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## Article

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## FINANCIAL COMMUNICATION IN THE CONTEXT OF CORPORATE SOCIAL RESPONSIBILITY GROWTH

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### Abstract

In this paper, we studied the manner in which, at the same time with the growth of companies' corporate 23

At the same time, financial communication has benefited from the emergence of a new communication channel, namely the Internet, which has allowed an unprecedented opening of financial and accounting information towards an extremely diverse audience. Thus, social responsibility and sustainable development have become subjects extensively addressed in the specialized literature, focusing on three main directions: environmental protection, social responsibility of companies and sustainable economic development, all under the attention of a public that has grown exponentially with the help of easy access to information via the Internet.

Given the increasing access of the population to the Internet, we intend to study to what extent the concerns of corporations to increase the corporate governance index, along with the high level of R & D expenditures produce concrete effects on Biodiesel production, recycling and waste measured in kg / capita as essential components of the bio-economy.

Using a model of Autoregressive Panel Vector type (PVAR), we have identified the relations that develop between the increasing access to internet of the population and the increase of corporate governance index and level of R&D expenditures on recycling, waste and production of biodiesel in the European Union.

**Keywords:** financial communication, social responsibility, Corporate Governance Index, Internet access, recycling, waste.

**JEL Classification:** D83, M14, Q53.

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## Introduction

If one of the first axioms of communication is "Communication is inevitable" (Watzlawick, Beavin & Jackson, 2011), then certainly the axiom of financial communication could be reformulated as follows: Financial communication is mandatory, this aspect being applicable to both types of financial communication, respectively:

- regulated, standardized, financial communication, formalized with deadlines for drafting, approving, auditing and publishing that are established through norms with national and international legal value;
- discretionary financial communication, an instrument used to promote an entity, presenting the company's current and prospective concerns while ensuring an alignment of the flow of financial accounting information with elements of organizational culture that emphasize the respect for the ambient and social environment in which organizations operate, and generally about those aspects of corporate governance that are not found in standardized communication.

The relationship between regulated financial communication and discretionary financial communication is that of completeness and interference. Though in the case of regulated financial communication the two predominant features are uniformity and conformity, discretionary communication creates the appropriate framework for the manifestation of creativity and force of "seduction" and influence for and towards the stakeholders. On the other hand, the regulated financial communication has improved by taking over some good practices that were specific for discretionary financial communication that have entered the regulated sphere, thus contributing to better reporting of the entity's financial position and performances.

Communication is an ongoing process that certainly will continue and will bring into question a number of non-financial information, which until recently would not have found their place in periodic financial reports. This is due, on the one hand, to the growing concern of companies for what the concept of social responsibility has become, but also to regulatory bodies that have capitalized on the best practices in this field and have allowed the enrichment of regulated financial reporting with non-financial items located in the sphere of companies' corporate social responsibility. Although the annual financial statements report information relating to completed financial years, the literature indicates that they can, every time, constitute a credible basis for implementing "the necessary measures for the future evolution of society" (Avram, 2010, p.252), starting from the fact that "annual reports are useful sources of information because business managers usually signal what is important through reporting mechanisms" (Guthrie, Petty and Youngvanich, 2004).

Our study starts from the reality that both regulators and companies have realized the need for completing the set of financial reporting with a series of non-financial information on the background of higher corporate social responsibility of companies. Financial communication has not only an issuer, but it also has at the other end, as any act of communication, a receiver. Beneficiaries of financial information have grown in number and have diversified in the Internet era, so that the public can get informed quickly, easily and at reasonable cost on issues of high interest such as those provided by non-financial information from integrated reporting and elements of social responsibility made public by companies.

In this context, specialized literature is becoming more and more interested in "financialization of social sciences" (Birch, 2017), respectively in the increasing dominance of the finance discipline in the economy and society, while corporate governance and social responsibility are beginning to focus more on the post-investment component (Styhre, 2014). These lines of research have been largely ignored by bioeconomy. Precisely for this reason, our study aims to establish a connection between corporate governance, social responsibility and post investment process from the perspective of bioeconomy.

Thus, in our research, we intend to analyze the extent to which the social responsibility of companies succeeds in producing effects on the public in the sense of raising awareness about bio-economics and environmental issues through a case study that will investigate the impact of corporate governance on some indicators social responsibility by the means of an unrestricted VAR panel (PVAR).

The elements of novelty pursued in our study are based on financial communication approach amid the growing corporate social responsibility of companies on the background of the increasing European public access to Internet. We believe that environmental and bio-economy issues cannot be achieved only by companies and authorities without the stable partnership provided by an informed, educated and demanding public. In this context, the novelty proposed by our article refers to the transversal study that connects the fields of financial communication, bioeconomy and corporate governance, in a European context.

### **1. Non-financial information within integrated reporting**

The main direction of evolution of the regulated financial communication materialized in what the specialized literature retained under the name of integrated reporting. Integrated reporting can be an opportunity for large enterprises to implement sustainable strategies (Eccles și Krzus, 2010). As a corollary of these developments, the U.E. Directive no. 95/2014 provides important insight into the disclosure of non-financial information in the set of mandatory financial reporting for large entities and public interest groups. Integrated reporting is a new way for large corporations to communicate simultaneously the potential future reporting as well, which led to the establishment of International Integrated Reporting Council (IIRC). It can be argued that, in practice, financial communication has evolved at the same time as corporate governance of various entities, on the background of their increasing social responsibility.

Prior to the establishment of the International Integrated Reporting Council (IIRC) on the one hand, integrated reporting aimed to receive from corporations some non-financial information on human resources (employees), research and development etc. besides the financial information established according to accounting standards applied at that time. On the other hand, it was required to submit a sustainability report in which non-financial information on environmental and social responsibility was presented (Burlaud și Niculescu, 2015; IFAC International Federation of Accountants, 2012).

Through Directive 34/2013/EU and its transposition into national regulations, large-scale or public interest entities must report environmental, social and personnel information in order to achieve responsible and sustainable reporting. Directive 95/2013/ EU, amending and supplementing Directive 34/2013/EU, which led to the adoption of new regulations in

national legislation (OMFP 1802/2014 and OMFP 1938/2016) on the presentation of non-financial information and information on diversity.

Directive 95/2013/EU brings as a novelty the notion of "Non-financial Statement". In order to comply with Directive 95/2014/EU, national regulations (OMFP 1938/2016 on amending and supplementing accounting regulations) specify the need to publish non-financial information called non-financial statements. According to these regulations, financial statements are prepared by entities of public interest with an average number of at least 500 employees during the financial year and contain information on: the impact of an entity on the environment, safety and health, on pollution and greenhouse effect, as well as on how to use resources, including human resources, social issues and compliance with the human rights, environmental changes, anti-corruption and anti-bribery fight.

Environmental, Social and Governance (MSG) actions, reflected in non-financial information, are aimed at determining the company's impact both on the business environment and on the ambient.

The use of financial and non-financial information takes place in an organizational context where each entity is both a provider of information for a wide range of beneficiaries and a beneficiary of information provided by third parties (competitors, suppliers, customers, regulators and supervisors).

Sustainable Reporting Standards are focused on the reporting of some performance indicators found in GRI (2019):

- environmental indicators: recycling, waste, gas emissions, water and energy;
- social indicators: human resource, professional training, health, safety;
- governance indicators: ethics, risks, shareholders and competition.

Non-financial information presented in the integrated reporting illustrates with clear data the concerns of companies regarding their social responsibility issues. Thus, integrated reporting provides comprehensive information to the public on the bio-economy specific indicators and the governance.

## **2. Corporate governance and social responsibility of companies in promoting bioeconomy**

Since the emergence of the corporate governance concept (Baysinger și Butler, 1985) and especially after publishing of the first corporate governance code (Cadbury, 1992), the main role of corporate governance has been to direct and control the work of an organization by setting rules and of decision-making procedures within organizations. A careful analysis shows that, alongside financial decisions, companies have begun to adopt a number of non-financial decisions while increasing their social responsibility.

The issue of corporate social responsibility has become the focus of business ethics since the second half of the last century through the works of Abrams (1951), Bowen (1953) and Davis and Blomstrom (1966). These pioneering works put in the forefront the businesspeople's obligations to society in general and militated towards the harmonization of corporate objectives with the values and expectations of the public. Over time, coverage of social responsibility has grown and diversified with works by Johnson (1971), Manne and Wallich (1972), Carroll (1979) and Walton (1982). The concept of social responsibility was disputed

at that time, well known being the moment when Milton Friedman (1970) stated that "the social responsibility of a business is to increase its profit" and accused those who defended the idea of social responsibility that they "preach pure and undiluted socialism" and "undermine the foundations of a free society". Friedman's position is contested by Peter Drucker (1979), who identified the notion of *stakeholder*, i.e. the beneficiaries of social responsibility policies that are not just shareholders but all parties interested in the business, considering that a company's profitability and social responsibility are two facets of the same reality, companies evolving upward both in profitability and social responsibility.

After 2000, "corporate responsibility becomes part of the business ..." (Rochlin et al., 2005, p. 8), social and environmental objectives being integrated in the strategies of sustainable development of companies (Van Marrewijk, 2003) while their performance is analyzed on three distinct levels, respectively from economic-financial, social and environmental point of view (Steurer et al, 2005). Therefore, a balanced development will take into account the environment, human resources and financial equilibrium (Lepineux et al., 2010), social responsibility being positioned in the "heart of the organization" (Dey and Sircar, 2012).

The European Commission (2001) defines corporate social responsibility as "a concept by which companies integrate social and environmental interests voluntarily into their economic operations and interaction with stakeholders". Among social activities that are considered socially responsible can be mentioned the charity contributions to national or local organizations such as fundraising, donations and gifts, rehabilitation of derelict land and creation of new jobs, or helping disadvantaged communities. Social responsibility and sustainable development are concepts extensively addressed in the literature due to the interdependence of the two concepts. In White's view, sustainable development "embraces the three pillars: environmental protection, social responsibility and economic development" (White, 2009). Corporate Social Responsibility (CSR) has emerged as a business approach to enhancing the social and environmental impact of the company's activities.

Over the past fifty years, the oil industry has been classified as a monopolist, receiving colossal profits at times when oil was extracted in insufficient quantities for consumption, as well as malignant to the environment due to accidents with a special impact on the environment and human health. In short, the oil industry is controversial due to the immoral business with adverse effects on the social environment and natural environment.

Since the 1980s, programs of ethics and social responsibility implemented by oil companies have included a greater number of tasks, including environmental sustainability and the protection of human rights. Oil companies play a major role in increasing the number of environmental problems because of the way in which the oil is extracted and used, such as global warming, deterioration of water quality and air quality in the vicinity of refineries. In response to widespread negative publicity and stakeholders' sensitivity to ethical, environmental and moral issues, oil companies have adopted the concept of Corporate Social Responsibility (CSR) in order to have a good reputation and acquire the legitimacy that is required for their main activity.

The oil sector was among the first industries to successfully adopt the concept of CSR. Multinational oil companies are more vulnerable to public criticism than companies in other economic sectors because the negative effects of their activity can easily be traced, and international reputation is vulnerable to media attacks.

Following the implementation of programs to increase social responsibility, the oil companies do not get a tangible financial benefit, but gain credibility and the respect of the public interested in environment and bio-economy policies.

The founder of bioeconomy, Nicholas Georgescu Roegen, author of *The Entropy Law and the Economic Process* (Georgescu Roegen, 1971), explained the relation between scientific and technological progress and environmental issues, thus opening up the path to sustainable development. For this, companies need to consider the impact of their own decisions on the ambient and social environment (Dabija and Băbuț, 2013). A competitive and sustainable bioeconomy (McCormick and Kautto, 2013) cannot be achieved without the support of an important actor like the public. Our research starts from the reality that, in the Internet age, the public can be informed in real time about companies concerns regarding environmental protection and bio-economy in general, being expected a feed-back materialized in a responsible, adequate and knowledgeable behavior.

### 3. Case study: the impact of the Corporate Governance Index on social responsibility indicators

#### 3.1. Research methodology

In our research, we used an unrestricted VAR panel (PVAR). The VAR methodology is based on the most flexible and comprehensive models for multivariate time series analysis. The reason for choosing VAR Panel methodology is given by the versatility of this research tool and especially by its recommendation for cross-section time series, as is the case with our research. Thus, Canova and Ciccarelli (2013) and Dees and Gurtler (2014) have successfully used Panel VAR methodology in cross-section time series analysis. Due to the multiple interdependencies between the model variables, the VAR methodology is very useful in observing the influences between the variables through the pulse-response functions. One of the most useful methods of the VAR methodology is the in-depth analysis of the implications of different public policies. At the same time, we relied on the VAR methodology as the variables used influence each other, thus there are two-way influences of these variables.

Therefore, given the multitude of uses of the VAR methodology, our case study is based on a pan-European approach at EU-27 level (without Croatia due to a lack of data for the entire period under review). The selected data was modeled in the E-Views 9 econometric software. However, standard testing for the VAR methodology, as done in our study, can be modeled in Stata or R, thus obtaining similar results. Also, to ensure that the VAR methodology is complete, we have performed standard panel testing. Consequently, the optimal number of selected lags is 2, so the effects of the growth with a standard deviation of some variables are effective after two years (our data series being annual data).

The second test system conducted was meant to verify the VAR stability state, which means testing and accepting the stability of the differential equations system. Because VAR stability is ensured, as can be seen in table no. 1, we can proceed to the subsequent tests.

**Table no. 1. VAR stability test**

<b>Roots of Characteristic Polynomial</b>	
<b>Lag specification: 1 2</b>	
<b>Root</b>	<b>Modulus</b>
0.687	0.687
0.607	0.607
-0.240 - 0.420i	0.484
-0.240 + 0.420i	0.484
0.020 - 0.467i	0.467
0.020 + 0.467i	0.467
-0.351 - 0.186i	0.398
-0.351 + 0.186i	0.398
-0.396	0.396
0.295	0.295
0.053 - 0.269i	0.274
0.053 + 0.269i	0.274

*Notes: No root lies outside the unit circle; VAR satisfies the stability condition*

The third test is the Portmanteau autocorrelation test performed to test the lack of serial correlation in the residues of a VAR (p). As we see in the table no. 2 and in table no. 3, we do not have autocorrelation; therefore, we can continue with VAR testing.

**Table no. 2. The Portmanteau autocorrelation test**

<b>VAR Residual Portmanteau Tests for Autocorrelations</b>					
<b>Lags</b>	<b>Q-Stat</b>	<b>Prob.</b>	<b>Adj Q-Stat</b>	<b>Prob.</b>	<b>df</b>
1	18.68335	NA*	18.76087	NA*	NA*
2	52.03251	NA*	52.38794	NA*	NA*
3	145.1998	0.0000	146.7247	0.0000	36
4	228.5489	0.0000	231.4746	0.0000	72

*Note: The test is valid only for lags larger than the VAR lag order*

**Table no. 3. The LM autocorrelation test**

<b>VAR Residual Serial Correlation LM Tests</b>		
<b>Lags</b>	<b>LM-Stat</b>	<b>Prob</b>
1	91.07905	0.0000
2	111.0442	0.0000
3	159.8459	0.0000
4	140.6838	0.0000

*Note: Probs from chi-square with 36 df*

The fourth test is the heteroscedasticity test, which is passed as can be seen in table no. 4, followed by decomposition of variance.



Table no. 4. Heteroskedasticity test

VAR Residual Heteroskedasticity Tests: No Cross Terms (only levels and squares)		
Joint test:		
Chi-sq	df	Prob.
1109.378	504	0.0000

### 3.2. Choice of variables

To measure companies' concern for social responsibility, promoting business ethics, environmental care and fair communication of financial and non-financial information, we have chosen the Corporate Governance Index (CGI) that provides a comprehensive picture of all these aspects through the way in which this composite index is drafted. Specialized literature has used CGI to illustrate the relationship between the level reached by this indicator and organizational performance, studies confirming a strong relationship between the growth of the corporate governance index and the performances of the investigated entities (Klapper and Love, 2002; Drobetz et al., 2004).

In our study, we try to find out whether a better corporate governance, guided by increased social responsibility, manages not only to improve a company's performance, but also, by example, to enhance public concern for environmental issues such as increase of recycling or reduction of waste per capita, as more and more investment is being drawn into development and research expenditures and the access to Internet has significantly increased. Undoubtedly, with the advent of Internet, the public's interest in communication in general and in financial communication in particular increased. If until recently the beneficiaries of the annual financial statements were part of precisely defined segment of the population – investors, regulators and supervisors, employees and trade unions, in the Internet era, financial and non-financial information is accessed by a wide range of users. If only 0.04% of the world's population had access to the Internet in 1995, we are now approaching 50% globally, and, at European level, the internet-connected population is approaching 90%.

In terms of Romanian population's access to Internet, it is noted that although it was on the last position in the European Union in 2007, it succeeded in 2014 to overtake Bulgaria and to approach Hungary and Poland which, in 2007, had recorded a level almost double to Romania.

The increasing level of access to the Internet brings along a problem related to the level of financial education of the public, necessary for the correct understanding of the messages that financial information and non-financial information brings, which requires sustained involvement on behalf of both professional accountancy bodies and academia (Avram, M. and Avram, V., 2012). Data used for the model analysis were taken from Eurostat as well as from the European Commission's website, such as the governance index, BIO (biodiesel production), I-access (access for individuals over the past 3 months), Research and Development expenditures, recycling (kg of recycled materials per capita), waste (kg of waste per capita) and presented in table no. 5.

**Table no. 5. Description of variables**

Variable Code	Name	Short Description
<b>CGI</b>	Corporate Governance Index	This index measures the perception of EU citizens about the quality of governance in the regions where they live. However, model data has been analyzed nationally, without taking into account the NUTS 2 regional level.
<b>BIO</b>	Biofuel production capacities	The indicator measures in tones the total amount of biodiesel produced annually.
<b>Iaccess</b>	Internet access at least once every 3 months	Share of total people who accessed the Internet at least once every three months (%).
<b>R&amp;D</b>	Research and Development expenditures	The indicator refers to the share of total R & D expenditures in GDP.
<b>Recycling</b>	Recycled materials per capita	The indicator takes into account the average number of kg of recycled material per capita.
<b>Waste</b>	Waste generated per capita	The indicator takes into account the average number of Kg of waste generated per capita.

*Source: Authors' own processing*

Our study is a transversal one in which we intend to analyze post-investment developments from the perspective of bio-economy and corporate governance. In this context, the role of financial communication needs to be reported to internet access by the means of which interested parties can track the bio-economy's quantified component from the point of view of innovation, recycling, biofuels and generated waste. These variables are commonly found in the literature, appreciated as being standard (Ragauskas et al., 2006; Birch and Tyfield, 2013; McCormick and Kautto, 2013; Allen et al., 2015). At the same time, measuring corporate governance by the governance index is an established approach in the specialized literature (Drobtz, Schillhofer and Zimmermann, 2004; Love and Klapper, 2004; Durnev and Kim, 2005).

The main motivation for selecting these variables is to focus on how the public is informed through corporate governance principles and corporate CSR strategies; therefore access to the Internet is extremely important. Both recycled materials and waste are part of the assessment of a circular and bio economy (McCormick and Kautto, 2013; Adamowicz, 2017). In addition, several authors studied bioeconomics and biofuels (Johnson, 2017), (Tyndall, Berg and Colletti, 2011) and showed the importance of biofuels and stimulating their production as public policy, corroborated with high energy security through bioenergy, therefore assuring a solid basis for the development of bioeconomy. Of course, we have taken into account research and development spending as R & D is a *sine qua non* condition for achieving sustainability in the bioeconomy and beyond.

Taking into consideration the above mentioned literature and the general economic theory, three research hypotheses were formulated

- H1 – Corporate Governance Index has a positive influence on biodiesel production capacities, recycling of materials and generated waste.
- H2 – Increasing public access to information resources promoted by the Internet has a positive influence on biodiesel production, recycling and generated waste.

- H3 – Research and development expenditures have a positive influence on some bioeconomy indicators such as: the quantity of biodiesel, the quantity of recycled waste and the quantity of waste.

### 3.3. Econometric model

In our case study we start from the Cobb-Douglas production function, modified by Koke (2002), which considers production to be determined by input factors. The proportional relationship between input data (Internet access, corporate governance and R & D) and production factors (waste, recycled materials, biofuels) is reflected in productivity. This factor shows how much the input into production is transformed, being an R & D function because it shows the efficiency with which R & D works and how corporate governance and CSR principles are accessible to households and how waste and recycling are affected.

The model used in the research is an unrestricted VAR panel (PVAR) because the variables used have been integrated into different degrees. This approach has been recommended by Harvey since 1990, being aware of the problems raised by the use of variables I (0) and I (1) in the same model.

$$\begin{aligned}
 CGI_{1,t} &= \alpha_2 + \Delta \sum_{j=1}^j \beta_{1,j} CGI_{1,t-j} + \Delta \sum_{j=1}^j \beta_{1,j} Bio_{1,t-j} + \Delta \sum_{j=1}^j \delta_{1,j} Iaccess_{1,t-j} \\
 &+ \Delta \sum_{k=1}^k \varepsilon_{1,j} RD_{1,t-j} + \Delta \sum_{k=1}^k \epsilon_{1,j} Recycle_{1,t-j} + \Delta \sum_{k=1}^k \theta_{1,j} Waste_{1,t-j} \\
 &+ u1_t
 \end{aligned} \tag{1}$$

$$\begin{aligned}
 RD_{1,t} &= \alpha_2 + \Delta \sum_{j=1}^j \beta_{1,j} RD_{1,t-j} + \Delta \sum_{j=1}^j \beta_{1,j} Bio_{1,t-j} + \Delta \sum_{j=1}^j \delta_{1,j} Iaccess_{1,t-j} \\
 &+ \Delta \sum_{k=1}^k \varepsilon_{1,j} CGI_{1,t-j} + \Delta \sum_{k=1}^k \epsilon_{1,j} Recycle_{1,t-j} + \Delta \sum_{k=1}^k \theta_{1,j} Waste_{1,t-j} \\
 &+ u1_t
 \end{aligned} \tag{2}$$

Where:

- CGI = Corporate Governance Index;
- BIO = Biodiesel;
- Iaccess = Internet access for at last 3 months;
- R&D= Research and Development expenditures;
- Recycle=Kg of recycled materials per capita;
- Waste= Kg of waste materials per capita.

#### **4. Analysis of results**

- **In terms of biodiesel variable**

The Biodiesel variable offers a contradictory response in the sense that internet access has a positive and growing influence, while the corporate governance index has a neutral influence in the first part of the interval, after which the impulse ceases and R&D expenditures have a negative influence.

Hypothesis H1 is partially confirmed, the impact of Governance on biodiesel production is initially positive, and the impact will become negative from the second year. Thus, corporate governance will move towards other directions of development rather than biodiesel production.

Hypothesis H2 is confirmed in the case of the connection between biodiesel and Internet access, showing that internet access has a positive impact on the production of biodiesel. We believe that better information for the public will lead to an increase in the quantity of biodiesel consumed and implicitly to an increase of production. Thus, promoting the ideas of social responsibility and corporate governance is reflected in the more responsible behavior of informed consumers.

Hypothesis H3 is not confirmed in the sense that the impact of R&D expenditures is negative on the production of biodiesel. Thus, R&D spending is directed towards other research areas, such as hybrid systems or electric vehicles, to the detriment of internal combustion engines that require biodiesel.

In the case of variance decomposition, it can be seen in table no. 6 that the production of biodiesel is influenced, starting with the third year, in proportion of 11.6% by the development and research expenditures, in proportion of 8.2% by the waste per capita and in proportion of 1.5% by the Internet access.

**Table no. 6. Biodiesel variance decomposition**

<b>Period</b>	<b>S.E.</b>	<b>BIO</b>	<b>CGI</b>	<b>Recycle</b>	<b>Waste</b>	<b>Iaccess</b>	<b>Rd</b>
1	2.491	100.00	0.000	0.000	0.000	0.000	0.000
2	2.734	83.02	0.014	0.002	6.797	0.016	10.14
3	2.847	77.54	0.140	0.950	8.212	1.521	11.62
4	2.871	76.31	0.362	0.950	8.148	2.378	11.84
5	2.879	75.89	0.385	1.118	8.250	2.560	11.79
6	2.883	75.72	0.423	1.132	8.247	2.668	11.80

- **In terms of recycling**

The impact of CGI on the amount of waste recycled by households, measured in kg per capita, is stable, confirming Hypothesis H1, which implies that corporate governance makes available to the public a model to be followed by households in terms of care for the environment and appreciation of policies targeted to limit waste and encourage responsible consumption.

Hypothesis H2 confirms that the impact of Internet access on recycling is positive, strong and long lasting, which highlights the educational function of Internet access and, implicitly, of access to financial and non-financial information that companies disseminate.

Hypothesis H3 is confirmed by our study and identifies a positive, strong and on ascending trend between recycling and research & development expenditures, which confirm the practical direction of R & D spending to address concrete challenges such as recycling.

In the case of variance decomposition, it can be seen in table no. 7 that recycling is influenced, from the third year, in proportion of 3.2% by development & research expenditures, in proportion of 2.4% by waste per capita and in proportion of 1,5% by Internet access.

**Table no. 7. Recycling variance decomposition**

Period	S.E.	BIO	CGI	Recycle	Waste	Iaccess	Rd
1	2.49	0.300	1.55	98.14	0.00	0.00	0.00
2	2.73	0.392	2.09	94.52	1.06	0.84	1.08
3	2.84	0.377	2.25	90.25	2.40	1.46	3.23
4	2.87	0.467	2.28	89.99	2.42	1.54	3.28
5	2.87	0.484	2.30	89.87	2.48	1.54	3.31
6	2.88	0.493	2.30	89.80	2.50	1.54	3.34

- **In terms of waste**

Regarding waste, Hypothesis H1 is not confirmed, while Hypothesis H2 and Hypothesis H3 are confirmed after a lag of 2-3 years needed to activate the educational function of the Internet, namely for research and development activities to produce tangible effects materialized in reducing the amount of waste per capita.

The CGI's influence on the amount of waste per capita shows that an increase in the corporate governance index at the EU level will also lead to an increase in the amount of waste per capita measured in kg, which proves that eventually good corporate governance leads to economic growth that is accompanied by an increase in production and under caeterisparibus conditions by an increase in the amount of waste. The increase in development and research expenditures is followed in the first phase by an increase in the amount of waste, but after a 3 years lag the shock reaps, which shows that between the moment when development and research spending occurs and the moment when they become effective a process of implementing new projects will take place, an absolutely mandatory phase.

Under these circumstances, we can assert that an increase in development and research spending will have a positive impact on productivity, obviously on production, and indirectly will lead to an increase in waste.

The increase of access to the Internet leads to a rapid increase in waste for a short period of time but afterwards the shock reaps, which demonstrates that the educational function of the Internet does not occur on simple access but it intervenes as times goes by, probably under the influence of educational factors that our study did not consider.

In the case of variance decomposition, it can be seen in table no. 8 that the waste is influenced, starting with the third year, in proportion of 5.05% by biodiesel, 2.3% by corporate governance index and 0.7% by research and development expenditures.

**Table no. 8. Waste variance decomposition**

Period	S.E.	BIO	CGI	Recycle	Waste	Iaccess	Rd
1	2.49	5.18	2.35	0.37	92.09	0.00	0.00
2	2.73	5.10	2.29	0.40	91.91	0.11	0.16
3	2.84	5.05	2.30	0.76	91.02	0.14	0.70
4	2.87	5.03	2.31	0.83	90.75	0.20	0.85
5	2.87	5.03	2.35	0.83	90.69	0.22	0.85
6	2.88	5.03	2.35	0.83	90.69	0.22	0.85

### **Conclusions**

Specialized literature has confirmed through a multitude of studies that an increase in the corporate governance index leads to an increase in organizational performance. Our study has proposed an analysis of the impact of CGI on variables such as: biodiesel, recycling and waste. As H1 research hypothesis has only partially been confirmed, corporate governance has primarily focused on its own performances, and environmental and bio-economics issues are still not receiving due attention. Practically, our views on the "financialization of social sciences" (Birch, 2017) and the orientation towards the post-investment component (Styhre, 2014) are confirmed by our study and strengthen the strong link between corporate governance, corporate social responsibility of companies and the post- investment process from the perspective of bio-economy.

Our study is thus useful both for those responsible for governance and for supervisory and regulatory authorities. If the company's performance targets were the priority for the period 2007-2017, with the widespread application of the provisions of Directive 2014/95 / EU, for the current and prospective period, are expected the results of the increase in corporate social responsibility which confirms the H1 research hypothesis.

R&D spending does not have a positive influence on the amount of biodiesel, which indicates that other development and research projects are also targeted. Thus, R & D spending will rather aim for a vertical rather than horizontal expansion of the biodiesel industry. The study highlights a strong connection between recycling and R&D expenditures as well as the fact that an increase in development and research expenditures is followed in the first phase by an increase in the amount of waste after which the amount of waste begins to decrease, being necessary a period of assimilation of new technologies. In terms of research and development activity, coherent public policies are needed to turn them into the true engine of sustainable economic growth and promotion of bioeconomy. Although we are approaching the time horizon of Europe 2020, we are still very far from the 3% allocated to research and development activity.

Truly remarkable is the internet access variable, which has a positive and growing influence on both the quantity of biodiesel and recycling. Increased access to the Internet leads to a rapid increase in waste, after which the amount of waste begins to decline, proving that the educational function of the Internet can be acknowledged after a certain period of time. Confirming Hypothesis H3 on the educational character of the internet should be supported by public policies promoting ethical values in cyberspace to avoid any form of manipulation of public options. At the same time, in terms of access to the Internet, we can see that by increasing the access of the general public to the Internet, companies can make their corporate governance directions known directly to them and disseminate non-financial information more easily. Thus, the social responsibility code and the public perception of corporate

governance can ensure the growth of recycling or the development of technologies that ensure the development and sustainability of the bioeconomy. Although biodiesel is a greener alternative to fossil fuels, R & D spending will stimulate the emergence of not only complementary but substitute technologies for internal combustion, thus ensuring the development of bioeconomy on sustainable bases.

The main limitation of our study is the bioeconomy elements investigated, and in future studies we intend to broaden the analysis by studying variables such as renewable energy and green procurement. Another limit is the pan-European analysis that does not allow the identification of the specific problems of each area of the European continent, the differences between Western Europe and Central and Eastern Europe being known. In this context, it is possible that the intensity of some variables' impact will vary between different parts of Europe.

For the next period, the provisions of Directive 2014/95 / EU are expected to contribute to a better and more accurate information of the public in general and to increasing the concern of corporations to produce and communicate non-financial high-interest information to an audience for whom the Internet access can also mean a connection to existing national and international concerns to ensure healthy living conditions, a clean environment and a sustainable economy.

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