

# Assessment of Financial Stability in Agricultural Companies and Implications for the Community in Romania

Turek Rahoveanu Maria Magdalena <sup>1</sup>, Dragos Sebastian Cristea <sup>2</sup>,  
Adrian Gheorghe Zugravu <sup>3</sup>, Adrian Turek Rahoveanu <sup>4</sup>,  
Constanta Laura Zugravu <sup>5</sup>

<sup>1,2,5</sup> Faculty of Engineering and Agronomy in Braila,

<sup>3</sup> Cross-Border Faculty of Humanities, Economics, and Engineering,

<sup>1,2,3,5</sup> "Dunarea de Jos" University of Galati, 800008 Galati,

<sup>4</sup> Faculty of Management and Rural Development, University of Agronomic Sciences and Veterinary Medicine, Bucharest, Romania.

Presented at **International Conference on Trends & Innovations in Management, Engineering, Sciences and Humanities**, Dubai, 19-22 December 2023 (ICTIMESH-23).

<https://doi.org/10.37082/IJIRMPS.ICTIMESH-23.6>



Published in IJIRMPS (E-ISSN: 2349-7300), ICTIMESH-23

License: Creative Commons Attribution-ShareAlike 4.0 International License



## Abstract

This research examines the stability vs. responsibility of a company (CAEN code 29) by evaluating its philanthropic behavior, financial performance, social inclusion, and financial stability, focusing on annual data from 2005-2019. The results suggest that the stability of a company assessed with age and size has a positive impact on the three factors. The purpose of the analysis is to explore the issue of sustainable development at the regional level, namely in the Southeast Region, Romania by offering a model for evaluating the activity of companies in the industry, agriculture, and services doubled by the interest shown by employees, in the sense of developing the educational level, specialization them. The relationships between the main indicators of the accounting balance sheets of the last 14 years are studied as the source of evaluation and the typology of philanthropic activities in which the company is active. The case study follows developments at the European level and the possibility of attracting new funding is discussed, namely "Financing the Future" which will lead to the improvement of companies' knowledge with best practices, methodologies, and practical advice of using stability metrics to measure business performance and improve internal processes (impact measurement); how the role of health of a company can contribute to the successful integration of stability into the company's financial decision-making process; how to streamline the value of sustainable investments to stakeholders, taking into account the input given by international organizations such as the United Nations Global Compact (UNGC) and the Global Reporting Initiative (GRI).

**Keywords: Sustainable Development, Sustainable Production**

## 1. Introduction

Institutional health is a new concept in our understanding, a way of showing successful companies, multiple, economic, social, and environmental responsibilities. We believe that it can represent a strategic decision by which organizations engaged in rewarding society can help solve environmental and social problems [1], aiming to positively affect people outside the organization.

Companies recognize the importance of financial as well as non-financial performance (e.g. corporate social performance) in the overall outcome of their business [2]. While traditional finance focuses on the theory of profit maximization of the firm, a CSR approach introduces a modern notion of community-oriented organizations [3].

The traditional view of the firm notes that its primary responsibility is to maximize shareholder wealth and that CSR activities are not the companies' responsibility, but rather the community and individuals [4]. Any activity that does not contribute to the profitability of the firm should be eliminated.

On the other hand, [5] argues that the responsibility of any organization is not only to satisfy economic expectations but also to participate in philanthropic and ethical activities because businesses are part of society. [6] states that RIC gives firms a competitive advantage by improving their financial strength, which implies that RIC has a positive impact on financial performance (PF), which is related to the effect on the community [7]. [8], explaining the effect on the community states that the success of a company depends on the relationships of its management with all stakeholders.

[9] draws attention to the fact that high CSR firms manage agency problems by offering higher dividends to shareholders. [10] suggests that RIC should be treated as an investment tool, not as a cost.

Therefore, business organizations are expected to spend more on CSR activities. Therefore, we want to evaluate the institutional health of a company, through a synthetic methodology for tracking CSR practices at the level of the Southeast Region, Romania.

In developed economies, firms are heavily involved in activities that contribute to the economy and education, the workplace, and building customer relationships. Firms report CSR information to obtain both financial and non-financial returns.

Financial returns can be reflected in financial stability (FS), social inclusion (SI), and better access to finance. In Romania, most companies do not have a written CSR policy, but some companies, in the practice multinationals, are little involved in CSR practices, which they disclose in their annual reports.

Social inclusion (IS) is another important goal of mature companies in a country's economy. Company-level research on IS is still in its infancy. [11] finds that IS helps reduce the gap between rich and poor and contributes to social stability in the area. It also points out that with the help of IS, community members can access more financial services, especially in times of crisis. [12] add that IS provides a path to SF as more bank deposits are expected to increase the stability of the banking sector. Therefore, IS contributes to increasing economic growth and reducing poverty.

At the macroeconomic level, financial stability (FS) has long been a concern of both academia and governments. Recently, researchers have realized that the SF of a country cannot exist in the absence of industrial, agricultural, service, and stable companies.

As industry plays an important role in economic activities and local development, acting as an intermediary between the government and the community, CSR contributes to the bottom line both directly and indirectly by integrating social and environmental concerns and the firm's function as a true corporate citizen.

CSR can thus lead to long-term stability in the domestic industry. Many firms engage in CSR activities after realizing that firms that do so are more resilient and have a much longer lifespan compared to firms that do not invest in CSR activities.

Most previous studies on CSR highlight its impact on profitability. Very little literature is available in the context of the emerging market, especially about IS and SF. Therefore, to fill this gap, this study tries to determine the impact of CSR on the profitability of a company in the CAEN code 29 industry, as well as IS and FS, in the context of the development of the South East region, Romania.

Since the results regarding the relationship between CSR and FP in the literature are mixed, the following hypothesis is tested in the context of the industry according to the CAEN code of Braila, Romania:

**Hypothesis 1: There is a significant relationship between social responsibility and financial performance within companies in the wiring manufacturing industry in Romania.**

[13] identified another important aspect of CSR, which is the philanthropic dimension, however, this dimension does not overlap the control of CSR activities. This obligation includes those activities that can make firms good corporate citizens, such as philanthropic commitments or training local unskilled people for jobs. In short, it can be said that philanthropic obligation is about contributing business resources to society to improve the quality of life [14], [15].

In addition to the firm's philanthropic obligation, the business strategy includes the effective funding of social events such as local music concerts; sports donations, and sponsorships can positively influence the evaluation of the service and the organizational performance of the firm for competitive advantage [16].

Moreover, in terms of marketing, the company's cause-related events, such as university scholarships or a social issue regarding cancer patients, can deliberately enhance the company's brand image, which is essential for the long-term sustainable growth long of a company [17].

Moreover, other deliberate or voluntary practices of firms as intangible donations, such as time and effort, can expand an organization's value, performance, and organizational status [18]. Finally, if an organization can sacrifice some profits to comply with moral responsibilities, customers will recognize the philanthropic dimension of the organization, which ultimately positively influences the company's brands and image. So, the following hypothesis was proposed:

**Hypothesis 2: Does the philanthropic dimension of Carroll's CSR pyramid have a positive and significant influence on organizational performance (FS)?**

After reviewing and comparing the existing research on CSR in the previous literature, it is found that, firstly, there have been few studies and insufficient information on CSR as a business strategy in terms of SME business.

Thus, in the context of SME business, the modified conceptual model of CSR as a business strategy was also emphasized and its impact on environmental and other social issues was evaluated in this study. Second, the response of the European Commission (EC) aimed to influence small businesses to incorporate social responsibility into their business regarding contemporary environmental and other social issues [19].

The environmental obligation is additionally referred to as "Environmental Corporate Social Responsibility (ECSR)". [20] and [21] studied and concluded that ECSR improved organizational performance in addition to services for community and stakeholder welfare. Furthermore, [22] analyzed corporate social responsibility with other aspects such as green technology, strategy, recruitment, and green product, which have a positive effect on corporate image and employee engagement or commitment. Then, the firm uses environmental-related CSR initiatives to manage the firm as a lower CO<sub>2</sub> emitter to create a green atmosphere, which also improves corporate image and organizational performance[23]; [24]. Thus, the added environmental dimension in Carroll's modified pyramid is of significant importance to society and organizational performance. Therefore, I formulated the following hypothesis:

**Hypothesis 3: Does the economic dimension have a positive and significant influence on organizational performance?**

## 2. Proposed Algorithm

This study uses annual statistical data over 14 years, from 2005 to 2019. Since most SMEs in Romania do not report their social responsibility activities separately, the data used are those collected from public annual balance sheets.

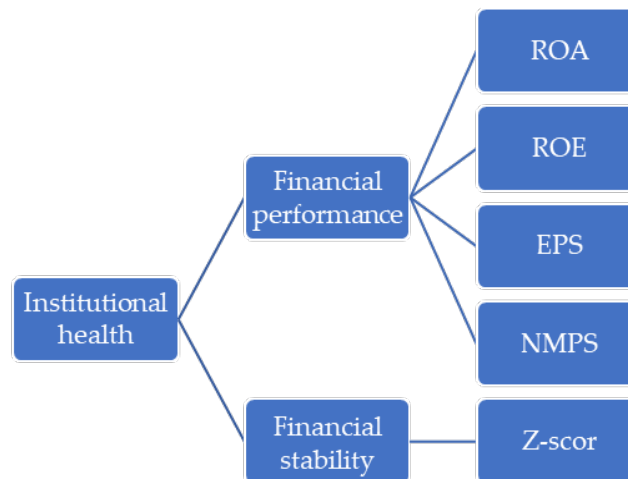
The following models are developed based on the literature, using social responsibility as the independent variable and leverage, income, age, and size of companies as control variables, with FP, IS, and FS as dependent variables.

To examine the relationship between the dependent and independent variables, data are analyzed using ordinary least squares regression analysis. To analyze the available data, we used the Minitab software, along with the Python programming language and the Spyder integrated development environment. Today, Python is one of the most popular programming languages because it is free to use and highly productive compared to other programming languages like C++ or Java.

The research analysis specifically used functions used to minimize objective functions for nonlinear curve fitting problems. Due to the nature of the data, most cases of curve fitting were related to the case where polynomial terms were added to the linear regression or quadratic predictors.

We usually choose the order of the model based on the number of bends observed in our data plot. Each increase in the exponent produces another bend in the curved line. However, I could not identify any situation that would require the term cube or more.

**Figure 1: Variables used in the Evaluation of Institutional Health at the Level of a Company in Romania**



Source: Own processing based on specialized literature

These are all reasonable proxies, based on previous literature, for the measurement variables in this study (Table 1.1). In the above model ROA, ROE, EPS, and NPMS are used to measure financial performance because ROA is used as a proxy variable [25], and ROA, ROE, and EPS are used to measure FP [26], [27], [28], [29], [30] uses NPMS to measure PF. The model uses financial stability as the dependent variable, which is calculated using the Z-score.

Our model is presented in Table 1.1 as follows:

**Table 1.1: Description and Measurement of Variables**

	The Name of the Variable	Indicator	Measurement Formula
<b>Dependent Variables</b>			
1	Financial Performance	Return on assets (ROA)	$ROA = \text{Net Income} / \text{Total Assets}$
		Return on equity (ROE)	$ROE = \text{Net Income} / \text{Total Equity}$
2	Social Inclusion	The unemployment rate in South East	Territorial statistical data
		Population economies in the Southeast Region	Territorial statistical data
3	Financial Stability	Z-Score	$((ROA + \text{Equity}) / \text{Assets}) / \text{Standard Deviation (ROA)}$
<b>Independent Variables</b>			
4	Corporate Philanthropy	Journal of amounts spent on CSR activities	Donations registered in the company CAEN code 29
5	Lever	Lever	$= \text{Total Liabilities} / \text{Total Assets}$
6	Tangibility	Tangibility	$= \text{Non-current Assets} / \text{Total Assets}$
7	Age	Number of years of operation	14
8	Size	The natural log of total assets	$\text{Log}_{10} \text{Total assets}$

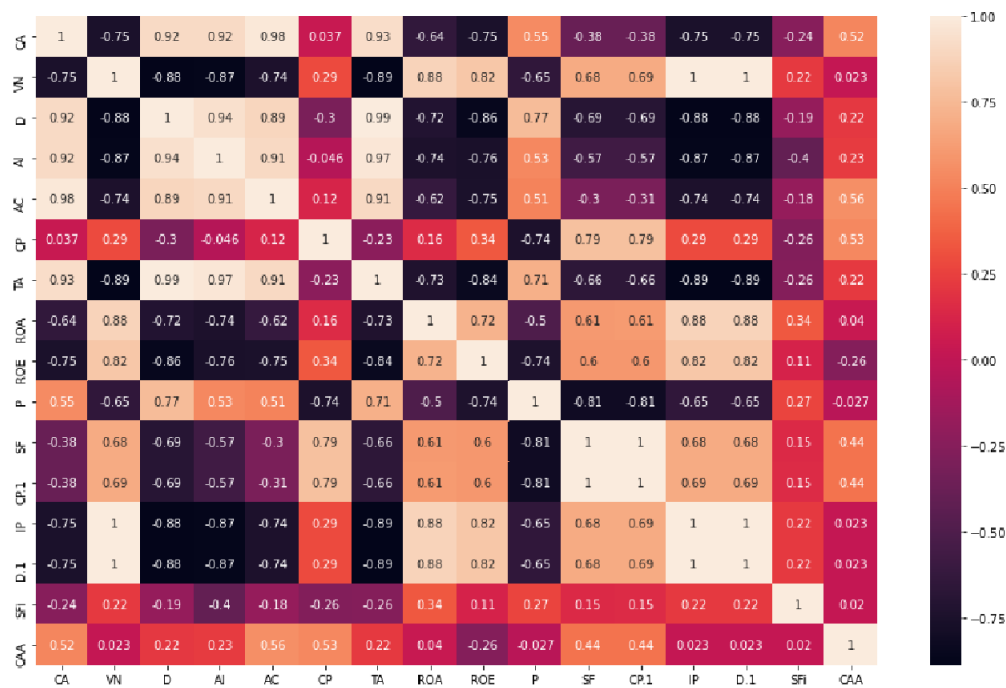
Different indicators are used to measure CSR in the literature. La Rosa (2014) uses a social score as a proxy measure of CSR, and uses a social capital index for CSR. Some use corporate donations and actual spending on CSR activities as a variable for CSR measurements [31], [32], [25].

This study also uses corporate donations and actual spending on CSR activities as variables to measure CSR. Four control variables are also used, including firm size, age, tangibility, and leverage, where size is measured as the logarithm of total assets, tangibility is measured by the ratio of non-current assets to total assets [25], and leverage is measured as total debt divided by total assets. A firm's size, age, tangibility, and leverage affect its FP, FS, and IS [33].

### 3. Results

#### 3.1. Analysis and Interpretation of Company-wide Institutional Health Results 2005-2019

Figure 1.2: Company-wide Correlation Matrix for Health Assessment Institutional in the Period 2005- 2019



Source: Own processing, 2022

Figure 1.2 shows the Pearson correlation matrix of the variables and their probabilities. Institutional health through the lens of social responsibility is significantly and negatively correlated with all other variables, except tangibility, with which it is negatively correlated. Leverage is negatively correlated with tangibility and positively correlated with firm size. On the other hand, tangibility has a significant negative correlation with all other variables. The age of a company (14 years) has a strong significant correlation with the average number of employees. The results also show that the size of a company has a strong significant correlation with the level of social responsibility, age, and the number of factories.

#### 3.2. The Effect of Philanthropy on Financial Performance

Table 1.5 presents the results of the ROE regression on all independent variables, including philanthropy. There is a significantly positive relationship between ROE and philanthropy close to 1%, suggesting that our company will perform better financially in terms of earnings if it invests in

philanthropic activities, supporting the findings. Like ROA, ROE also has a significant but negative relationship with leverage and Turnover/Employee and a significant positive relationship with firm age and size.

**Table 1.5: The Effect of Philanthropy on Financial Performance and Social Inclusion**

Variables	Financial Performance				Social Inclusion	
	ROA	ROE	Financial Stability	Net Income	Turnover/ Employees (medium)	No. Employee Environment
Company Philanthropy	0,88	0,82	0,22	1	0,023	0,44
Lever	-0,5	-0,74	-0,81	-0,65	-0,027	0,71
Turnover/Employee	-0,64	-0,26	0,022	0,023	1	0,023

Source: Own processing, 2022

The third column of Table 1.5 presents the results of the regression of financial stability with all independent variables. The results show that philanthropy has a highly significant and positive relationship with financial stability at a level below 1%, and the coefficient value is also higher compared to the other performance indicators.

This finding implies that as a company's investment in philanthropic activities increases, its image improves, and its shareholder earnings increase. These results are consistent with previous studies [34]. A significant but negative relationship between leverage and financial stability at the 8% level, as the probability of default, increases with the increase in the debt ratio, which decreases the confidence of shareholders, whose income also decreases. Turnover/Employee has an insignificant relationship with financial stability.

The fourth column of Table 1.6 presents the regression results of net income and philanthropy, leverage, turnover/employee. The results show a significant and positive relationship between net income and philanthropy at the 1% level, implying that a company's net income will increase as its investment in philanthropic activities increases, consistent with previous studies.

Leverage and turnover/employee have a significant but negative relationship at the 6% and below 1% levels, respectively. Like the other performance measures, company age and size have a significant and positive relationship with revenue meaning that mature and larger companies have higher revenue due to their larger setup and resources. All results indicate that company health positively affects company performance, supporting H1, that there is a significant relationship between corporate responsibility and the performance of Romanian companies. Our results are also consistent with the results of social responsibility studies, such as those of [28], [29], [35], [36].

Table 1.5 presents the results of regressing philanthropy on ROA, ROE, financial stability, and net income, where philanthropy is the independent variable and the rest are dependent variables, with leverage, and turnover/employee as control variables. The first column shows a significant relationship between ROA and philanthropy at the sub-1% level. This finding means that those companies that invest more in philanthropic activities will achieve greater financial benefits, in line with the findings.



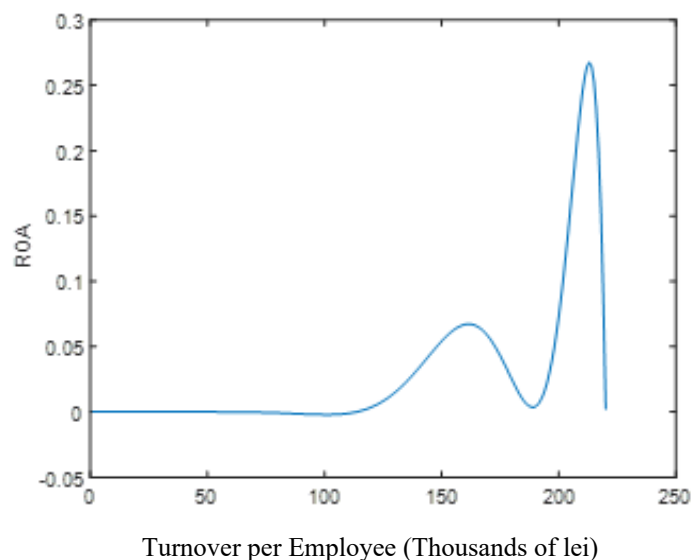
Leverage and Turnover/Employee have a significant but negative relationship with return on investment at the 5% and 1% levels, respectively, which means that the firm that is highly leveraged with tangible assets has a lower ROA. Company age and size have a significant and positive relationship with ROA at the 1% and 5% levels, respectively, meaning that ROI is higher for mature or older and larger companies.

#### 4. Discussion

##### 4.1. The Effect of Employee Turnover on ROA

Figure 1.3 shows a significant but negative relationship, this finding means that the more this company invests in employee performance, the more financial benefits it will achieve, in line with the findings of [37] and [21]. Also, this relationship between the indicators is significant, but negative, the lower the ROA levels, thus explaining the fact that the investments made are higher compared to the revenues, a phenomenon that occurs for small or newer companies.

**Figure 1.3: Correlation between ROA and Turnover/Employee during 2005-2019**



Source: Own processing, 2022

##### 4.2. Analysis of Social Inclusion based on the Correlation between Turnover/Employee – Company Philanthropy

The involvement of companies in social responsibility activities ensures creates the premise of integrity in the current environment of the community but also protects the company in the face of aspects that could attract damages or sanctions, affecting its prestige and long-term financial results.

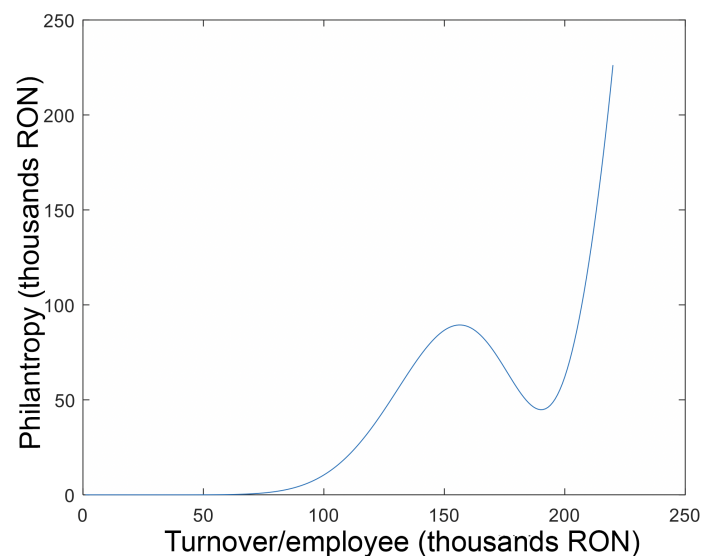
In Romania, the policy regarding donations from companies for future beneficiaries would be in the field of culture (projects, cultural-artistic events, visual arts, music, dance, performance, theatre, cinematography, photography, literature, etc.), science and technology (projects that support technology and technological innovation, especially in the field of energy), Education (activities/projects to improve education, decrease school dropout, social inclusion, recognition of elites and performance, funding of research projects, etc.), Health (activities/projects intended for people with various conditions, health promotion, etc.), Sports (activities/projects to promote movement, supporting sports performance, etc.), Environment (activities/projects aimed at protecting the environment, greening, protecting biodiversity,



collecting and recycling waste, reducing emissions, promoting responsibility towards the environment, combating natural calamities (supporting communities, affected people at regional/national/international level through donations of funds, materials, food, various services), society and local communities (activities/projects for the benefit of society and communities, for sustainable development, for the initiation and promotion of social enterprises, for harnessing the potential of communities and improving the standard of living, health and comfort of their members)), Disadvantaged and Special Needs Categories (activities/projects to help people from disadvantaged categories or with special needs), Children (activities/projects that have aim to ensure and increase the standard of living, social inclusion, etc.).

Figure 1.4 shows the results of the regression between Turnover/Employee and company philanthropy, where Turnover/Employee is the independent variable and philanthropy is the dependent variable. age and size as independent and control variables.

**Figure 1.4: Social Inclusion through the Correlation of Turnover/Employee and Philanthropic Activity of the Company in the Period 2005-2019**



Source: Own processing, 2022

The results show that there is a significant positive relationship between the two indicators at the level of our company, which implies that as the company becomes more financially stable, so do its investments in the social inclusion rate grow. Leverage has a significant but negative relationship, indicating that higher debt levels lead to lower Turnover/Employee - as also found in our performance results.

Tangibility has an insignificant relationship with Turnover, which means that it does not matter if the company owns more fixed assets compared to current assets. Company age and size show a highly significant turnover and positive relationship with Turnover which means that with increasing age and size, in terms of greater economic resources, the company becomes more financially stable. This result is also consistent with the work of Lev et al. (2010), Turnover restates that social performance reduces firms' financial risks.

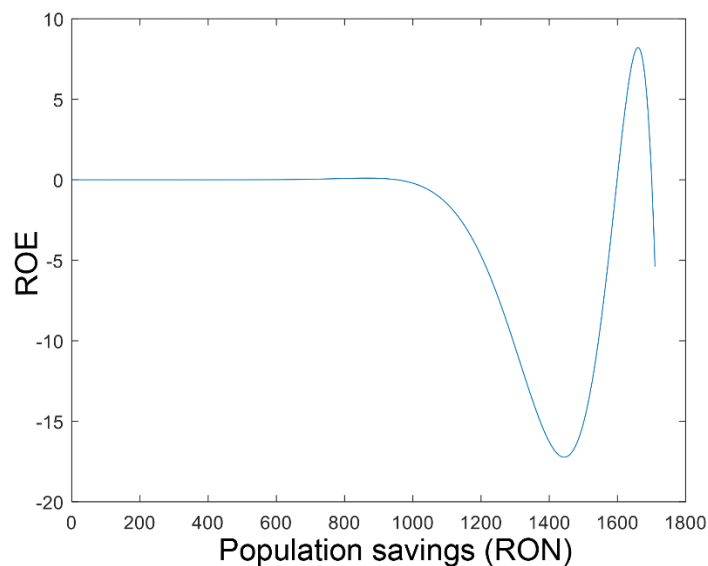
In the current period, our company has shown an increase in interest in implementing turnover in the community through donations, they are invested for visible and immediate results because the public's

perception is that organizations should solve especially urgent and immediate needs. In recent years, the company's involvement in the community is made from its resources, but also with the contribution of employees. Our company's initiatives are punctual, and immediate, as long as there are no longer-term implementation practices and in partnership with other companies, turnover can be manifested in the future.

#### 4.3. Analysis of the Correlation between the Average Number of Employees and Philanthropic Activity

Figure 1.5 shows the results of the regression between the average number of employees and the company's financial performance over the past 14 years.

**Figure 1.5: Correlation between Population Savings in the South East Region and ROE**



Source: Own processing, 2022

The intensity of the correlation for the studied company can produce effects at the regional level through the average number of employees and ROE which is very weak, where the evolution of ROE has not left its mark on the savings of the employed population, the company's activity reflected by weak investments in the regional economy that create jobs. This weak negative correlation confirms the state of affairs at the regional level.

Among the factors that led to this situation, it shows that an increase in spending on research and development can support economic recovery and the intensity of economic activity in the long term. At the regional level, a demographic increase in business can occur, increasing industrial production. In response, there will be training and an increase in jobs with a major social impact.

The evolution of the population's economies at the regional level is linked to the evolution of the degree of participation and occupation of the population with a major impact that leaves its mark on the entire economic-social system in the period 2005-2019.

About the increase in the degree of employment, in Romania, there is, compared to the European situation, an important reserve that refers to the oversizing in the official statistics of the population employed in agriculture, about the requirements of a modern economy.

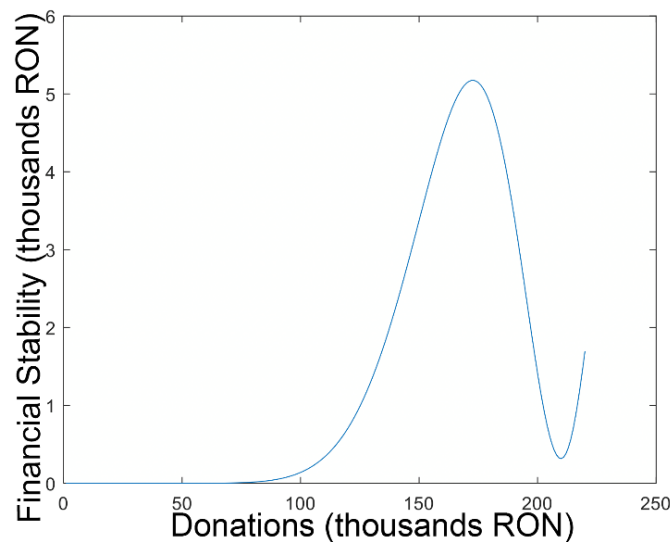
Therefore, the initiation of investments and measures aimed at the modernization and reduction of the share of the population in agriculture would obtain important benefits, both in terms of increasing the incomes of those employed in agriculture and the modernization of the rural environment.

Given that, in Romania, regional occupational mobility is extremely low, doubled by the lack of oriented public policies, it is expected that, in the coming years, we will face an increase in the exposure to the risk of poverty for the employed population.

#### 4.4. Analysis of the Correlation between Company Philanthropy and Financial Stability

Figure 1.6 presents the results of the regression between the company's philanthropic activity and the degree of its financial stability over the last 14 years.

**Figure 1.6: Correlation between Company Philanthropy and Financial Stability 2005-2019**



Source: Own processing, 2022

Philanthropy is the independent variable, financial stability is the dependent variable, and age and size are the control variables. We present the results of the company's philanthropic actions and its economic results in the period 2005-2019. One such example of the value of partnerships is shown in Figure 1.6 shows that there has been no economic growth creating sustainable financial stability.

#### 4.5. Analysis of the Correlation between Company Philanthropy (Donations) - Net Profit

The results of the regression of Turnover/Employee and percentage of people with higher education, where Turnover/Employee is an independent variable and percentage of people with higher education is a dependent variable, with leverage, tangibility, age, and size as control variables (Figure 1.7).

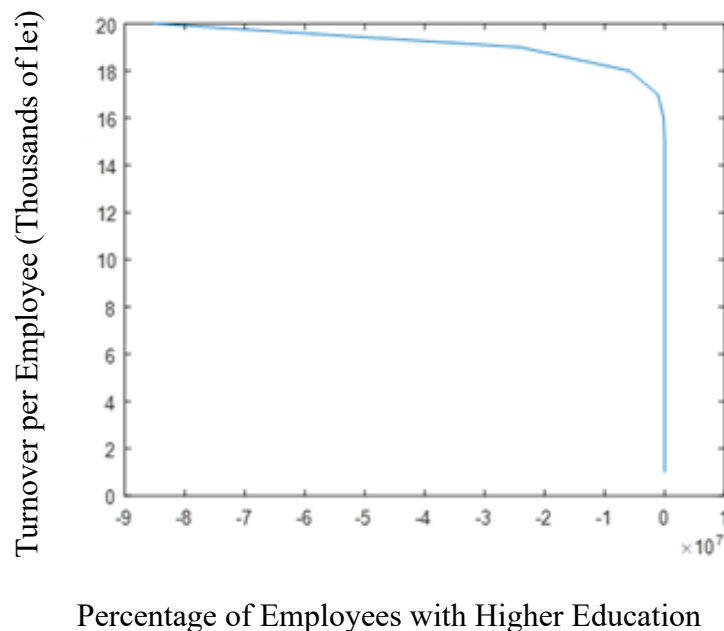
The results indicate that the two variables have a highly significant and positive relationship at the 1% level, implying that as a company's investment in education activities, employee specialization Turnover/Employee increases, so is better inclusion of this model in the form of several factories of this

company. Like the average number of employees, the number of factories also has a highly significant and positive relationship. This indicates that larger and older companies have more physical resources and, to better serve their customers, open more establishments in different locations.

Finally, H3, shows that there was a significant relationship between the economic dimension and the performance of the company studied in Romania, which is also supported because companies that spend more on economic performance activities have better health in terms of high-performing employees, you make more.

Experiences have shown that high levels of social participation in companies lead to high levels of financial stability in terms of commitment and customer service. The results are also that larger firms have more resources and are therefore better able to invest in social responsibility activities than smaller firms.

**Figure 1.7: Correlation Analysis between Company Philanthropy (Donations) - Net Profit**



Source: Own processing, 2022

## 5. Conclusion

This study aimed to provide a model for assessing the health of a company for sustainable development in the Southeast region of Romania. The examination of the health of the company related to CAEN CODE 2931 was done by evaluating the impact of social or philanthropic responsibility on financial performance and social inclusion in the automotive industry sector in Romania with over 10 years of activity.

Our findings suggest that there is a significant positive relationship between company philanthropy and financial performance, and companies' social inclusion, indicating that activities create a positive perception in the minds of potential customers, which helps attract them, ultimately leading to an increase in the institutions' profits and turnover. This is proven by the results that show that the units in the automotive industry where the study was done, spend more on philanthropic activities, and build a

strong relationship with their customers, Turnover re helps reduce financial risk and increase financial stability.

Moreover, the results suggest a positive link between social inclusion initiatives and social responsibility, implying that as companies increase their investment in such actions there is an increase in the number of factories and the number of employees. In other words, to have greater financial stability, it is necessary to better serve the community and implicitly a greater number of clients,

This study suggests that a company in the industry should emphasize philanthropic activities to enhance its profitability and market performance. The other companies and the authorities should support and stimulate them in this direction. Investors should review philanthropic reports before investing in stocks to ensure the betterment of society as well as to get higher returns. The government should encourage companies to engage in philanthropic activities to achieve higher levels of social inclusion, especially in disadvantaged communities. Regulators should regularly monitor the stability of companies and provide different types of rewards and certificates, for example, healthy companies (economically, socially, and environmentally responsible).

## References

- [1] B. Corona, M. Nakano, & H. Pérez, "Adaptive Watermarking Algorithm for Binary Image Watermarks", *Lecture Notes in Computer Science*, Springer, pp. 207-215, 2004.
- [2] A. A. Reddy, & B. N. Chatterji, "A new wavelet based logo-watermarking scheme," *Pattern Recognition Letters*, vol. 26, pp. 1019-1027, 2005.
- [3] P. S. Huang, C. S. Chiang, C. P. Chang, & T. M. Tu, "Robust spatial watermarking technique for colour images via direct saturation adjustment", *Vision, Image and Signal Processing*, IEEE Proceedings, vol. 152, pp. 561-574, 2005.
- [4] F. Gonzalez, & J. Hernandez, "A tutorial on Digital Watermarking", In *IEEE annual Carnahan conference on security technology*, Spain, 1999.
- [5] D. Kunder, "Multi-resolution Digital Watermarking Algorithms and Implications for Multimedia Signals", Ph.D. thesis, University of Toronto, Canada, 2001.
- [6] J. Eggers, J. Su, & B. Girod, "Robustness of a Blind Image Watermarking Scheme", *Proc. IEEE Int. Conf. on Image Proc.*, Vancouver, 2000.
- [7] Barni M., Bartolini F., & Piva A., "Multichannel watermarking of color images", *IEEE Transaction on Circuits and Systems of Video Technology*, 12(3), pp. 142-156, 2002.
- [8] Kundur D., & Hatzinakos D., "Towards robust logo watermarking using multiresolution image fusion", *IEEE Transactions on Multimedia*, vol. 6, pp. 185-197, 2004.
- [9] C. S. Lu, & H. Y. M Liao, "Multipurpose watermarking for image authentication and protection", *IEEE Transaction on Image Processing*, vol. 10, pp. 1579-1592, Oct. 2001.
- [10] L. Ghouti, A. Bouridane, M. K. Ibrahim, & S. Boussakta, "Digital image watermarking using balanced multiwavelets", *IEEE Trans. Signal Process.*, 54(4), pp. 1519-1536, 2006.
- [11] P. Tay, & J. Havlicek, "Image Watermarking Using Wavelets", in *Proceedings of the 2002 IEEE*, pp. II.258–II.261, 2002.
- [12] P. Kumswat, Ki. Attakitmongcol, & A. Striaew, "A New Approach for Optimization in Image Watermarking by Using Genetic Algorithms", *IEEE Transactions on Signal Processing*, 53(12), pp. 4707-4719, December, 2005.

- 
- [13] H. Daren, L. Jifuen, H. Jiwu, & L. Hongmei, "A DWT-Based Image Watermarking Algorithm", in Proceedings of the IEEE International Conference on Multimedia and Expo, pp. 429-432, 2001.
  - [14] C. Hsu, & J. Wu, "Multi-resolution Watermarking for Digital Images", IEEE Transactions on Circuits and Systems-II, 45(8), pp. 1097-1101, August 1998.
  - [15] R. Mehul, "Discrete Wavelet Transform Based Multiple Watermarking Scheme", in Proceedings of the 2003 IEEE TENCON, pp. 935-938, 2003.