot raise the required finance (*Department of Business Innovation and Skills*, UK, 2012). On average, about 20% of start-ups are affected by financing difficulties, which typically manifest themselves in a lack of equity, protracted loan negotiations, or ultimately failure to finance (Leifels & Metzger, 2015). Small companies in particular often receive poorer financing conditions and have to provide higher collateral and pay high-interest rates compared to their larger competitors. This in turn limits the growth potential of SMEs. The establishment, as well as the growth of SMEs, is particularly limited in developing countries. Due to the lack of capital in general, it is particularly difficult to obtain

financing here. The problem here is that profitable and innovative ideas or business models could exist in the companies, but these are never realized due to a lack of financing and accordingly cannot contribute to the development of the already weak economy. In addition, the financing behavior of industrialized banks has declined considerably in recent years, especially in the area of SME financing, which underscores the aspect of financing as a hurdle. One reason for this is that banks usually prefer to finance the projects of larger companies, as these concepts are significantly more lucrative from the bank's point of view due to the size of the loan required. The comparatively small sums required by SMEs tend to be unattractive to the bank, as the bureaucratic and personnel workload behind them is usually identical to that involved in processing larger orders. Furthermore, the traditional borrowing of SMEs is further hampered due to their lack of creditworthiness (Leifels & Metzger, 2015). The assessment of companies in terms of their ability to borrow is often based on the evaluation of revenues and the performance of recent years or on the extent to which the company can provide collateral for the loan. This particularly affects founders who come from a financially weak background and thus cannot rely on the support or performance of a guarantee from their family environment. Given the relevance of the SME sector through its innovative strength and the creation of the majority of jobs, eliminating the financing gap seems particularly necessary (Leifels & Metzger, 2015).

1.4. Possibilities of Alternative Financing

Especially about this gap, it is more important than ever to manage the available capital as efficiently as possible with the help of financial expertise or to inform oneself about alternative financing options.

In their study, Seghers et al. (2012) analyzed how limited knowledge about financing alternatives causes suboptimal financing decisions. Whether in the start-up phase or to overcome liquidity shortages, the lack of knowledge in the financial sector means that financially illiterate entrepreneurs often resort to the wrong and thus unfavorable alternatives, as they are usually unaware of the low-cost options. Opportunities such as crowdfunding, private equity, venture capital investments, or financially supportive start-up assistance from the government offer in most cases more lucrative financing to start a business

than the classic bank loan. In crowdfunding, in particular, the company itself can decide what is paid to investors as compensation, depending on the amount of their investment. In addition, financing through a crowdfunding platform offers several advantages for the budding company. By advertising the project on the platform, interested parties are made aware of the company virtually free of charge. This in turn enables the company to build up a customer and prospect base even before actively participating in the market, which is just waiting to purchase the advertised company's products. In addition to building a customer base, the advertisement can be used to determine whether the product is appealing to the market or whether it is indistinguishable from existing alternatives and thus rejected. There is also the possibility of funding companies that were originally rejected in a bank's previous evaluation because their product or venture was generally deemed unviable (Seghers et al., 2012).

Another option is to appear on TV. Offshoots of the American business reality show "Shark Tank" exist worldwide and offer the appearing entrepreneur the opportunity to secure financial support from investors present. Even if many entrepreneurs are deterred by the possibly harsh criticism of the jury, the appearance on TV allows them to advertise free of charge and to reach other investors through the resulting publicity. Likewise, the criticism of the jury can be accepted, which can improve the existing business plan.

The essential force of these listed financing options is the trend of advancing digitalization. The Internet in particular enables the acquisition of and communication with a large number of international investors, which above all reduces the obstacle of financing in this context.

But there are also alternatives for overcoming financial bottlenecks when the company is already operating on the market, such as the factoring of liabilities, in which outstanding receivables are sold to a third party, or the sale-and-lease-back procedure, in which equipment, for example, is sold and leased back on instalment terms from the proceeds to be able to realize a short-term liquidity boost from this (Klapper, 2006).

Figure no. 1 illustrates different sources of financing in terms of their use by financially literate as well as financially illiterate entrepreneurs.

Figure no. 1. Utilization of different financing options by level of financial literacy
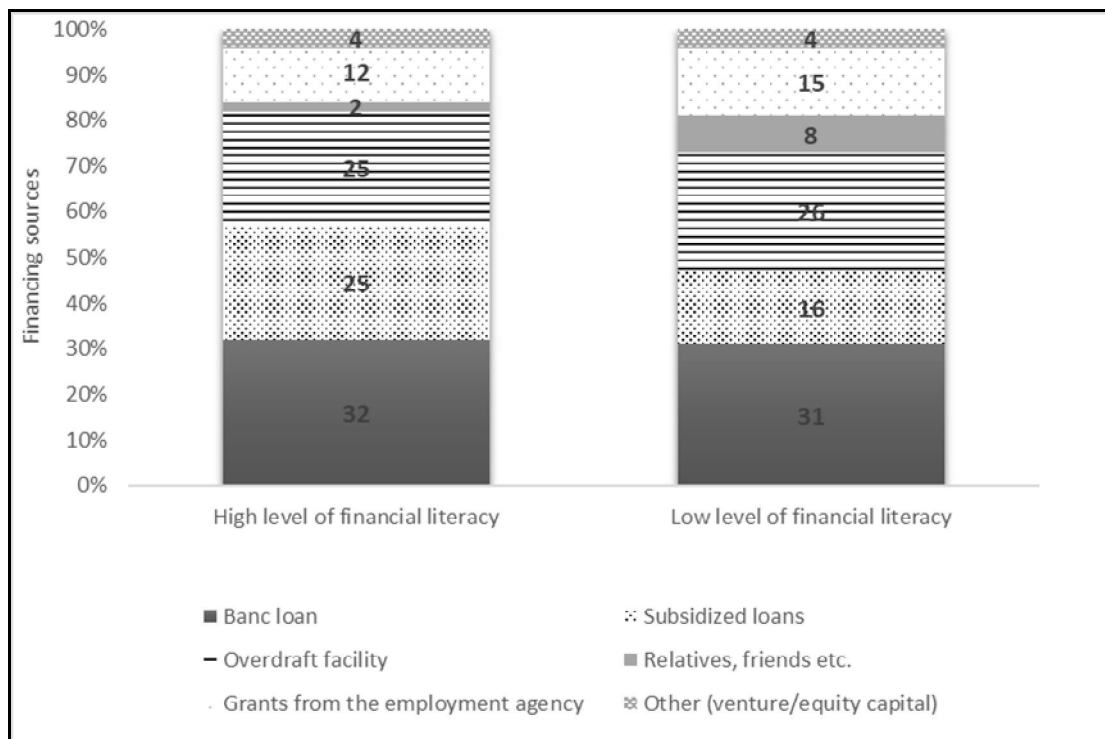
Source: KfW Start-up Monitor 2014, from "Fokus Volkswirtschaft" No. 107 (Leifels & Metzger, 2015).

As can be seen in *Figure no. 1*, entrepreneurs with good financial knowledge tend to use financing alternatives that are more advantageous for themselves. Financially literate entrepreneurs more often turn to subsidized loans, where capital is obtained from the public sector at favorable rest rates.

1.5. Financial literacy and interpreting of reports and figures

Another link between business performance and financial literacy was established by Dahmen and Rodriguez (2014). As part of an inventory for the use of business consulting services, a total of 14 companies were financially evaluated by the "Florida Business Development Center". The financial literacy of the entrepreneurs and the incorporation of financial reports in strategic decision-making were included. It was found that a total of seven of the 14 companies had problems with financial constraints. In this regard, six of the seven companies indicated that they very rarely if ever reviewed the company's financial reports and accordingly did not

include them in the strategic decision-making process. All of the entrepreneurs who experienced difficulties with financial bottlenecks and indicated that they did not review the reports admitted that they were unable to do so due to a lack of competence. Accordingly, a correlation can be established between the use of own financial reports and company performance.

The relevance of financial report writing has also been demonstrated in a Canadian study on the impact of financial literacy on new business survival by Wise (2013). In his study, a total of 509 young entrepreneurs who received start-up loans for their business creation through their participation in a program of the "Candian Youth Business Foundation" were interviewed regarding their financial literacy, the regularity of preparation and use of financial reports, and the overall financial situation of the business. Initially, it was assumed that the meticulous inclusion of these reports would help improve the overview of the company's financial situation, thereby identifying emerging risks and financial bottlenecks early on. The research found that higher levels of financial literacy led to

financial reports being prepared on a comparatively more regular basis and incorporated into the decision-making process, better factoring in loan repayments and thus preventing involuntary closure of the business (Wise, 2013).

In addition to the studies on the correlation between education and business success, Cumurovic and Hyll (2018) investigated the relationship between the financial literacy level and the employment relationship of the tested person. The "German Save Study" from 2009 served as the data basis. For the analysis of the facts, the respondents were categorized as wage earners or self-employed depending on their vocation and employment relationship. A selection of a total of nine questions served to measure the level of education. The first four questions dealt with basic topics from the "Big Three", while the remaining five dealt with more advanced sub-areas. Here, questions were asked regarding money value illusion, volatility, the stock market, funds, and the bond market.

Self-employed persons were generally more likely to answer the basic questions correctly than wage earners. The same tendency could also be found in the advanced questions. On average, the self-employed respondents answered 6.5 of the questions correctly, while the wage earners were slightly lower, with an arithmetic mean of 5.7 questions answered correctly. Even though the difference is small, a tendency can be derived from a total of 1039 respondents (Cumurovic & Hyll, 2018).

As entrepreneurs are more aware of financial opportunities and risks, they may not only have a better understanding of how or what makes a business more profitable, but may also be more willing to take the step into self-employment than those who do not have a basic knowledge of how to deal with the challenges, risks, and responsibilities of running a business (Cumurovic & Hyll, 2018). In addition, Elert et. al. (2015) found that entrepreneurial education during secondary school would increase both the long-term probability of starting a business and the future income from the business.

Conclusions

In summary, financial literacy is key as it helps reduce information asymmetry (Hussain et al. 2018) and assists in achieving better-informed financial decisions

in both personal and business terms. In her dissertation, Fernandes (2015) shows a positive correlation between company performance and the level of education and also demonstrates the discrepancy between self-reported and objectively tested financial literacy. Furthermore, Alperovych et al. (2020) likewise demonstrated a positive correlation between the two variables. However, this Dutch study only included self-reported knowledge levels. Another positive correlation has been demonstrated by Dahmen and Rodriguez (2014) in the U.S. and by Wise (2013) in Canada, examining the relevance of preparing financial reports meticulously or incorporating them strategically and their positive effects on business performance, which was found to be more frequent among financially literate entrepreneurs. Since the effects of financial literacy on entrepreneurship and the often-studied business performance have been less researched, it is advisable to conduct further research with qualitative data collection in this field. The focus should be, especially in developing countries, to investigate the issue based on a leading industrialized country, such as Germany, to further strengthen the evidence for effects based on this country. In addition, a standardized measure such as the "Big Three" framework should be used to measure financial literacy to rule out falsification of the results and to ensure the representativeness and comparability of the data collected. Furthermore, research on the impact of financial literacy on the overall likelihood of entrepreneurial activity and the promotion of entrepreneurship should take into account that many country-specific factors, such as the cost of setting up a legal entity and the tax rate of the income generated, can significantly influence this activity and lead to a distortion of the research results.

Overall, the existing international studies indicate a correlation between financial literacy and entrepreneurship, but this has not yet been scientifically validated to the same extent as the correlation between financial literacy and wealth creation. In particular, there is a lack of empirical evidence from the industrialized countries – above all from Germany. To achieve scientific evidence a nationwide empirical Germany study among start-ups and SMEs is planned and will provide significance to the link between financial literacy and entrepreneurship in research and policy discussion.

Appendices

Appendix 1: The "Big Three" financial literacy questionnaire

The "Big Three" financial literacy questions (listed below), created by Professor Annamaria Lusardi and Professor Olivia S. Mitchell, have now been used in more than 20 countries to measure financial knowledge. Comparisons of results across countries have demonstrated that financial illiteracy is a global problem, that financial literacy peaks in middle age, and that women consistently score lower than men. (Note: Correct answers are in **bold**).

1. **Suppose you had $100 in a savings account and the interest rate was 2% per year. After 5 years, how much do you think you would have in the account if you left the money to grow?**

   o **More than $102**
   o Exactly $102
   o Less than $102
   o Do not know
   o Refuse to answer

2. **Imagine that the interest rate on your savings account was 1% per year and inflation was 2% per year. After 1 year, how much would you be able to buy with the money in this account?**

   o More than today
   o The same
   o **Less than today**
   o Do not know
   o Refuse to answer

3. **Please tell me whether this statement is true or false. "Buying a single company's stock usually provides a safer return than a stock mutual fund."**

   o True
   o **False**
   o Do not know
   o Refuse to answer

Source: GFLEC, Three Questions to Measure Financial Literacy

Appendix 2: The "Big Five" financial literacy questionnaire

(Note: Correct Answers are in **bold**)

1. Suppose you had $100 in a savings account and the interest rate was 2% per year. After 5 years, how much do you think you would have in the account if you left the money to grow?

A) More than $102
B) Exactly $102
C) Less than $102
D) Don't know
E) Prefer not to say

2. Imagine that the interest rate on your savings account was 1% per year and inflation was 2% per year. After 1 year, how much would you be able to buy with the money in this account?

A) More than today
B) the same
C) Less than today
D) Don't know
E) Prefer not to say

3. If interest rates rise, what will typically happen to bond prices?

A) They will rise
B) They will fall
C) They will stay the same
D) There is no relationship between bond prices and the interest rate
E) Don't know
F) Prefer not to say

4. A 15-year mortgage typically requires higher monthly payments than a 30-year mortgage, but the total interest paid over the life of the loan will be less.

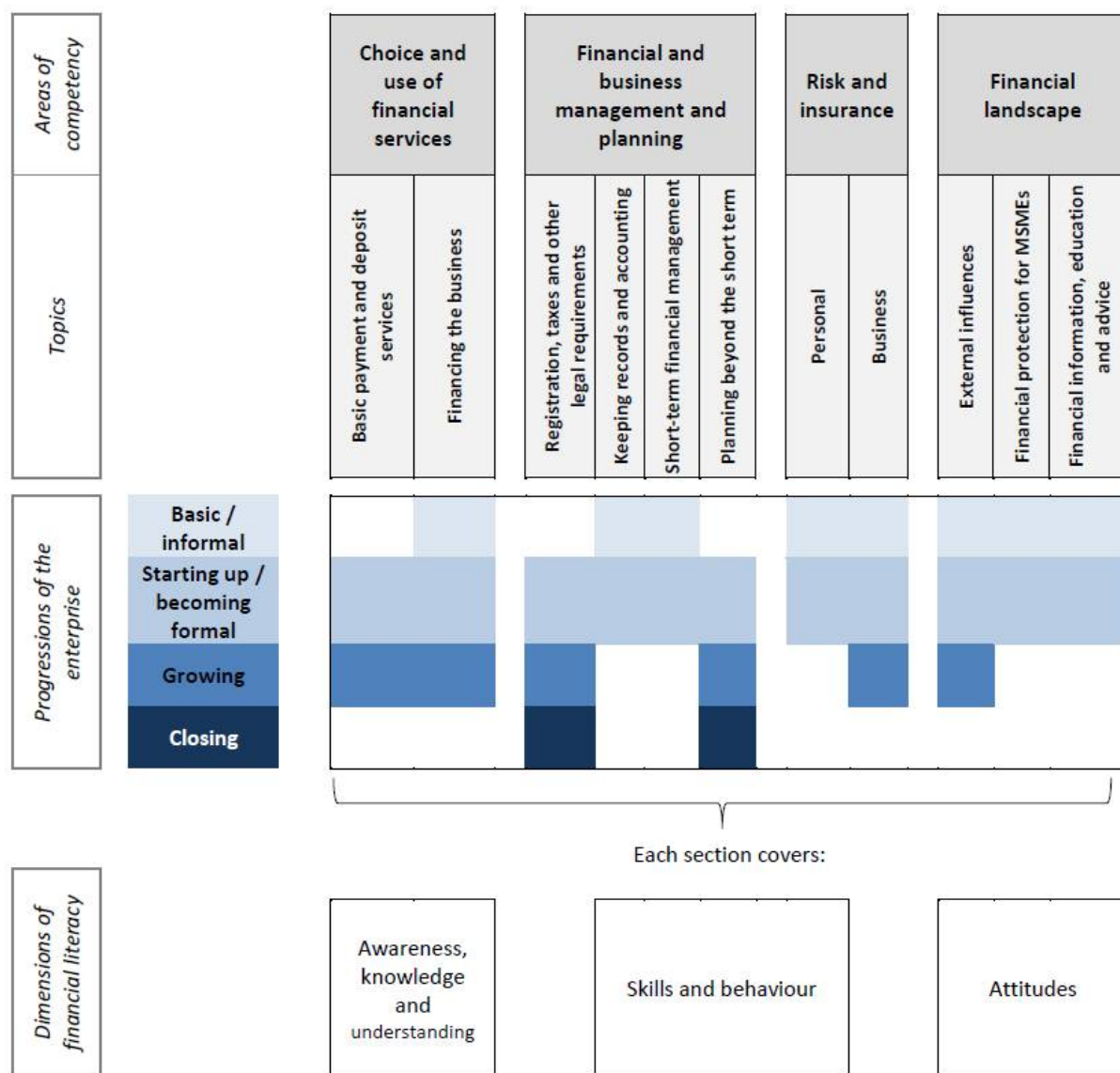**A) True**
B) False
C) Don't know
D) Prefer not to say

5. Buying a single company's stock usually provides a safer return than a stock mutual fund.

A) True
B) False
C) Don't know
D) Prefer not to say

(Source: GFLEC, "Big Five": Test your financial literacy knowledge with the "Big Five" questions)

Appendix 3: OECD framework on financial literacy for MSMEs

Areas of competency		Choice and use of financial services		Financial and business management and planning				Risk and insurance		Financial landscape		
Topics		Basic payment and deposit services	Financing the business	Registration, taxes and other legal requirements	Keeping records and accounting	Short-term financial management	Planning beyond the short term	Personal	Business	External influences	Financial protection for MSMEs	Financial information, education and advice

Progressions of the enterprise

- Basic / informal
- Starting up / becoming formal
- Growing
- Closing

Each section covers:

Dimensions of financial literacy

Awareness, knowledge and understanding	Skills and behaviour	Attitudes

Source: OECD/INFE Core Competencies Framework on Financial Literacy for MSMEs, 2018

REFERENCES

1. Adomako, S., Danso, A. & Ofori Damoah, J. (2016). The moderating influence of financial literacy on the relationship between access to finance and firm growth in Ghana. *Venture Capital, 18*(1), pp. 43 – 61.

2. Alperovych, Y., Calcagno, R. & Lentz, M. (2020). *Entrepreneurs on their Financial Literacy: Evidence from the Netherlands*, 203/20.

3. Anderson, S. J., Chandy, R. & Zia, B. (2018). Pathways to profits: The impact of marketing vs.

finance skills on business performance. *Management Science, 64*(12), pp. 5559 – 5583.

4. Andoh, F. & Nunoo, J. (2011). *Sustaining Small and Medium Enterprises through Financial Service Utilization: Does Financial Literacy Matter?*

5. Bacigalupo, M., Kampylis, P., Punie, Y. & van den Brande, G. (2016). *EntreComp: The Entrepreneurship Competence Framework*. Luxembourg: Publications Office of the European Union.

6. Bätz, K./Siegfried, P. (2021): Complexity of culture and entrepreneurial practice, International Entrepreneurship Review, Volume 7, Issue 3, DOI: https://doi.org/10.15678/IER.2021.0703.05

7. BDC (2017). *Financial literacy among Canadian entrepreneurs and business owners, December*, pp. 1 – 15.

8. Binks, M. R., Ennew, C. T. & Reed, G. V. (1992). Information asymmetries and the provision of finance to small firms. *International Small Business Journal, 11*(1), pp. 35 – 46.

9. Cumurovic, A. & Hyll, W. (2018). Financial literacy and self-employment. *Journal of Consumer Affairs November, 53*(2), pp. 1 – 33.

10. Dahmen, P. & Rodriguez, E. (2014). Financial literacy and the success of small businesses: an observation from a small business development centre. *Numeracy, 7*(1), p. 3.

11. Department of Business Innovation and Skills (2012). *SME Access to External Finance*. London.

12. Dollinger, M. J. (2008). Entrepreneurship: Strategies and Resources. 4th Edition.

13. Elert, N., Andersson, F. W. & Wennberg, K. (2015). The Impact of Entrepreneurship Education in High School on long-term entrepreneurial Performance. *Journal of Economic Behavior and Organization, 111*, December, pp. 209 – 223.

14. European Commission (2018). *Average time to start a company in EU countries 2018*.

15. European Commission (2006). Entrepreneurship Education in Europe: Fostering Entrepreneurial Mindsets through Education and Learning. October.

16. Fernandes, T. (2015). *Financial Literacy Levels of Small Businesses Owners and its Correlation with Firms' Operating Performance*.

17. GEM, 2019. *GEM Global Entrepreneurship Monitor*.

18. Gibb, A. (2008). Entrepreneurship and enterprise education in schools and colleges: Insights from UK practice. *International Journal of Entrepreneurship Education, 6*(2), pp. 101 – 144.

19. Hartog, J., Van Praag, M. & Van Der Sluis, J. (2010). If You Are So Smart, Why Aren't You an Entrepreneur? Returns to Cognitive and Social Ability: Entrepreneurs Versus Employees. *Journal of Economics and Management Strategy, 19*(4), pp. 947 – 989.

20. Hilgert, M., Hogarth, J. & Beverly, S. (2003). Household financial management: the connection between knowledge and behaviour. *Federal Reserve Bulletin*, July, pp. 309 – 322.

21. Huke, J./Siegfried, P. (2021): Finance Methods in the Automotive Sector – Business Agility in the Age of Digital Disruption, *International Journal of Automotive Science And Technology*, Volume 5, Issue 3, 281-288, DOI: https://doi.org/10.30939/ijastech..955551

22. Hussain, J., Salia, S. & Karim, A. (2018). Is the knowledge that powerful? Financial literacy and access to finance: An analysis of enterprises in the UK. *Journal of Small Business and Enterprise Development, 25*(6), pp. 985 – 1003.

23. Leifels, A. & Metzger, G. (2015). Financial literacy helps with business startups: easier, better funded, more competitive. *Focus on Economics, 107*, pp 1 – 5.

24. Li, R. & Qian, Y. (2019). Entrepreneurial participation and performance: the role of financial literacy. *Management Decision, 58*(3), pp. 583 – 599.

25. Lopez-Gracia, J. & Sogorb-Mira, F. (2008). Testing trade-off and pecking order theories financing SMEs. *Small Business Economics, 31*, pp. 117 – 136.

26. Musah, A. & Muazu, I. (2014). Record Keeping and the Bottom Line: Exploring the Relationship Between Record-Keeping and Business Performance Among Small and Medium

Enterprises (SMEs) in the Tamale Metropolis of Ghana. *Research Journal of Finance and Accounting*, *5*(2), pp. 107 – 117.

27. Njoroge, R. (2013). Relationship between Financial Literacy and Entrepreneurial Success in Nairobi County Kenya. *The University of Nairobi.*

28. OECD (2018), *OECD/INFE Core Competencies Framework on Financial Literacy for MSMEs*, OECD Publishing, Paris, pp. 1 – 36.

29. OECD (2015), *OECD/INFE Progress report on financial education for MSMEs and potential entrepreneurs*, OECD Publishing, Paris, pp. 1 – 25.

30. Oseifuah, E. (2010). Financial literacy and youth entrepreneurship in South Africa. *African Journal of Economic and Management Studies*, *1*(2), pp. 164 – 182.

31. PACFL (2008). 2008 Annual Report to the President.

32. Palacin-Sanchez, M. J., Ramirez-Herrera, L. M. and di Pietro, F. (2013). The capital structure of SMEs in Spanish regions. *Small Business Economics, 41*(2), pp. 503 – 519.

33. Puri, M. & Zarutskie, R. (2012). On the lifecycle dynamics of venture-capital and non-venture-capital financed firms. *Journal of Finance, 67*(6), pp. 2247 – 2293.

34. Seghers, A., Manigart, S. & Vanacker, T. R. (2012). The impact of human and social capital on entrepreneurs' knowledge of finance alternatives. *Journal of Small Business Management*, *50*(1), pp. 63 – 86.

35. Seipp, V./Michel, A./Siegfried, P. (2020): Review of International Supply Chain Risk Within Banking Regulations in Asia, US and EU Including Proposals to Improve Cost Efficiency by Meeting Regulatory Compliance, *Journal Financial Risk Management (JFRM),* Volume 9, Issue 3, pp. 229-251, DOI: 10.4236/jfrm.2020.93013

36. Siegfried, P. (2014): Analysis of the service research studies in the German research field, Performance Measurement and Management, *Publishing House of Wroclaw University of Economics*, Volume 345, pp. 94-104, DOI: 10.15611/pn.2014.345.09

37. Siegfried, P. (2015): Die Unternehmenserfolgsfaktoren und deren kausale Zusammenhänge, Zeitschrift Ideen- und Innovationsmanagement, *Deutsches Institut für Betriebswirtschaft GmbH/Erich Schmidt Verlag*, Berlin, ISSN 2198-3143, pp. 131-137, DOI: https://doi.org/10.37307/j.2198-3151.2015.04.04

38. Siegfried, P. (2021): Strategic Management Business Cases and Management Concepts, ISBN: 978-3-75349-909-3, BoD Book on Demand, Norderstedt.

39. Spinelli, S. Jr., Adams, R. J. Jr. & Timmons, J. (2015). New Venture Creation: Entrepreneurship for the 21st Century. 10th Edition. *New York: McGraw-Hill Education*.

40. Suparno, S. and Saptono, A. (2018). Entrepreneurship education and its influence on financial literacy and entrepreneurship skills in college. *Journal of Entrepreneurship Education*, *21*(4), pp. 1 – 19.

41. The Gallup Organization (2007). *Observatory of European SMEs Analytical report Observatory of European SMEs*.

42. van Auken, H. E. (2005). A model of small firm capital acquisition decisions. *The International Entrepreneurship and Management Journal, 1*(3), pp. 335 – 352.

43. Wise, S. (2013). The Impact of Financial Literacy on New Venture Survival. *International Journal of Business and Management*, *8*(23), pp. 30 – 39