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# CORRELATION BETWEEN SOLVENCY OF SERBIAN AGRICULTURAL SECTOR AND INVESTMENTS IN ENVIRONMENTAL RESPONSIBILITIES

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## ABSTRACT

Whether investment in environmental protection is conditioned by the solvency of agricultural companies, due to the growing importance of environmental sustainability, is the topic of this paper. The goal of the research is to determine, on a sample of 40 agricultural companies, whether investment in environmental protection is conditioned by solvency in a three-year period. Solvency, which is relatively good in the sampled companies, is not correlated with investment in the environment, in the analyzed time period, based on the quantification of descriptive data from the annual report. The level of disclosure of the environmental dimension of the sustainability of agricultural companies in Serbia is at a very poor level and the ESG reporting concept is necessary. The research indicates non-compliance with the legal obligation of non-financial reporting on environmental protection of agricultural companies, which indicates that educational, legal and regulatory measures must be urgently taken in order to make the reporting as representative as possible.

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## Introduction

An old Indian proverb says: “We did not inherit nature from our ancestors, we borrowed it from our descendants.” Every conscientious inhabitant of Planet Earth should have this attitude towards nature, especially those who make a profit by exploiting its wealth. This especially applies to agricultural producers. Agriculture and environmental

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protection are inextricably linked fields that require a careful balance between food production and ecosystem preservation.

Environmental protection, contributes in the long term to the preservation of resources, the maintenance of biological diversity and the reduction of negative impacts of agricultural production on the environment. Sustainable development in agriculture includes economic, ecological and social aspects. Socially responsible behavior implies the integration into business activities of the concept of concern for social issues, environmental protection, concern for all stakeholders and all issues that affect the quality of life in the long term. Integrating these dimensions helps to achieve a balance between food production, environmental conservation and improved living conditions for communities dependent on agriculture. Sustainable agriculture can be successfully implemented if there is an adequate cooperation between agricultural producers, the government, research institutions and local communities.

It is necessary to raise awareness about the importance of environmental protection, to educate agricultural producers about organic farming and the advantages that such a business concept has for them, for the users of their products and for the broader socio-economic community. Also to implement regulations that stimulate sustainable agricultural production. Responsible business behavior includes the use of renewable energy sources, when and where possible, using solar energy, wind energy and biomass. Adequate management of waste from agricultural production, applying recycling and composting of organic waste in order to improve soil structure, also contributes to the preservation of the environment.

As the stakeholders' interest in all the above-mentioned information about agricultural enterprises is increasing, efforts are being made not only to apply it, but also to adequately report on environmental performance. Research shows that a higher level of economic development of a country is accompanied by a higher level of disclosure of information about environmental moves. This is further followed by a greater number of scientific studies from developed countries than from developing countries, such as the Republic of Serbia. In Europe, some of the studies dealing with environmental indicator reporting are Radhouane et al. (2018) in France, D'Amico et al. (2016) in Italy, Borgstedt et al. (2019) in Germany and others. Outside the European Union, research is conducted in China Liu et al. (2021), Yang et al. (2021) in Australia, Chelli et al. (2018) in Canada. All these countries belong to the group of developed countries. A smaller number of studies are conducted in developing countries, primarily due to incomplete information in financial reports and lack of adequate integrated reporting. One of the newer studies in our area is the study by Denčić-Mihajlov et al. (2023) which deals with companies operating on the Belgrade Stock Exchange and their level of reporting on environmental indicators. In the results of the research, the same problem of inadequate reporting is encountered, where in the eight-year period of the entire sample, only one company continuously reports on environmental indicators, with a note that the sample includes 27 of the most successful and liquid companies, and potential polluters on the territory of the Republic of Serbia (Denčić-Mihajlov et al., 2023; Popescu & Andrei, 2011).

The research was conducted with the aim of establishing whether there is a dependency between the solvency of the Serbian agricultural sector and investment in environmental protection. The research hypothesis of this paper is that better solvency of the agricultural sector causes greater investment in environmental protection. According to the defined goal of the work, it is structured as follows. After the introductory part on the trends of sustainable agriculture and the analysis of research related to the reporting of companies on that topic, in the second part, a brief review of the institutional frameworks that define the obligations of non-financial reporting of companies on investment in environmental protection, both in the European Union and in the Republic of Serbia, is made. In the third part of the paper, the methodology applied in the research is explained. The fourth part presents the results of the research that show whether financial reporting is correlated with the solvency of the sampled companies. After the concluding remarks, the literature and sources used in the research are presented.

### **Institutional frameworks related to environmental protection**

The regulations adopted at the level of the European Union regarding sustainable development, and thus environmental protection, which are becoming binding and strive for a more transparent presentation of the company's operations, can be seen in the last ten years. In that transition period, a special step forward was made in the adoption of specific directives, starting with the European Union Directive on non-financial reporting, originally adopted in 2013 and then revised in 2014, with concrete binding information that large companies must contain (Non-financial Reporting Directive –NFRD, Directive 2014/95/EU). After that, the European Commission was trying to publish guidelines on non-financial reporting in 2017 (European Commission, 2017) and 2019 (European Commission, 2019). A significant milestone is the adoption of the Regulation on reporting on sustainable financing (Sustainable Finance Disclosure Regulation –SFDR, Regulation (EU) 2019/2088), which emphasizes sustainable development and the obligation of participants in the financial market to look at investments through that aspect as well. The Regulation on Taxonomy from 2020, which prescribes the objectives of environmental protection and economic activities that are considered to be climate neutral, is also important for environmental protection (EU Taxonomy, Regulation (EU) 2020/852). As efforts have been made to achieve a more transparent financial reporting since 2022, the Directive on reporting on corporate sustainability was adopted (Corporate Sustainability Reporting Directive –CSRD, Directive (EU) 2022/2464) combining financial and non-financial information and instructions for auditors on forming an assessment of the fulfillment of the stated reporting conditions. The new framework of obligations will apply from the financial year 2024, and will be quite restrictive compared to the previous free choice of application of reporting standards.

The European Union applies strict standards for organic farming, which relate to the use of chemicals, soil management, animal health and other aspects of food production. Products marked with the “EU organic” certificate must meet these standards. The

2030 Agenda for sustainable development also speaks of commitment to environmental protection (Sustainable Development Goals – SDG) which is followed by the adoption of the European Green Deal (2019) to eliminate the emission of harmful gases with the greenhouse effect by 2050 (European Commission, 2019). By adopting a set of legal regulations that, depending on the identity of the business entity, would bring a specific package of benefits (tax exemptions), and direct those funds to investment in support of the development of sustainable development goals (Pejović, B., Petrović, S., 2022; Andrei & Darvasi, 2012)

Five Sustainability reporting frameworks help to implement ESG principles in the company: Global Reporting Initiative (GRI), International Organization for Standardization (ISO), Principles for Responsible Investments (PRI), Sustainability Accounting Standards Board (SASB) and United Nations Global Compact. GRI standards include performance measurement and reporting on the company's positive and negative impact on the environment, social environment and economy. SASB defines sustainable accounting standards for the disclosure of ESG topics. These two frameworks are the most important for ESG reporting. ISO is an international standard that provides a framework and set of guidelines for environmental management. PRI integrates ESG factors into investment decision-making, and UNGC is a voluntary initiative for companies to implement the 10 principles of the UN Global Compact Initiative in their operations (The GRI Standards, 2022). It is also important to mention the GRI 300 standards (Global Reporting Initiative), which include 28 environmental indicators that can be expressed quantitatively. According to a 2020 KPMG survey, 73% of the world's largest companies prepare their sustainable development reports based on the GRI standard (The KPMG, 2020).

The National Strategy for Sustainable Development in the Republic of Serbia contains guidelines for sustainable agriculture and environmental protection. The Law on Incentives in Agriculture and Rural Development defines provisions related to agricultural production practices and negative impacts on the environment. The Law on Environmental Protection provides environmental protection standards for all production sectors, including agriculture, as well as Local self-government contributes to the implementation of all laws and prescribed regulations by measures of stimulation, supervision and control of the application of environmental protection measures.

In the Republic of Serbia, non-financial reporting began in 2019, when the first changes and adoption of the Accounting Act were made, which is in accordance with the European Union Directive on non-financial reporting, adopted in 2013 and amended in 2014. The newly adopted Law entered into force on January 1, 2020, and for that reason, the reporting period 2020-2022 was taken into account. As the regulations on non-financial reporting at the level of the European Union are continuously improved, it is necessary to keep up and harmonize the way of reporting with the trends.

From 2021, large legal entities in Serbia with over 500 employees will be obliged to report non-financially. They are obliged to include in the Annual Business Report

a non-financial report that includes ESG qualitative disclosures and quantitative measurements of the impact of their company on the environment, social environment and the way the company is managed. Agricultural companies in Serbia that want to have access to the European market and become part of the supply chains of large companies must have an adopted ESG concept.

### Research methodology

Given that in the Republic of Serbia, agriculture is a highly developed industrial branch and that by performing its activities, it belongs to the polluters of the environment, the research idea in this paper is to draw attention to the level of reporting of this economic branch and to the monitoring of trends. A three-year period was used for the research, one year before and two years after the passing of the law on mandatory reporting on environmental protection.

295 agricultural enterprises were analyzed, whose data were taken from secondary sources, the Agency for Economic Registers, and from their business reports. The sample was taken by random selection from the total number of legal entities that were operating in the Republic of Serbia at the time of the research. In order for the data to be as representative as possible, only large and medium-sized legal entities were analyzed, since only they had complete publicly available financial and business reports. In addition to regular financial reporting, in accordance with Article 12 of the Rulebook, from 2021, legal entities that were subject to audit, except for entrepreneurs, were required to submit, among other things, an annual report on operations in accordance with the Law. For the purposes of the research, 40 of the stated number met this requirement. The remaining number of legal entities consisted of small and micro legal entities, and they were not taken into account. The sample consisted of 5 large and 35 medium enterprises. A three-year analysis of the company's financial reports was made. We covered the period 2020-2022, where 2021 was assumed to be a turning point in financial reporting in terms of reporting on environmental protection. Although it would have been better if a larger sample had been used for the correlation, the lack of a business report in which the public was informed descriptively about investments in environmental protection was shown by a very small number of respondents.

The analysis of financial reports by means of financial indicators largely depends on the activity and sub-activity that the company deals with. For this reason, Table 1 shows the structure of sub-activity of the analyzed sample.

**Table 1.** Characteristics of the sample

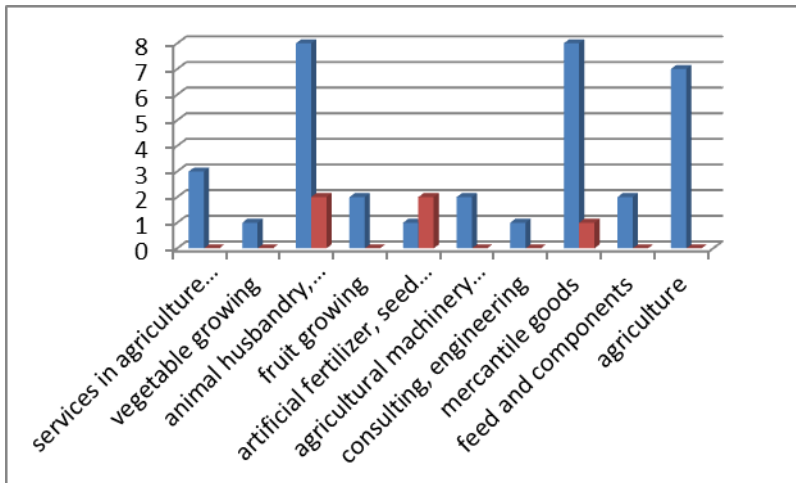
Ord.Num.	Sub-activities	Number	Percentage share
1.	Animal husbandry, poultry farming	9	22,50%
2.	Artificial fertilizer, seed products and protective agents	3	7,50%
3.	Vegetable farming	1	2,50%
4.	Fruit farming	2	5,00%

Ord.Num.	Sub-activities	Number	Percentage share
5.	Farming	7	17,50%
6.	Fodder and components	3	7,50%
7.	Mercantile goods	9	22,50%
8.	Services in agriculture and animal husbandry	3	7,50%
9.	Agricultural machinery and equipment	2	5,00%
10.	Consulting, engineering	1	2,50%
<b>Total:</b>		<b>40</b>	

Source: Authors' calculations

In the analyzed sample, there is the largest number of companies from the field of animal husbandry and poultry farming and companies that deal with mercantile goods.

Figure 1. Crosstabulations of company size and activity



Source: Authors' calculations

In Figure 1, it can be seen that two large companies each participated in the research within the company's activities: animal husbandry and poultry farming and artificial fertilizers, seed goods and environmental protection, while one large company participated in the mercantile goods sample. Among medium-sized enterprises, the most are those engaged in animal husbandry and poultry farming (8), mercantile goods (8) and farming (7).

The following four formulas were used to calculate solvency ratios in the research. (Bogavac-Cvetković, N., 2009)

$$Fixed\ Assets\ Covered\ Ratio\ (FACR) = \frac{Equity}{Fixed\ Assets} \tag{1}$$

$$\text{Real Assets Covered Ratio (RACR)} = \frac{(\text{Equity} + \text{Long Term debt})}{(\text{Fixed Assets} + \text{Stocks})} \quad (2)$$

$$\text{Covered Current Assets by Net Working Capital Ratio (CCANWCR)} = \frac{((\text{Equity} + \text{Long term debt}) - \text{Fixed Assets})}{\text{Current Assets}} \quad (3)$$

$$\text{Covered stocks by Net Working Capital Ratio (CSNWCR)} = \frac{((\text{Equity} + \text{Long term debt}) - \text{Fixed Assets})}{\text{Stocks}} \quad (4)$$

These solvency ratios are based on horizontal funding rules and are called asset coverage ratios. In practice, ratios of solvency indicators based on funding sources are also used, which are based on vertical funding rules. In this research, only ratio indicators based on asset coverage were used. The capital coverage ratio of fixed assets should preferably be greater than 100%, that is, all permanently invested assets are financed from long-term sources. The coverage ratio of real assets should preferably be around 100%, because for agricultural producers, especially crop producers who realize stock turnover once a year, stocks should also be financed from long-term sources. The optimal amount of net working capital depends on the type, size and activity of the company, profitability rate, procurement and sales policy, the ratio between capital and liabilities and the amount and conditions of using long-term loans. For agricultural companies, it is desirable that the net working capital is positive.

After analyzing all financial reports, it was observed that information on environmental protection was either not available or was available qualitatively within the Annual Business Report. We decided to code the variables with numerical codes based on belonging to a certain category. In order to verify the existence of a correlation between solvency and reporting on environmental protection, the coding went as follows: a legal entity that has not published an Annual Business Report for a given year is marked with a mark 0 (zero), a legal entity that has published an Annual Business Report, but within it there is no information about the actions undertaken in the matter of environmental protection, is marked with the symbol 1 (one), a legal entity that has a published Annual Business Report, and within it there is very concise information about the actions undertaken regarding the issue of environmental protection, is marked with the symbol 2 (two) and the label 3 (three) marks a legal entity that has published an Annual Business Report, and within it there is detailed information on actions taken and plans in terms of environmental protection.

Under the assumption that the increase in awareness of the need for environmental protection leads to progress in the part of financial reporting by including and disclosing activities related to it, the goal was to establish a correlation between indicators showing stability in business and positions related to the allocation of funds for the protection of environment.

## Research results

The connection between the solvency of the agricultural sector and environmental protection was reflected in the influence of environmental factors on the business viability of agricultural enterprises, as well as in the decisions of enterprises to take steps towards more sustainable business operations. Sustainable agricultural practices can contribute to the long-term sustainability and resilience of businesses to environmental challenges.

**Table 2.** Average values of solvency ratios by years

Ord. Num.	Sub-activities	FACR			RACR		
		2020	2021	2022	2020	2021	2022
1.	<b>Animal husbandry, poultry farming</b>	509	382	377	281	295	289
2.	<b>Artificial fertilizer, seed products and protective agents</b>	72	158,671	374,125	263	76	93
3.	<b>Vegetable farming</b>	8	9	9	9	212	277
4.	<b>Fruit farming</b>	113	51	54	81	60	62
5.	<b>Farming</b>	55	68	115	68	55	65
6.	<b>Fodder and components</b>	52	96	66	95	111	94
7.	<b>Mercantile goods</b>	2,612	3,208	109,668	49	65	80
8.	<b>Services in agriculture and animal husbandry</b>	103	99	71	107	110	87
9.	<b>Agricultural machinery and equipment</b>	104	144	198	63	53	50
10.	<b>Consulting, engineering</b>	102	106	108	100	103	101

*Source:* Authors' calculations

Out of all respondents, 17.5% have a negative value of net working capital, so the ratio of coverage of current assets and inventories, which were shown in Table 3, was not even calculated in that case. Among the other respondents, there were large deviations in the coverage of current assets and stocks with net working capital, which indicated different activities within agricultural enterprises.

Based on the obtained values of the calculated indicators, grouped by sub-activities and years, shown in Table 2, the following can be concluded. The coverage ratios of fixed assets for almost all respondents individually in the time period for which the research was carried out were without large deviations. Large differences in absolute amounts were explained by different activities within agricultural enterprises. Companies engaged in providing services and trade within agriculture had higher ratios than manufacturing companies, which generally had large capital investments.



The coverage ratio of real assets was in most cases less than 100%, which indicated that most companies' inventories were not financed from long-term sources.

**Table 3.** Average values of solvency ratios by years

Ord. Num.	Sub-activities	CCANWCR			CSNWCR		
		2020	2021	2022	2020	2021	2022
1.	<b>Animal husbandry, poultry farming</b>	219	218	215	239	259	248
2.	<b>Artificial fertilizer, seed products and protective agents</b>	31	23	30	249	93	151
3.	<b>Vegetable farming</b>	-653	1,115	1,083	-1,063	8,335	4,318
4.	<b>Fruit farming</b>	41	22	23	68	38	41
5.	<b>Farming</b>	11	0	15	24	-4	29
6.	<b>Fodder and components</b>	43	29	32	98	130	80
7.	<b>Mercantile goods</b>	17	25	20	26	51	85
8.	<b>Services in agriculture and animal husbandry</b>	21	28	-45	2,562	1,687	-228
9.	<b>Agricultural machinery and equipment</b>	14	16	22	15	23	30
10.	<b>Consulting, engineering</b>	69	85	82	99	171	115

*Source:* Authors' calculations

Based on the analysis of the financial statements of the companies from the sample, balance sheets, profit and loss statements, cash flow statements, notes to the financial statements for the three-year period, as well as the annual business report for the last two years, no quantitative indicators related to environmental protection were found, which could be analyzed in the planned correlation with the solvency of the companies in the sample.

In the profit and loss account, within all expenses, it was not possible to conclude which of the expenses were invested in environmental protection. Expectations were that medium and large legal entities, for the sake of completeness of financial reporting, would more precisely explain the recording in the annual report on operations.

Based on the analysis of the financial statements of the companies from the sample, for the three-year period, as well as the annual business report for the last two years, no

quantitative indicators related to environmental protection were found. Although it was an obligation, according to the Law from 2021, that all manufacturers had to declare in their financial reports at the end of the year how they had contributed to environmental protection, all respondents stated descriptively what and when they planned to do in this regard, without any quantitative indicators. This type of information could not be used for precise research, since it could be of a subjective nature and did not necessarily indicate the real activities of the company. By quantifying the descriptive data, we came up with quantitative indicators that we used for the correlation test of solvency indicators and investments in environmental protection.

**Table 4.** The relationship between solvency indicators and environmental protection in 2020. (Pearson's linear correlation coefficient)

	Statistics	Fixed Assets Covered Ratio (FACR)	Real Assets Covered Ratio (RACR)	Covered Current Assets by NWC Ratio (CCANWCR)	Covered Stock by NWC Ratio (CSNWCR)
Environmental protection in 2020.	r	/	/	/	/
	p	/	/	/	/
	N	40	40	40	40

*Source:* Authors' calculations

In Table 4, it can be seen that there was no statistically significant correlation between solvency indicators and environmental protection, given that companies were not obliged to prepare an annual report containing data on investment in environmental protection in 2020. The variable environmental protection in 2020 was a constant, so there was no data related to the coefficient and the level of significance of the correlation.

**Table 5.** Correlation between solvency indicators and environmental protection in 2021. (Pearson's linear correlation coefficient)

	Statistics	Fixed Assets Covered Ratio (FACR)	Real Assets Covered Ratio (RACR)	Covered Current Assets by NWC Ratio (CCANWCR)	Covered Stock by NWC Ratio (CSNWCR)
Environmental protection in 2021.	r	-0.106	0.063	0.180	0.184
	p	0.514	0.701	0.266	0.256
	N	40	40	40	40

*Source:* Authors' calculations

Table 5 shows that there was no statistically significant correlation between indicators of solvency and environmental protection in 2021.

**Table 6.** The relationship between solvency indicators and environmental protection in 2022 (Pearson's linear correlation coefficient)

	Statistics	Fixed Assets Covered Ratio (FACR)	Real Assets Covered Ratio (RACR)	Covered Current Assets by NWC Ratio (CCANWCR)	Covered Stock by NWC Ratio (CSNWCR)
<b>Environmental protection in 2022.</b>	r	-0.156	0.123	0.146	0.087
	p	0.337	0.448	0.369	0.593
	N	40	40	40	40

*Source:* Authors' calculations

Table 6 shows that there was no statistically significant correlation between solvency indicators and environmental protection in 2022.

The established correlation between financial indicators and environmental performance was, to a greater extent, present in research that used a qualitative environmental variable. Relying on quantitative data pointed to the problem of financial reporting of agricultural enterprises on environmental protection. Based on the research, it can be concluded that it is necessary to introduce some radical changes in the way of reporting in order to be able to reliably monitor indicators of socially responsible behavior of agricultural producers.

### Conclusions

The research indicated that in the financial reporting of Serbian agricultural companies, it was not possible to reliably establish the extent to which investments were made in environmental protection. Apart from the descriptive reports, no quantitative indicators were disclosed in the financial statements in the time period (2020-2022) in which the research was done. Quality reporting of agricultural companies should provide information to all stakeholders to what extent the companies adhere to a sustainable business concept in their operations and provide them with the opportunity to differentiate themselves from their competitors. Based on the conducted research, it can be concluded that the initial hypothesis of the research was rejected. Solvency of the agricultural sector is not correlated with investment in environmental protection. It is a consequence of inadequate financial reporting or regulations that should impose on all agricultural producers to disclose special reports for that purpose within the framework of financial reporting. Those reports should include quantitative indicators that demonstrate socially responsible behavior.

The quality of financial reporting in the Republic of Serbia is affected by insufficiently developed awareness of the importance of reporting on sustainable business and the absence of responsibility towards the public. The aforementioned problems may call into question the confidence in the accuracy and truthfulness of the reporting of the agricultural sector of the Republic of Serbia. As the purpose of their compilation is still

reflected as an obligation to submit a report at the end of the current period, and not as a presentation of the image and responsible behavior of the company, it follows that any type of analysis, based on financial indicators, can be questioned.

In order to eliminate this problem, it is first necessary to improve the regulation, to train experts on improved reporting for the preparation of reports from this area of the economic sector, and to implement greater control in the area of financial reporting by the state. It is necessary to raise awareness about the importance and responsibility of non-financial reporting to the public, considering that the business operations of a company cannot be observed in isolation in relation to the environment in which it operates. Reports should include specific data, whether the investment has contributed to the reduction of carbon dioxide emissions, the increase in recycling of waste material, the reduction of water pollution and the increase in the use of renewable energy sources. Also, it could be useful to increase in reimbursement for companies that take care of environmental protection, as well as better information about it for small agricultural legal entities. For this reason, more and more attention is drawn to the importance of socially responsible business, and within it, the importance of adequate reporting on environmental protection, which can affect the differentiation of agricultural producers.

### **Conflict of interests**

The authors declare no conflict of interest.

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